

**REPORTING FOR DUTY DURING DISEASE OUTBREAKS: THE VIEWS OF  
EMS PROVIDERS**

by

Mahmoud T. Alwidyan

A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Disaster Science and Management

Summer 2017

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EMS PROVIDERS**

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Mahmoud T. Alwidyan

Approved: \_\_\_\_\_  
Maria P. Aristigueta, D.P.A.  
Director of the School of Public Policy and Administration

Approved: \_\_\_\_\_  
George H. Watson, Ph.D.  
Dean of the College of Art and Sciences

Approved: \_\_\_\_\_  
Ann L. Ardis, Ph.D.  
Senior Vice Provost for Graduate and Professional Education

I certify that I have read this dissertation and that in my opinion it meets the academic and professional standard required by the University as a dissertation for the degree of Doctor of Philosophy.

Signed:

---

Joseph E. Trainor, Ph.D.  
Professor in charge of dissertation

I certify that I have read this dissertation and that in my opinion it meets the academic and professional standard required by the University as a dissertation for the degree of Doctor of Philosophy.

Signed:

---

Sue McNeil, Ph.D.  
Member of dissertation committee

I certify that I have read this dissertation and that in my opinion it meets the academic and professional standard required by the University as a dissertation for the degree of Doctor of Philosophy.

Signed:

---

Bethany Hall-Long, Ph.D.  
Member of dissertation committee

I certify that I have read this dissertation and that in my opinion it meets the academic and professional standard required by the University as a dissertation for the degree of Doctor of Philosophy.

Signed:

---

Richard Bissell, Ph.D.  
Member of dissertation committee

## **ACKNOWLEDGMENTS**

It would not have been possible to write this doctoral dissertation without the help and support of the kind people around me, to only some of whom it is possible to give particular mention here.

I am truly indebted to my committee. I am grateful to Dr. Joseph Trainor, my committee chair, for his guidance, encouragement, and patience over the last year and a half. You provided me with a vital research and writing guidance to develop my skills and complete this work. Thank you for the experience and support that made it possible for me to work in a topic that was of great interest to me. It was a pleasure working with you.

I am hugely indebted to Dr. Sue McNeil, my academic advisor who provided an invaluable guidance and support from day one of my doctoral study. You were of great help in guiding me developing my study plan, selecting the appropriate classes, and developing and defending my dissertation proposal. Thank you for being part of my committee.

I would like to express my gratitude to Dr. Bethany Hall-Long for serving on my committee. You provided me with a great help in selecting my research topic. Your help in accessing the EMS systems and collecting data from the State of Delaware was imperative to my completion of this degree. Despite the time constraint of the many work hats you wear, you never missed to reply to my emails or messages. I really appreciate that.

I am grateful to Dr. Rick Bissell for being part of this project. As a former advisor during my master's degree and a committee member in this work, you provided me with guidance, support and suggestions to pursue my academic adventures. Your very specific inputs on this topic as an expert in both disaster science and epidemiology provided invaluable values to this work. Thank you, Dr. Bissell. The council of these four individuals in my committee was imperative to have this work completed.

While not on my committee, I am extremely grateful to Dr. Joanne Nigg whom I work with in a project that broadened my understanding and experience in disaster research. Dr. Nigg was always following up with me regarding my dissertation progress and provided support and help when needed.

I would like to thank the Office of EMS in the State of Delaware that facilitated conducting the interviews and the survey. Special thanks go to Dennis Godek from Christiana Fire and Allen Barnes from Sussex County EMS who provided great help in conducting the interviews. Additionally, I would like to thank my student colleague and EMS administrator Jonathan Bratt for disseminating the survey to Maryland EMS. Special thanks to all EMTs and paramedics who participated in this study.

The staff and faculty of the Disaster Research Center (DRC) made my academic adventures a truly gratifying experience. They gave me a home and supported me with every possible method. I would like to thank my fellow graduate students who helped providing an exciting and challenging environment at the DRC. I cannot name everyone, but I am particularly appreciative of the friendship I developed with the doctoral students and future colleagues Valerie, Cynthia, Nuno, and Sam. I

am especially thankful for Valerie who proofread my dissertation and provided me with comments that improved this work.

I am grateful to Jordan University of Science and Technology (JUST) for its financial support and giving me three years of dedicated time to pursue my doctoral studies. By providing me with a tenure track position, it also puts me at ease and comfort of not looking for jobs following this degree.

I would like to thank my wife and kids for putting up with an absentee husband and father during this process. I must thank my lovely and beautiful wife, Rabab. She has been my encouragement and reason for much of this work. She took care of the household over the past three years so I can focus on my study and pursue my goals. Without you none of this would ever have been possible. Words are inadequate to express the level of sheer gratitude I have for the sacrifices you made to enable this work to come true. Thank you, Rabab. And now, my kids, Yaqeen, Yamin, Haneen, Yusef, and the little Mashour. Although without you my work would have been done much faster, it is true that the doctoral journey would have been really tasteless without you. I always worked really hard and tried to do my best, in part because I wanted to be a role model for you, and a dad that you want to be proud of. I'm proud that you learned English fast and became able to proofread some of my work.

As an international student studying abroad, I miss my family and friends back in Jordan. I would like to thank my brothers and sisters who provided me with a great support and encouragement in my academic endeavors. I am really grateful and fortunate to have grown up in a loving and humble family. Thank you for the priceless support.

The last word goes to my parents. They supported me to study overseas and accomplish my study endeavor. They instilled within me my work ethics, impressed upon me early the value of effort and a love of learning, and provided never-ending encouragement. They both are constant examples of what parents should be. Sadly, to know that my father passed away in the middle of my doctoral journey. There is one thing that changed when you left...everything. There are not enough words I can say to describe how important you were to me. You were a man like no other. I miss you Dad. I dedicate this work to my mother who is counting days to my return and to the soul of my father.

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## **ABSTRACT**

In the last century, our globe has been affected by a number of notable pandemics. The Spanish flu pandemic of 1918-1919 infected one third of the world's population and killed an astonishing 50 million people (Fineberg, 2014). Since this pandemic, the deadliest in recorded history, several other disease outbreaks have swept through the world, including "Swine Flu" in 2009, Severe Acute Respiratory Syndrome (SARS) in 2003, and Ebola in early 2014. The number of people who have died of flu in the last century exceeds anything else in history (Bunting, 2008). Among those who became ill or lost their lives during these more recent disease outbreaks were a disproportionate number of healthcare providers (Singer et al., 2003).

An essential component of the healthcare system that is expected to be in the frontlines during public health emergencies is the emergency medical services (EMS). Yet, this system is exceptionally understudied when it comes to working during disasters and public health emergencies. This study, therefore, assesses EMS providers' views about working during the events such as disease outbreaks and explores the factors that may influence their willingness to continue working during such situations.

This study uses a mixed methods approach, which was implemented in two phases. In the first phase, interviews were conducted to assess the views of EMS providers about working during disease outbreaks, and the factors that may influence their decision-making related to whether to report to work. ATLAS.ti was used during analysis to code data and develop themes of study. In the second phase, an online

survey was developed and disseminated using the Qualtrics software to assess the extent to which EMS providers are willing to work during disease outbreaks. The survey is also used to assess how the factors that were explored in the first phase could influence the decision-making process on reporting for duty. SPSS was used to analyze data, create descriptive statistics, and assess for significance.

This project presents interesting findings. The interviews show that while participants are “excited” to work during natural disasters, they are a little concerned about working during disease outbreaks. Yet, their concerns may not prevent them from fulfilling their work obligations. Family safety, training, resources, and confidence in their employer are among the most important factors viewed to influence the decision to come to work during disease outbreaks. The interviews showed high confidence in the employer to provide training, resources, and other measures to keep the providers and their families safe. It seems that the influencing factors have less of potential effects than expected and reported in prior research studies. The survey supported the interview findings in some ways, but contradicted them in others.

This study provides the base upon which EMS, public health, and emergency management agencies can formulate actions that emerged from the views of EMS providers concerning work during disasters and public health emergencies. They can obtain insights from the findings of this project to develop their plans and implement strategies that enhance the safety in the workplace that, in turn, bolster the dedication and willingness of EMS providers to stay on to work during such conditions.

## Chapter 1

### **INTRODUCTION**

In the last century, our globe has been affected by a number of notable pandemics. The 1918 “Spanish flu” pandemic for example claimed the life of about 50 million, making it the deadliest pandemic in recorded history (Fineberg, 2014). The 2003 Severe Acute Respiratory Syndrome (SARS) and the 2009 influenza A (H1N1) pandemic or the so called “Swine Flu”, are more recent examples of disease outbreaks that affected the global population (Ho, Wang, & Liu, 2010). The extraordinary outbreak of Ebola in early 2014, in the West African countries, reinforced the dangerous potential for pandemics. At its conclusion, the World Health Organization (WHO) suggested a total of 28,616 confirmed cases and 11,310 deaths occurred from Ebola outbreak (WHO, 2016). It is important to note that, while death tolls are relatively concrete and easy to report, the countries affected directly by Ebola suffered huge losses of agricultural production and other kinds of economic activity, as well as closing down schools and other important social functions for a year or more. This is only a current demonstration of how the “disaster” of an epidemic is not only measurable in terms of the number of ill or dead, but also the huge long-term consequences in the social and economic aspects of society.

According to Bunting (2008), “[i]n the past century, more people have died of flu than anything else in history” (p. 592). Moreover, it is expected that an influenza pandemic with the virulence similar to the 1918 Spanish flu could result in about 1.9

million deaths and 10 million hospitalizations in the United States in the absence of appropriate interventions (U.S. Department of Health and Human Services, 2005).

The emergence of a potentially virulent infectious disease like those just mentioned, could easily devastate the healthcare system in the affected region. This is the case because the healthcare system in the United States generally works near its full capacity during normal conditions, and can be easily and rapidly overwhelmed by disasters (Bissell & Kirsch, 2013). Healthcare workers who are an essential component of the health system need to be competent and willing to respond to such conditions. It is generally recognized that healthcare workers are willing to prioritize patient needs over their personal needs, interests, and safety, especially during disasters (Chaffee, 2009). Unlike natural disasters, disease outbreaks, however, have the potential to alter the willingness of healthcare workers to report for duty for a variety of reasons (Devnani, 2012). Many research studies have assessed the ability and willingness of healthcare workers reporting for duty to different kinds of disasters generally and public health emergencies in particular (Damery et al., 2010; Devnani, 2012; Dimaggio, Markenson, T Loo, & Redlener, 2005; Draper et al., 2008; Kohloff et al., 2012; Qureshi et al., 2005; Trainor & Barsky, 2011). However, one component of the health care system is exceptionally understudied in this field, the Emergency Medical Services (EMS). In the following section, I provide a discussion about the EMS system, and how it is similar or different from the overall healthcare system.

During epidemic disasters, EMS is an invaluable asset to the healthcare system as it is often the portal to the larger healthcare system (Maguire, Dean, Bissell, Walz, & Bumbak, 2007). EMS providers show a leadership in disaster management that include preparedness, communication, urgent medical care, transport, and hazardous

material response (Catlett, Jenkins, & Millin, 2011). This is because they receive a considerable amount of training on the incident command system (ICS), and are capable of working under the national incident management system (NIMS) (Chapleau, Burba, Pons, & David, 2009). EMS providers are trained and experienced in triage, which will be very important during disaster situations that require more healthcare services than can be provided in a reasonable time. EMS providers are also trained to work under stressful situations with limited resources and time constraints. Moreover, EMS providers can also help in other roles in mitigating disease outbreak by, for instance, distributing and administering vaccines and antiviral medications, as well as providing community education during such events (Maguire et al., 2007).

EMS shares many similarities with the overall healthcare system yet it has also many differences, which makes it a distinct system. This system needs to have its own research to address its unique aspects when it comes to willingness to report for duty during an outbreak of infectious diseases. Therefore, the objectives of this research are to explore EMS providers' views about working during the events of disease outbreaks, determine what factors may influence their willingness to continue working during such situations, and determine what measures could be used to enhance their willingness to keep working in times of disasters and public health emergencies. The information gained from this study has the potential to be very beneficial to a wide spectrum of stakeholders. Frontline EMS providers on whom this study is focused could benefit from the outcomes. The factors that affect EMS providers' willingness to report for duty are studied in-depth in an attempt to identify some beneficial recommendations and strategies to address these factors. Public health officials, emergency managers, and EMS administrators could obtain significant insights when

it comes to planning and responding to an outbreak of an infectious disease. They need to know their potential workforce, the expected number of personnel who may, or may not, show up, and the factors that led to absenteeism. Next, the background section presents a discussion about healthcare system works during disasters and public health emergencies, and how the EMS system is similar or different from the overall healthcare system.

## 1.1 Background

This section provides an overview about infectious diseases, healthcare system preparedness for emerging infectious diseases, and the EMS system. Also, in order to develop this study, it is important to establish working definitions for a number of key terms including those used in public health:

- For instance, a *disease outbreak* is defined as “the occurrence of cases of disease in excess of what would normally be expected in a defined community, geographical area or season. An outbreak may occur in a restricted geographical area, or may extend over several countries” (WHO, 2015a).
- A close term is *emerging infections*, which “are those that are new to a population or geographical region, or have increased rapidly” (Rebmann, 2014, p. 2).
- There are three “emic” concepts used in public health which are *endemic*, *epidemic*, and *pandemic*. When a disease chronically exists in a particular area like malaria in some African countries, this is called *endemic*. *Epidemic* on the other hand occurs when a disease or a condition outbreak to include a number of cases that are more than

expected, and can be in a jurisdiction as small as a single school or as big as a whole country, whereas a *pandemic* occurs when an epidemic crosses many countries' borders and spreads and affects significant portions of the world (Bissell & Kirsch, 2013). While they are different by definition, disease outbreaks, pandemics, and epidemics are often used interchangeably in general literature to provide the same meaning. For the purpose of this study, these concepts are also used interchangeably.

- Lastly, disease *pathogenicity* and *virulence* are also important terms. According to Thomas and Elkinton (2004), while pathogenicity means “the number of dead individuals relative to the number exposed to the pathogen”, virulence means “the number of dead individuals relative to the number infected”. Again, while these are conceptually different, they are likely to be used interchangeably in research studies and by healthcare providers. These concepts are used very often in public health and are important to clarify for better understanding of the material to follow.

### **1.1.1 Healthcare System Preparedness to Emerging Infectious Diseases**

The healthcare system is one of the main assets during emergencies and disasters. It is crucial that this system keeps functioning during disasters to help those in need by providing them with the appropriate medical care. While response to pandemics has dramatically improved over the last ten decades, it is still challenging due to limited scientific understanding and limited technical capacity (Fineberg, 2014). Early detection and response are the current actions taken for pandemic

preparedness. Nevertheless, vaccination is the best solution for prevention of infections from emerging and reaching a human-being (McCloskey, Dar, Zumla, & Heymann, 2014). Given that the next pandemic strain cannot be predicted, no vaccine can be developed and stockpiled in advance. Rather, vaccines can be developed with a limited quantity following outbreaks with some degree of uncertainty regarding their efficacy (Schoch-Spana et al., 2006). Depending on the disease or the agent, vaccination could be an effective measure to control the outbreak of an infectious disease. Some diseases like Ebola and SARS currently have no available vaccines, and some others may have vaccines with limited effectiveness or availability (Rebmann, 2014).

Healthcare providers have specialized skills that are hugely needed in case of disease outbreaks. They also have a social contract with the society in which they serve. Therefore, it is assumed by the public that healthcare workers have an ethical duty to work, which is based on the code of conduct that governs their practice, even if they risk themselves and their families (Damery et al., 2010). The outbreak of SARS in Canada 2003 was an obvious and unique case study to examine the implication of this assumption. During this outbreak, many healthcare providers were infected with SARS because of their work, some of them transmitted the infection to their families, and two of them died (Singer et al., 2003). According to Smith, Burkle, Holman, Dunlop, and Archer (2009), 21% of victims of the SARS outbreak were healthcare workers. Moreover, approximately half of the EMS providers in Toronto, Canada, were exposed to the disease and consequently quarantined at home or work (Maguire et al., 2007; Silverman, Simor, & Loutfy, 2004).

The recent Ebola outbreak that began in 2014 has shown high infection and mortality rates among healthcare workers as well. That is, as of January 3<sup>rd</sup>, 2016, there were 881 reported cases of the disease in healthcare workers, resulting in 513 reported deaths among healthcare workers from a total of 28,616 cases and 11,310 deaths of Ebola worldwide (WHO, 2016). A report from the WHO shows that healthcare workers are 21 to 32 times more likely to be infected with Ebola than people from the general population (WHO, 2015b). The outbreaks of these infectious diseases and many others like swine and avian influenza highlighted concerns about the current preparedness and willingness of healthcare workers to respond in such situations. While healthcare providers are generally willing to prioritize patient needs over their needs during natural disasters, this might not be the case when they respond to an emerging infectious disease (Connor, 2014). That is, studies found that human-caused events and pandemic outbreaks are typically the disasters to which responders feel unfamiliar and fear, and in turn, are less willing to respond (Connor, 2014; Gershon et al., 2009; Smith, Morgans, Qureshi, Burkle, & Archer, 2009). A systematic review of the literature by Connor (2014) found no single study with 100% willingness of its participants to work during disasters. The review found that 45% to 58% of healthcare workers were willing to respond to a human-caused disaster like a terrorist attack, 25% to 82% were willing to respond to a pandemic, and 83% to 90% were willing to respond to a mass casualty event like a plane crash or a tornado. The big gap in willingness to respond to a pandemic (25%-82%) is perhaps related to the many factors and the uncertainty that influence the decision to work during such an event. Also, the way the questions and scenarios were developed and presented to potential participants could significantly influence the selected choices.

The willingness of healthcare providers to respond to disasters can be influenced by many factors. Some of these factors could facilitate their willingness, some may hinder, and some others may have contradictory effects (Devnani, 2012). Connor (2014) suggested four main factors that may facilitate or hinder the intention of healthcare providers to work during disasters. These factors are: “(1) the nature of the PHE (public health event); (2) competing obligations; (3) organizational role and climate; and (4) the relationships between knowledge and perceptions of efficacy” (p. 271). These factors and many others are to be discussed later in the literature review chapter.

EMS personnel perhaps have the same challenges in responding to disasters as other frontline healthcare providers at hospitals. Although EMS workers have many similarities with their counterparts at hospitals, they have many differences, as well, that makes EMS a distinct entity. The next section describes the EMS system, similarities and differences between EMS providers and other healthcare providers, and how these differences could result in different views and opinions toward working during disease outbreaks.

### **1.1.2 What is EMS?**

Emergency Medical Services (EMS) is “a system that provides emergency medical care. It is activated by a call for help, after an incident of serious illness or injury” (NREMT, 2015). This system provides out-of-hospital care for patients with perceived urgent needs. EMS personnel with their different levels of certifications and licensing are trained to provide care for patients with perceived urgent needs in the out-of-hospital settings. They are trained to rescue medical and trauma patients, provide them with the emergency care, and transport them to the appropriate definitive

care facilities (NREMT, 2015). In the United States, typically, there are four levels of EMS providers based on their knowledge, skills, and scope of practice. Those levels include Emergency Medical Responder (EMR), Emergency Medical Technician (EMT), Advanced Emergency Medical Technician (AEMT) and Paramedic (Chapleau et al., 2009; NREMT, 2015). As prehospital healthcare providers, EMRs and EMTs provide care to a wide spectrum of case presentations that include, but are not limited to, cardiopulmonary resuscitation, airway support, and trauma care using basic, non-invasive, medical interventions known as basic life support (BLS), while AEMTs and Paramedics are further trained to provide patient care with critical medications, fluid resuscitation, advanced cardiac support, and some invasive procedures. This level of care is known as advanced life support (ALS) (Chapleau et al., 2009). EMS systems are diverse across the country and the world. All states have developed state-level requirements for certification and licensing, and most of them require the certification from the National Registry of Emergency Medical Technicians (NREMT) as part of their certification and licensure (NREMT, 2015).

The organization structure of EMS varies considerably across the country and the world. EMS services “can be based in a fire department, a hospital, an independent government agency, a non-profit corporation or be provided for by commercial for-profit companies” (NHTSA, 2015). Fire-based EMS is considered the most common and represents about 40% of all EMS agencies in the United States (NHTSA, 2014). As the EMS system does not exist in isolation, it is working with other systems and services to enhance the health of individuals and the community (NHTSA, 2015). As shown in figure 1.1 below, EMS works at the crossroads between health care, public health, and public safety.

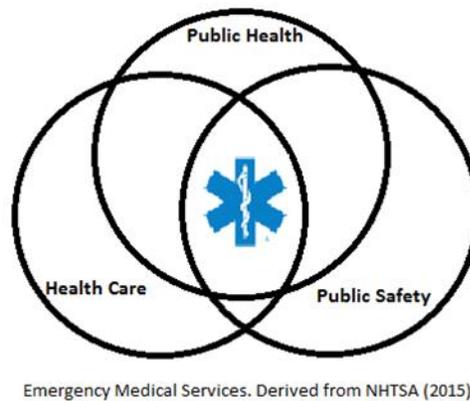


Figure 1.1: Emergency Medical Services System. Derived from NHTSA (2015)

The essential reason for the existence of EMS is to provide medical care at the prehospital setting and transport patients to the appropriate care facilities. By definition, EMS providers are those who provide urgent healthcare for patients in the prehospital setting. Given that a healthcare provider can be simply defined as “a person who helps in identifying or preventing or treating illness or disability” (The Free Dictionary, 2016), it means that physicians, nurses, and other allied health professionals including EMTs and paramedics are all healthcare providers. While EMS has diverse education and training curricula across the United States, their patient care standards are based on protocols developed by medical directors who oversee the EMS work and ensure that their service is congruent with healthcare system standards (Chapleau et al., 2009). As healthcare providers, EMS personnel perhaps have many of the same challenges like their counterparts at hospitals when responding to disasters. They are all expected to respond to all kinds of disasters that result in mass casualties, they work hand in hand to provide appropriate care for patients, they are at risk of exposure, illness, and death as a result of their work, they

have ethical obligations to work, and they need to keep in mind the safety of themselves and their families when providing care for potentially infected patients. Moreover, when EMS is hospital-based, more of work harmony is expected between EMS providers, physicians, and nurses who belong to the same organization.

While it seems, at first glance, that EMS is part of the healthcare system and EMS work is an extension in the pre-hospital setting, which is not necessarily the case. For instance, although EMS works hand in hand with hospitals, they are not sharing electronic health information with one another most of the time. That is, hospitals, healthcare centers, and individual physicians share electronic health records with one another, but EMS is considered non-eligible for these benefits (Pfister, Ingargiola, & Ickowicz, 2014). Nevertheless, things are changing now as the current federal efforts are focused on encouraging hospitals and ambulance services to adopt electronic health records that enable these agencies to share patient health information with one another (Pfister et al., 2014). Despite the many similarities, there are in fact many differences between EMS providers and other healthcare providers that make EMS a distinct entity.

First, healthcare workers at hospitals have different levels of knowledge and training about infectious diseases as compared to their counterparts in the prehospital setting. Knowledge and training are reported to be important factors that influence reporting for duty with higher knowledge and training associated with fewer concerns regarding the need to report to work (Devnani, 2012; Tippett et al., 2010; Watt et al., 2010). Given that EMS systems are more likely to be based outside the hospitals (NHTSA, 2015), they may not have the same knowledge and training on infection prevention as in healthcare facilities (Woodside, 2013). While healthcare providers

like doctors, nurses, and EMS providers are the ones who typically provide direct patient care for all kinds of diseases and injuries, EMS providers generally are the least prepared to do so (Woodside, 2013). Physicians and nurses are more knowledgeable and better trained regarding infectious diseases and infection control practices due primarily to longer education and training periods that they receive, and the stricter certification and licensing standards in their disciplines. EMS providers on the other hand are not taught to diagnose and manage infections within their scope of practice, due to the wide array of infection types that need sophisticated knowledge of pathophysiology, which are not feasible in the prehospital setting (Bissell et al., 1999).

Second, EMS has a different culture and organization than that in hospitals. EMS has very diverse organizational structures depending on who provided this service. Yet, the ultimate goal of their existence is to provide health care, public health, and public safety. This is different from hospitals that typically provide healthcare only. As mentioned earlier, organizational culture has an important effect on workers' willingness to show up during disasters (Connor, 2014; Damery et al., 2010; Ives et al., 2009; Trainor & Barsky, 2011). In sum, EMS and hospital providers have different cultures and some different goals.

Third, there is the issue of confidence in the employer. It is reported that lack of confidence in the employer is associated with less willingness to work during disasters (Trainor & Barsky, 2011). Employers can provide risk mitigation strategies that are important in influencing healthcare workers to take some risk as part of their duty to work (Draper et al., 2008; Ives et al., 2009). In a study by Smith, Morgans, et al. (2009), paramedics reported mistrust in their employer with regard to accurate information they may receive about the emerging infectious disease. Paramedics

mentioned that “they would seek information from outside of the ambulance services before making their personal risk assessments” (Smith, Morgans, et al., 2009, p. 25). There is good reason for this, since EMS services are not staffed with infectious disease experts.

Fourth, the work environments are different between the two. EMS personnel provide patient care in the prehospital setting, either inside the ambulance or on scene, where the environment is highly unstable and uncontrolled. In hospitals on the other hand, the environment is much more stable, and the providers are more comfortable working in places they are used to. Furthermore, EMS providers are less trained and less compliant with hand hygiene, due to their unstable work environments as well as the limited access to soap and water or alcohol-based hand rub dispensers in ambulances (Teter, Millin, & Bissell, 2014). This puts EMS providers at higher risk of exposure to a variety of organisms, in comparison to physicians and nurses. Moreover, the daily work has some differences as well. Typically, EMS providers work in a team of two workers per ambulance in normal conditions, whereas physicians and nurses at hospitals work in bigger teams. This may have some effect as members of teams can support and help each other during disease outbreaks (Ives et al., 2009), or it could be the opposite in case on an exposure among co-workers.

Fifth, the volunteer status is also different between the two. Unlike the hospital setting, due mainly to funding reasons (Rural Health Research & Policy Centers, 2015), EMS heavily depends on volunteers to provide the service, mainly in rural areas (Barishansky & Robertson, 2005; Rural Health Research & Policy Centers, 2015). Volunteer workers in EMS are reported to be less likely to perceive high risk during disease outbreaks than paid workers, which is an interesting finding and needs

further studies (Watt et al., 2010). However, their willingness and ability to work during disasters are yet to be researched, given that volunteer workers are likely to have other full- or part-time jobs, which may conflict with their ability to volunteer during disasters.

Finally, EMS does not work under the umbrella of the health system, rather, EMS belongs to the National Highway Traffic Safety Administration (NHTSA). Due to its diversity in organizational structure (NHTSA, 2015), EMS seems to have an integral part in all healthcare, public health, and public safety, but does not belong to any. The point here is that EMS providers are healthcare providers, but they have their unique culture that is different from their counterpart healthcare providers at hospitals. This is an important point because when it comes to generalizing study findings about healthcare providers, it does not necessarily mean that it can be generalized to EMS. Willingness to report to work during disasters is highly influenced by many factors as mentioned earlier. Given that many of these factors are different between EMS and hospital settings, it is more likely than not that they both differ in their willingness to respond to disasters. EMS providers have unique culture, education, work environment, hierarchy, and challenges that are different from others who may work with them hand in hand, and therefore the EMS system needs to have its own research studies that address these challenges. With that in mind, although EMS personnel are among the frontline healthcare workers during disasters and public health emergencies, they are excluded, most of the time, from research on the attitudes and behaviors during disasters and emergencies, as these studies focus mainly on nurses, physicians, and hospital administrators (Watt et al., 2010). Very limited research has been done to explore the EMS willingness to work during disease outbreaks and how

factors like work environment, knowledge and training, family safety, disease pathogenicity and virulence, and pandemic risk perception could play roles in their decision to report for duty.

Chaffee (2009) who performed a review of the literature found that research on willingness to respond to a disaster is still “immature” or “emerging”, and the areas that need further exploration are “the influence of family, education, personal obligations, concerns for personal safety, and the type of disaster” (p. 55). Among the 27 studies included in this review, three of them were conducted on EMS. Since this review, not enough studies were performed to assess the views of EMS providers about working in public health emergencies. Knowing the expected behavior of the EMS personnel is crucial to mitigate the psychological and operational effects of such events, and enables those decision makers to plan for them and to implement measures that enhance willingness to report for duty (Tippett et al., 2010).

## **1.2 Statement of the Research Question**

Given the gaps in existing research, this study focuses on the views of emergency medical service personnel to report for duty during outbreaks of infectious diseases. Additionally, the current study explores the influencing factors that may affect their intended behavior. The research questions for this study are:

1. What are the views of EMS providers about working during disease outbreaks compared to natural disasters and day-to-day operations?
2. What are the factors that influence the EMS providers’ decision to report for duty in case of an outbreak of an infectious disease?
3. What is the extent to which EMS providers are willing to report for duty in case of an outbreak of an infectious disease?
4. What is the extent to which factors affect willingness to report to work?

To answer these research questions, I structured the study as follows: in the following chapter, I provide a literature review that includes sections about healthcare system preparedness for emerging infectious diseases, willingness of healthcare workers to report for duty, factors influencing the decision to report for duty, EMS preparedness, research on EMS reporting for duty, and why this research is important. The third chapter is the methodology where I discuss the study design, data collection methods, sampling, and data analysis procedures. In the fourth chapter, I present the interview analysis and findings, which explore the views of EMS providers about working during disease outbreaks and the factors that may influence their decision-making process. In chapter five, I present the survey analysis and findings, which assess the extent to which EMS providers are willing to work during disease outbreaks, and how factors could interfere with their decisions. And finally, in chapter six, I present a discussion that integrates the findings from both the interviews and the survey in the context of the available literature. This chapter also provides conclusions that include contributions of the study, recommendations, limitations, and opportunities for future research.

## Chapter 2

### **LITERATURE REVIEW**

This study addresses four related questions. The first looks for the views of EMS providers about working during disease outbreaks. The second is what factors influence the EMS providers' decision to report for duty during disease outbreaks. The third is how willing are EMS providers to report for duty during disease outbreaks. The last question is to what extent the identified factors can affect the decision-making. To answer these questions, it is crucial to have a background about each topic and the research that has been done to address each area. This chapter starts with a discussion about the healthcare system roles and expectations during disease outbreaks in terms of its workers' willingness and ability to report for duty and the factors that may facilitate or hinder their decision. The chapter then discusses EMS role in disease outbreaks, and research on EMS providers' willingness to report to work. The chapter ends by identifying the gaps in the literature and how this research could help fill these gaps and answering the research questions.

#### **2.1 Healthcare System Roles and Expectations during Epidemics**

As is the case in all disasters, during epidemics or pandemics, it is expected that there will be a considerable number of illnesses and deaths. These events could interrupt the functions of all systems in the affected community, including the healthcare system. The healthcare system fills an integral part in disasters and plays a key role in all disaster phases, mitigation, preparedness, response, and recovery. The

unprepared health care system could result in significant impacts on the effectiveness of disaster management in all its phases. According to Lai (2012), successful pandemic fighting requires adequate resources that can be classified into two types: hard resources like stockpiles of vaccines and antiviral medications, and soft resources like knowledge, skills, and expertise. In the United States' setting, although the country might have a satisfactory capacity for providing hard resources, the capacity of soft resources in managing a surge of a high number of infected patients is more likely to be challenging. Given that the healthcare system in the United States works near its full capacity during normal conditions, this system can easily and rapidly be overwhelmed by a disaster (Bissell & Kirsch, 2013).

Sufficient staffing is essential for the healthcare system to keep functioning during disasters and public health emergencies. As frontline responders, healthcare workers are important players in the success of the emergency response. Given that vaccine development for an emerging infectious disease with a novel virus takes about six months (Mackler, Wilkerson, & Cinti, 2007), it is expected that the outbreak would be globally spread before the vaccine would become available even in limited quantities. During this time, frontline healthcare providers are expected to provide care for patients using the nonpharmacological measures like the use of standardized personal protective equipment (PPE). Healthcare providers know that they are at risk of exposure to those infections while they are doing their work. This creates fear and anxiety among those first responders who might not be well prepared, knowledgeable, or trained to handle such situations (Mackler et al., 2007). In sum, researchers have found that healthcare workers who stated their intention to respond to public health events like a pandemic are just 25%-82%, compared to 83% to 90% for a mass-

casualty incident like an airplane crash or a tornado (Connor, 2014). The following section, therefore, discusses more about healthcare workers' attitudes during disasters and public health emergencies.

## **2.2 Healthcare Workers Reporting for Duty during Disease Outbreaks**

Research on reporting for duty during disasters uses two methods. Studies that look for the potential reaction of the participants after receiving hypothetical situations are known as perception studies, whereas studies that look for the actual response of people during events are known as behavioral studies (Trainor & Barsky, 2011). Both methods have their strengths and weaknesses in their ability to predict the actual behavior in potential future hazards. Although perception studies are based on hypothetical scenarios that might not replicate the real events and in turn may not predict the actual behavior, this method can be very useful as it has the potential to generate very large datasets. It can also be used to predict the attitude of people in less common events like terrorist attacks, pandemics, or public health emergencies (Trainor & Barsky, 2011).

The research performed by Trainor and Barsky (2011), explored the role strain, role conflict, and role abandonment, as major phenomena in the willingness of emergency responders and public safety workers to report for duty during disasters. Trainor and Barsky (2011) have defined those three concepts as follows:

- *Role strain* “describes a situation when it is difficult to meet the multiple demands of a single role or the more serious expectations of a role” (p. 9).

- *Role conflict* refers to “the times when a person must deal with the difficulties of filling multiple roles. In lay terms, these are the moments when we “wear two hats”” (p. 9).
- *Role abandonment* is “a label used to describe when a person dismisses the responsibilities associated with his or her role. In simple terms, a person decides to quit doing the things that are expected of him or her” (p. 9).

Role strain and role conflict can clearly affect the willingness of healthcare workers as emergency responders to report for duty. When it comes to role abandonment, although perception studies are more likely to predict role abandonment as a problem of response, behavioral studies minimize the significance of this problem. The authors concluded that: “[i]t is more complicated to draw conclusions and make predictions about what will happen in the case of uncertain, highly contagious, and hazardous threats such as biological, nuclear, and naturally occurring public health threats.” (Trainor & Barsky, 2011, p. 17).

It is important here to know that willingness to report for duty is different from ability to report for duty. According to Qureshi et al. (2005), “ability refers to the capability of the individual to report to work, whereas willingness refers to a personal decision to report to work” (p. 379). Willingness, then, is in an attitudinal domain, while the ability is in a knowledge- and skill-based domain (Barnett et al., 2010). In certain kinds of events, workers might be able to report to work, but for some reasons, like safety for themselves or their families, they are unwilling to work. In other kinds of events, workers might be willing but not able to present at work because they are directly affected by the event, or lack the ability to respond. Although factors that

affect the ability and willingness are different, it is found that both the ability and willingness are lowest to events with highest perceived risk to responders and their families (Qureshi et al., 2005). The difference between ability and willingness is not clear cut however, because workers are more likely to show inability rather than unwillingness to report for work as the former is a more socially desirable response (Australian Centre for Prehospital Research, 2008). Work absenteeism during disease outbreaks could be a challenging problem as healthcare workers may get sick (inability), have to care for sick family members (inability and perhaps unwillingness), or just not show up due to concerns with safety for themselves and their families (unwillingness) (Draper et al., 2008). Given that the decision to report for duty or not is influenced by many factors, the next section discusses these factors and how these factors could affect the willingness of healthcare workers to report for work.

### **2.2.1 Factors Influencing Decision to Report for Duty**

Understanding the contributing factors associated with willingness of healthcare workers to work during disasters is essential for preparedness planning in terms of the expected behavior of the frontline emergency staff during such events. Studies assessing willingness to report for duty typically include the contributing factors for such expected behavior (Barnett et al., 2010; Damery et al., 2010; Devnani, 2012; Dimaggio et al., 2005; Draper et al., 2008; Gershon et al., 2009; Ives et al., 2009; Qureshi et al., 2005; Smith, Burkle, & Archer, 2011; Tippett et al., 2010; Trainor & Barsky, 2011; Watt et al., 2010). Thus, the research highlights many factors that could facilitate or hinder the responders' decision. Some studies, however, indicate contradictory findings regarding some factors like age and race (Devnani, 2012).

Starting with the nature of the event, disasters can occur as a result of a variety of hazards. Some of these hazards could be natural, like hurricanes or earthquakes, whereas others could occur due to human involvement, like a plane crash or an act of terrorism, which is known as human-caused disasters. There are public health emergencies or disasters that could result from epidemics or pandemics that could also be due to an act of terrorism. There are other classifications of disaster causes that are not within the scope of this study. Research studies show that healthcare workers are generally less willing to work during human-caused events and pandemic outbreaks than other disasters from natural events (Connor, 2014; Devnani, 2012). The review by Connor (2014) showed that 45% to 58% of healthcare workers were willing to respond to a human-caused disaster like a terrorist attack, 25% to 82% were willing to respond to a pandemic, and 83% to 90% were willing to respond to a mass casualty event like a plane crash or a tornado. The big gap in willingness to respond to a pandemic (25%-82%) is perhaps related to the many associated factors and the uncertainty that influence the decision to work during such an event. The reason for less willingness to work in pandemics was not elucidated well in the literature and needs further investigation (Devnani, 2012). Although the type of disaster has a major role in responders' willingness to report for duty (Barnett et al., 2010; Devnani, 2012; Smith et al., 2011; Tippett et al., 2010; Trainor & Barsky, 2011), when it comes to responding to emerging infectious diseases, factors like fear and concern for family members, demographics, and type of healthcare provider have a major influence on responders' decisions (Australian Centre for Prehospital Research, 2008).

Fear and concern for the family are an important factor when it comes to work during disasters and public health emergencies. Healthcare providers feel that they are

obligated to keep their families safe during disasters, which could have a profound influence on reporting to work (Dimaggio et al., 2005). In fact, concern for family is reported to be by far the most influencing factor for not being willing to report for duty during disasters (Connor, 2014; Dimaggio et al., 2005). This is because during disasters, healthcare workers have a sense of duty to work that might conflict with their sense of duty to their families. This leads to tension of the role conflict between work and family. Uncertainty regarding the safety of families and the feeling that the responder should protect his family are the main source of role conflict during disasters (Trainor & Barsky, 2011). Adding to that, during disease outbreaks, first line responders are more concerned that they could transfer the contagious disease to their family members. During SARS outbreak in 2003, many healthcare providers were infected with SARS because of their work, some of them transmitted the infection to their families, and two of them died (Singer et al., 2003). According to Smith, Burkle, et al. (2009), 21% of victims of the SARS outbreak were healthcare workers. While the proportion was 21% in general, it was 43% in Canada and 40.8% in Singapore (Koh et al., 2005). This situation was the first in the healthcare system in Canada in decades, in which healthcare providers had to weigh the safety of themselves and their families against their obligation to provide care for the sick. A study found that about 30% of nurses, 25% of hospital doctors, and 18% of GPs think they do not have to report for duty if doing so would risk themselves and their families (Damery et al., 2010). Those healthcare workers also consider such unwillingness should not attract punishment. Interestingly, concerns for family were reported to be greater than concerns for self in some studies (Connor, 2014; Dimaggio et al., 2005; Ives et al., 2009).

Knowledge and training about infectious diseases and infection control practices are considered in some studies as one of the important contributing factors to enhance intention to work during disasters. While knowledge and training about infectious disease are reported to decrease the responders' concerns to report to work (Barnett et al., 2010; Devnani, 2012; Gershon et al., 2009; Watt et al., 2010), this is not always the case. The study conducted by Watt et al. (2010) showed that although adequate knowledge about infection transmission mechanisms and influenza infection in general are associated with less stress and perceived risk, it also showed that adequate knowledge of an avian influenza is associated with higher perceived risk of working during an epidemic. The authors demonstrated that this is thought to be due to perceived lack of confidence in workers' skills and training to protect themselves from infection. Also, this might be due to the relative high fatality rates among infected patients with avian influenza, which makes the study participants more concerned about responding. Related factors like level of education, years of practice, knowledge of individual role during disasters, and sense of self-efficacy seem to significantly influence the willingness as well (Connor, 2014).

The perception of a duty to work is reported to be of major influence on reporting for duty (Damery et al., 2010; Devnani, 2012). Connor (2014) stated that emergency responders face difficulties in balancing their safety and duty to work during disasters. There is a general acceptance among healthcare workers for duty to work during the outbreak of infectious diseases. This is based on the code of conduct that governs their practice (Damery et al., 2010). While healthcare providers have obligation to work, they also have obligation to maintain their own health to be able to provide care for patients (Singer et al., 2003). The outbreak of SARS, in 2003,

resurfaced the dilemma of duty to care. During this outbreak, medical and non-medical professionals in Toronto, as well as decision makers were forced to make hard decisions with a high level of uncertainty (Singer et al., 2003). In such situations, there are two positions with respect to the ethical obligation to work during disasters. Some argue that healthcare personnel are obligated to maintain their health in order to be able to care for others and not to be victims. Also, they believe that it is not reasonable that healthcare workers threaten their lives and the life of their families to care for others (Damery et al., 2010). Others believe that professionals should have limited self-regard and should accept a potential harm in performing their job. Devnani (2012) found that healthcare workers who believe in duty to work are more likely to respond to influenza pandemics. Also, Dimaggio et al. (2005) found that sense of responsibility and ability to provide care are the two main reasons that enhance willingness to respond to a terrorist-related disaster.

Organizational culture and structure that first responders belong to have a major role in willingness to work during disasters (Trainor & Barsky, 2011). Confidence that the employer is capable to respond appropriately to disasters is crucial for worker's duty to work (Connor, 2014). Employer risk mitigation strategies are important influencing factors for healthcare workers' perception to take some risk as part of their duty to work (Draper et al., 2008; Ives et al., 2009). In other words, healthcare workers might be "willing to take necessary risks, but not unnecessary risks" (Damery et al., 2010). Healthcare workers need their employer to reward and support them during pandemics and providing them with the appropriate PPE to keep them safe to the degree possible. Confidence in employer has a significant effect on many aspects during disease outbreaks. These include PPE use, willingness to change

roles, willingness to report to work, and willingness to work with colleagues exposed to the infection. Yet, a study found that about two thirds of the ambulance personnel reported low confidence in their employer (Australian Centre for Prehospital Research, 2008).

Communication with workers and keeping them informed is important. Communication with workers and keeping them abreast of the available information about the evolving outbreak as it unfolds can bolster the workers' trust with their employer. Given that pandemics are associated with a high level of uncertainty in the early stages, it is necessary that employers communicate with emergency workers about the emergency plan, what is known, what is unknown, and what is expected of workers (Ives et al., 2009). However, Ives et al. (2009) who conducted focus group sessions with physicians and nurses found that “[I]ack of information was a key theme across all groups, with the majority finding the lack of information and engagement a demotivator to work, while clear information, guidance and support seemed to be important motivators” (p. 9). A study conducted by Koh et al. (2005) assessed fears and anxieties of healthcare workers following SARS outbreak in Singapore in 2003. While the majority (76%) of participants felt at a great risk of exposure to SARS, more than two thirds (69.5%) accepted the risk of contracting the disease as part of their job. Interestingly, the authors found that 96% of healthcare workers were satisfied with the effectiveness of the implemented protective measures. Additionally, 93% agreed that there were clear policies and protocols, and 90% agreed that these policies and protocols “were implemented quickly enough.”

Protective gear is important to keep healthcare worker safe from contracting infections. According to the National Institute of Occupational Safety and Health (NIOSH), an estimated 385,000 sharps-related injuries (needle sticks, or other unintended perforations) occur annually among healthcare workers in hospitals in the United States; perhaps half or more injuries go unreported (NIOSH, 2013). A previous report shows an estimated 600,000 to 800,000 needle-sticks and sharp-related injuries occur each year among healthcare workers in the United States (NIOSH, 1999). These needle-stick injuries could result in transmission of infectious diseases from infected patients. Therefore, during epidemics, there might be a need for additional protective equipment and training to protect workers. The lack of effective PPE along with vaccination to self and family were reported to drop willingness to report for duty from 91% to 4% in one of the studies (Mackler et al., 2007). Although vaccine availability is important in protecting responders, prompt availability of vaccination in the early stages of disease outbreaks is unlikely due to the long process of its development and distribution. It is noteworthy to know that people are more likely to cite family concerns than self when it comes to the risk of disease outbreaks (Ives et al., 2009). Dimaggio et al. (2005) found that personal health problems was the least cited reason for unwillingness to respond to disasters. According to Ives et al. (2009), healthcare providers are reluctant to explicitly discussing personal risk, rather, they seem to express their self-concerns by stressing the importance of being provided effective PPE. This is an important point when it comes to preparedness of healthcare providers by providing them with appropriate and effective PPE. Equally important are the measures that enhance healthcare providers' compliance with the use of these PPE when needed like appropriate training on their use.

The pathogenicity and virulence of the disease is also important when it comes to risk perception of an individual toward an infectious disease and the duty to care. If the disease is virulent or highly pathogenic, healthcare workers may become afraid of providing care for patients with such a disease. During both the epidemic of AIDS/HIV in the United States in the 1980s and SARS in Toronto, Canada, in 2003, some healthcare providers refused to provide care for infected patients given the virulence of these diseases (Sokol, 2006). Previous studies also showed that healthcare workers have a higher perceived risk for avian influenza, smallpox, and SARS, which are reported to have high pathogenicity and virulence relative to other disease outbreaks. The latest Ebola outbreak had a high fatality rate, which was 50% (WHO, 2016), making it one of the highly virulent diseases. Two nurses reported infection of Ebola after contacting the patient with Ebola infection at Texas Health Presbyterian Hospital Dallas (Edmond, Diekema, & Perencevich, 2014; Gostin, Hodge, & Burris, 2014; Rosenbaum, 2015). Following this event, the CDC changed the guidelines mainly on donning and doffing of PPE when caring for potential Ebola patients. Although it is reported that the “likelihood of contracting Ebola in the U.S. is extremely low” (Burke, 2015), the lack of appropriate knowledge and training when caring for Ebola patients or other highly pathogenic diseases can result in a higher perceived risk and ultimately less willingness of healthcare providers to report for duty.

In sum, many factors could facilitate or hinder willingness to report for duty during disease outbreaks. Some of these factors could have profound effects, while others may have minimal effects. Connor (2014) performed a recent systematic review of the literature regarding the contributing factors associated with willingness to work during disasters. He suggested four primary factors that either bolster or hinder the

person's intention to work during disasters. These factors are: "(1) the nature of the PHE (public health event); (2) competing obligations; (3) organizational role and climate; and (4) the relationships between knowledge and perceptions of efficacy" (p. 271). Additionally, Devnani (2012) made a systematic review of the literature to assess the willingness of healthcare providers to work during an influenza public health emergency. The review found that the following factors associated with willingness to work during pandemics:

Being male, being a doctor or nurse, working in a clinical or emergency department, working full-time, prior influenza education and training, prior experience of working during an influenza emergency, the perception of value in response, the belief in duty, the availability of PPE, and confidence in one's employer...the provision of PPE, bonus salary, insurance, and flexible hours (p. 565)

On the other hand, "being female, holding a supportive staff position, working part-time, the peak phase of the influenza emergency, concern for family and loved ones, and personal obligations" (p. 565), are associated with less willingness to report to work during pandemics. Another study shows that when controlling all potential influencing factors, it is reported that physicians and EMS personnel were more likely to show ability and willingness to respond (Australian Centre for Prehospital Research, 2008).

### **2.2.2 EMS Preparedness for Disease Outbreaks**

The CDC has issued guidelines to universal precautionary measures when caring for potentially infected patients (CDC, 2011). This is to control, or at least reduce, the exposure rates of healthcare workers to blood and body fluids contaminated with infectious pathogens such as HIV, Hepatitis B virus, Hepatitis C

virus, and the Ebola virus. However, EMS providers' compliance with PPE use, which is also the case with all other healthcare providers, is always universally suboptimal (Gershon et al., 2009). This dramatically increases the risk of exposure, illness, and possibly death of key emergency responders during public health emergencies (Gershon et al., 2009; Smith et al., 2009).

Wright, Wrenn, Fowle, and Slovis (1995) performed a study to examine the compliance of EMS personnel with the CDC and employer guidelines on using universal precautions when dealing with patients in the prehospital setting. The study found that EMS providers were rarely fully compliant with the use of PPE as recommended by the CDC and/or their employers. Despite the availability of standardized PPE in ambulances, gloves were the most likely PPE to be used routinely. Goggles were used in 6% of the cases, but mask and gown were never used when recommended. Reasons for noncompliance were thought to be due to inappropriate training, low perception of risk, inability to perform some procedures when using the recommended PPE, forgetting to use them "in the heat of the moment", and the belief that wearing the PPE would slow down the provision of emergency care (Wright et al., 1995). A newer study found that 83% of EMS personnel always wear gloves, 93% use protective devices when they resuscitate patients, 71% are always wearing masks when transporting a patient diagnosed with tuberculosis, and 26% would use masks when transporting a patient with other airborne diseases (Harris & Nicolai, 2010). These studies did not address the effect of compliance with using PPE on the views and willingness to work during epidemics. However, it is perhaps true that epidemics could influence their compliance with using

PPE. Meaning that during disease outbreaks EMS providers may become more adherent to use of their protective gear.

When EMS personnel provide care for patients with highly infectious diseases like AIDS or Hepatitis B, they know that they are at a considerable risk of exposure, and the majority (94%) agree that PPE use can protect them from exposure and infection (Mathews, Leiss, Lyden, Sousa, & Ratcliffe, 2008), however, they do not always follow the safety procedures that are required to protect themselves (Harris & Nicolai, 2010). Gershon et al. (2009) studied this issue and demonstrated three sets of factors that influence the compliance with the use of PPE standards. These factors include: “(1) individual factors (e.g., demographics, lack of knowledge, and misperception of risk); (2) organizational factors (e.g., safety culture (including training), policies and procedures, staffing and scheduling, and PPE availability and accessibility); and (3) equipment factors (e.g., comfort and fit)” (p. 509).

Unlike other healthcare professionals, EMS personnel often perform invasive procedures in moving ambulances, restricted spaces, poor visibility, and pressure of emergency conditions. This makes them more vulnerable to the risk of exposure to patients’ blood and other body fluids than their hospital-based colleagues. A study from a national sample of paramedics in the United States found that 21.6% of paramedics had experienced at least one exposure to blood and body fluid from any route (Leiss et al., 2006). Reichard, Marsh, and Moore (2011) found that the fatality rate of EMS providers is 7.0 per 100,000 per year, which is higher than the fatality rate for the fire fighters. Maguire and Smith (2013) also found that the injury rate of EMS providers in the United States is about three times more than the national average of all occupations, making it one of the most dangerous professions.

During the SARS outbreak, 436 out of 850 paramedics from Toronto, Canada, were exposed to SARS and placed in 10-day home or work quarantine, 62 of them developed SARS like illnesses, and four of them were hospitalized (Silverman et al., 2004). This exposure resulted in huge challenges in addressing patient surge and staff shortage (Maguire et al., 2007; Silverman et al., 2004). Likewise, in Australia, many paramedics were exposed to the 2009 influenza H1N1 either from social transmission or occupational exposure. The infection and quarantine of paramedic staff had stressed the ambulance system in some places in Australia like Tasmania; however, other areas like Victoria Ambulance had not experienced issues related to the absenteeism due to illness, exposure, or unwillingness to report for duty. Interestingly, after supplying paramedics with respirators, no one contracted the disease, even without fit-testing (Smith et al., 2009).

In order for healthcare workers to provide safe and quality health care, they need to be well prepared on infection control knowledge and practices. This helps health care providers to limit disease transmission between patients and protecting healthcare providers themselves from contracting diseases. However, despite the high-risk and unstable environments that EMS providers work in, they lack the necessary knowledge and training about infectious diseases. EMS are not taught and entitled to diagnose and manage infections within their scope of practice, due to the wide array of infection types, the need for sophisticated knowledge of pathophysiology, and the need for laboratory and diagnostic modalities, which are not feasible needs in the prehospital setting (Bissell et al., 1999). A study by Klein, Atas, and Collins (2004) assessed the ability of emergency response personnel in the prehospital and hospital settings to identify and appropriately manage patients with potential communicable

diseases. In this study, 13 “moulaged patients” who imitated a smallpox presentation were used to evaluate the hospitals and EMS in urban and suburban areas. “Patients” were transported to hospitals either by cars or ambulances. None of the EMS providers who transported four mock patients correctly identified their patients as having potential infectious diseases, and in turn, EMS providers did not use the appropriate PPE for themselves nor for the mock patients. Another study by Shaban (2006) found that EMS providers have poor knowledge of basic infectious disease mechanisms and infection control principles.

In sum, EMS has a crucial role in helping people in urgent medical need. Although EMS and hospital healthcare providers work in harmony to provide care for patients, they work in different environments and they have different cultures. When it comes to working during disease outbreaks, EMS providers have a crucial role that supports healthcare, public health, and public safety. During disease outbreaks or pandemics, EMS, which is the nation’s healthcare “safety net”, will face a dramatic increase in patient volume, coupled with other challenges like supply chain disruption and increased rates of exposure, illness, and death (FICEMS, 2009). During the early stages of such events and when vaccines are yet to be available to first responders, EMS providers are expected to care for patients using the non-pharmacological measures like the use of PPE. Unfortunately, EMS providers’ compliance with using such PPE is reported to be suboptimal.

Like their counterparts in hospitals, EMS personnel know that they are at risk of exposure to those infections while they are doing their work. Due to their very unstable work environments and the lack of appropriate knowledge and training, as first line workers, EMS providers perhaps face greater risk of exposure than their

counterparts in the healthcare system. The exposure of about half of the EMS workforce in Toronto, Canada during the SARS outbreak of 2003 is a clear example. This creates much greater fear and anxiety among those first line workers who might not be well prepared, knowledgeable, and trained to handle such situations (Mackler et al., 2007). The inadequate knowledge and training on infectious diseases, the unstable work environments, the noncompliance with the use of PPE, and the high anxiety levels are likely to hinder the willingness of EMS personnel to report for duty during disease outbreaks or pandemics, increase worker absenteeism, and ultimately drop the workforce of the system. The next section explores research on EMS willingness to report for duty during disasters and disease outbreaks.

### **2.2.3 Research on EMS Reporting for Duty**

While in a previous section I discussed reporting for duty that includes some studies on EMS, in this section I present the studies that specifically conducted on EMS providers. This helps in revealing the gaps in the literature and highlights how EMS is understudied in this area.

EMS providers are very core during disasters and public health emergencies. During such events, they are at the frontlines providing care, and saving lives while endangering their own. The role that efficient EMS can provide is invaluable during such events as they are the entry point to the healthcare continuum in most emergency cases. EMS personnel's willingness to report for duty is important as the failure of this system would in turn increase the burden on the already compromised healthcare system during pandemics (Barnett et al., 2010). Although EMS personnel are expected to have an appropriate response rate to disasters with mass casualty (Devnani, 2012), the high perceived risk, which is dependent on the type of disaster, could reduce the

willingness to report for duty (Smith et al., 2009). This was clear when a number of studies showed low rates of willingness to report for duty in case of pandemics (Barnett et al., 2010; Gershon et al., 2009; Mackler et al., 2007; Tippett et al., 2010). For instance, a study was performed by Smith et al. (2011) to assess risk perception among Australian paramedics toward different hazards. The authors developed 40 disaster scenarios of hazards paramedics mostly encounter nationally and internationally. The study investigated which disasters caused paramedics concern more in terms of “fear” and “unfamiliarity”. As shown in figure 1.2 below, the study found that the highest concerns in terms of fear and unfamiliarity are nuclear events including war, terrorism, and accidental release, followed by the outbreak of a new infectious disease. Among scenarios of infectious diseases, the study found that avian influenza ranked the highest for fear and unfamiliarity. While tsunamis, landslides, earthquakes, and aviation accidents ranked high in unfamiliarity scale, they rank low in fear scale, meaning that paramedics are more willing to respond to these disasters even if they are unfamiliar with them. Conversely, SARS ranked high for fear and low for unfamiliarity, meaning that even though paramedics are familiar with SARS, they are concerned about responding. This study was in line with other studies that show high levels of anxiety and risk perception to work during pandemics (Smith et al., 2009; Watt et al., 2010). This highlights that understanding people’s perceived risk is a major challenge that faces researchers and decision makers (Slovic & Weber, 2002).

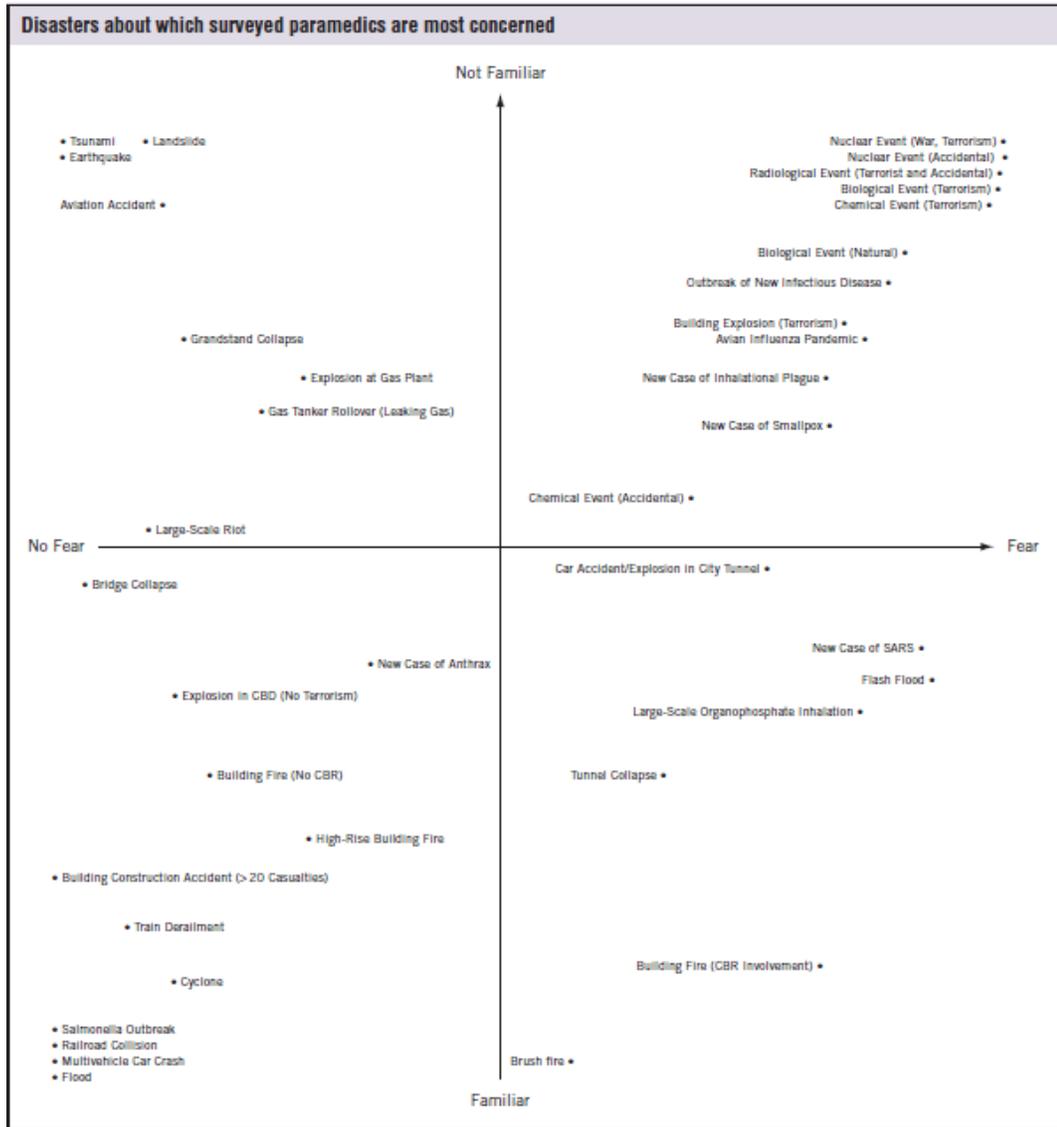


Figure 2.1: Location of the 40 hazards on factor space ranked by paramedics. Source: (Smith et al., 2011)

In studying the association between knowledge and attitude of Australian paramedics with regard to working during an avian influenza pandemic, Tippett et al. (2010) found that while, generally, EMS providers lack appropriate knowledge of

infectious diseases, knowledge is also associated with more likeliness of EMS personnel to respond to such an event. This is perhaps the reason why this study found that only 56.3% of the participants are willing to report for duty in case of an outbreak of infectious disease. Likewise, Harris and Nicolai (2010) found that due to different levels of training, EMTs and paramedics have different knowledge of universal precautions with paramedics being 7.7 times more likely to have accurate knowledge of universal precautions. Moreover, the study found that paramedics are more compliant with universal precautions and more willing to report needle-stick incidents. However, there are no studies addressing the differences between the EMTs and paramedics when it comes to reporting for duty during epidemics. Another study found that even following a training program on pandemics and how to use the PPE, respondents demonstrated an increase in willingness to report for duty only from 63% to 66% (Gershon et al., 2009), which highlights the importance of other factors on the intended decision of first responders during disease outbreaks.

The safety of family and self was reported to be one of the most challenging barriers to reporting to work during disasters as mentioned elsewhere. A study performed by Barnett et al. (2010) to understand the effect of family safety on response rate among EMS providers. The study findings were highly variable. That is, although 93% of EMS personnel would be willing to report for duty if required, and 88% if asked, but not required, the willingness falls to 48% if there is a possibility of disease transmission to a family member. A similar study found that 91% of the respondents would remain on duty if they have been vaccinated and guaranteed that they are protected from infection (Mackler et al., 2007). This percentage, however, falls to 38% if their families have not received the vaccine. Only 4% probably would

remain on duty if there is neither vaccine available, nor is there protective gear (gloves, N95 masks, and eye protection), and no one definitely would remain on duty. When it comes to vaccination, while frontline emergency responders are among the first to receive prophylactic antiviral medications once available, a study showed that paramedics are unlikely to get vaccinated from largely untested vaccines and becoming as a “guinea pigs” (Smith et al., 2009).

Although a paucity is there, the reviewed studies on the EMS personnel’s willingness to report for duty during disease outbreaks showed variable results. These studies highlighted the importance of studying the expected behaviors of EMS personnel, and shed the light on some of the factors that influence their behavior. However, the review of the literature showed a limited amount of research on those first line responders who are expected to be the first to care for patients should an emerging infectious disease arise. The following section discusses what is missing in literature and how this research addresses these gaps.

### **2.3 What is missing?**

EMS has a crucial role as an extension to the healthcare system in the out of hospital setting. The reviewed studies show that EMS personnel are at high risk of exposure to infectious diseases due to their work environments, they demonstrate inadequate knowledge and skills in infection control and PPE use, they have inadequate training for and supply with hand hygiene, they demonstrate a suboptimal level of compliance with protective measures, and they reported high exposure rates. This in turn could affect their risk perception and willingness when it comes to handling a newly emerging infectious disease. While they are potentially at a greater risk of pandemic consequences compared with other healthcare providers at hospitals,

and in turn at a greater fear and anxiety, they are understudied. That being said, having a unique entity, EMS needs to have its own research to address its specific interests and challenges especially to examine the views of EMS personnel to work during disease outbreaks, and what influence their decision in such situations.

Although there are some qualitative studies that explore the attitude of healthcare workers reporting for duty during disease outbreaks (Damery et al., 2010), there are no known studies using this approach for EMS in the United States. To the best of the researcher's knowledge, only one qualitative study has addressed the risk perceptions and willingness to work of paramedics in Australia during disasters (Smith et al., 2009). Qualitative studies enable researchers to conduct in-depth research to understand the views of EMS providers in this area (Berg & Lune, 2012). Also, they are helpful to explore the factors affecting willingness to report for duty, which is needed if we are to develop strategies or training programs to enhance the confidence of EMS workers regarding their safety when they report to work. Moreover, interviewing EMS providers to discuss their views and exploring influencing factors to report for duty could result in the emergence of new factors that have not previously been studied. This is because EMS providers are working in environments that are different from that for other healthcare providers. To achieve this, this study is designed to use a mixed quantitative and qualitative approach to explore the known and the potential factors influencing the decision to report to work.

There is a dearth research on specific known influencing factors on EMS decision-making. For instance, studies show that paramedics are more likely to be knowledgeable and compliant with universal precautions than EMTs (Harris & Nicolai, 2010). Although knowledge and training is reported to affect the decision of

EMS providers to report for duty (Watt et al., 2010), there is a lack of studies about the extent to which EMTs and paramedics are different in their views and willingness when it comes to reporting for duty during disease outbreaks.

Fear and concern for family members was reported to be by far the most influencing factor for reporting for duty (Connor, 2014; Dimaggio et al., 2005). While this factor was addressed in many studies, due to its importance, there is a need for deeper understanding of the EMS providers' insights about their concerns to their families. Additionally, we need to explore if there are plans or strategies at the individual and organizational levels to ensure family safety during disease outbreaks.

Confidence in employers is reported to profoundly influence reporting for duty (Damery et al., 2010). More studies showed lack of confidence in employers (Ives et al., 2009; Smith et al., 2009) than confidence that the employer will provide timely communication, clear policies, and protocols during health disasters (Koh et al., 2005). It is therefore important assess the views of EMS workers toward their employers, and to explore in more depth the role of employers on reporting to work.

As mentioned in the previous sections, EMS providers work in unique and unstable environments, which developed a unique culture in the workplace. Organizational culture is reported to influence the willingness to report to work (Connor, 2014; Damery et al., 2010; Ives et al., 2009; Trainor & Barsky, 2011). Given that EMS agencies are varied considerably across the country in terms of design, methods, and sophisticated knowledge regarding employee health, they might have different views about working during extreme events. For instance, fire-based EMS is expected to be different from for-profit EMS in terms of their expectations and

perception to work obligation. Yet, there is a lack of studies in EMS to explore the effects of organizational structure on reporting for duty.

Volunteer workers reported to have less fear and anxiety to work during pandemics than paid workers (Watt et al., 2010). Other studies reported that full-time or paid workers are more willing than others to report for duty (Devnani, 2012; Dimaggio et al., 2005). Given that many EMS systems are heavily dependent on volunteer workers to keep their systems functional (Barishansky & Robertson, 2005; Rural Health Research & Policy Centers, 2015), there is a need to assess how the EMS agencies can depend of those volunteers during disaster events. This is because volunteer workers are likely to have other full- or part-time jobs, which may conflict with their ability or willingness to do volunteer work during disasters. Job satisfaction is reported to be associated with more risk-taking behavior in universal precaution (Harris & Nicolai, 2010), does that mean people who are more satisfied with their jobs will be more willing to respond and take more risk?

Risk perception was reported to be one of the major contributing factors that affect the willingness of healthcare providers to report for duty, with a high risk perception associated with a lower intention to work (Smith et al., 2011; Smith et al., 2009). Previous studies showed that healthcare workers have a higher perceived risk for avian influenza, smallpox, and SARS (Smith et al., 2011). The current Ebola outbreak could also have a high-risk perception like those highly virulent diseases. Given that no known studies explored the effect of disease pathogenicity and virulence on EMS risk perception, this study, therefore, intends to assess the extent to which disease pathogenicity and virulence could affect risk perception among EMS providers and ultimately their willingness to report for duty.

Finally, given that little research has been done in the field of EMS to assess the views of those frontline providers about responding to unconventional disasters, this research will add to the existing body of knowledge of understanding the extent to which EMS personnel are willing to report for duty, and what influencing factors may affect their decision. Due to the low frequency of pandemics, behavior studies about EMS reporting for duty during pandemics are very limited. To explore this issue, perception studies that are scenario-based could be developed and studied. This study, therefore, explores the potential attitude of EMS providers in times of disease outbreaks using the perception study approach. The results of previous studies vary considerably due, in part, to how realistic scenarios and questions were developed. The determination of potential attitudes of EMS providers with more studies using different and more realistic scenarios could have significant implications when planning for surge capacity of EMS as well as the entire healthcare sector.

## Chapter 3

### **METHODOLOGY**

As mentioned in the previous chapter, there are two main approaches for studying report for duty likelihood during disasters, behavior studies and perception studies. Behavior studies are the best choice if we are to explore an event that is happening or has already happened. In such a case, researchers can simply assess, document, and analyze the behaviors of targeted population to obtain their actual experiences. However, these studies are limited by the number of the actual events that have occurred, the number of personnel involved, and the specific conditions of these events (Trainor & Barsky, 2011). On the other hand, perception studies tend to target a large number of participants using quantitative methods. This can be done through developing “what-if” scenarios without having actual events. According to Trainor and Barsky (2011), “perceptions studies tend to be used more frequently to address hazards that are less common and therefore more uncertain, such as pandemics, public health emergencies, and biological, radiological, or nuclear terrorist attacks (p. 14).” In emerging infectious diseases or pandemics, which are uncommon events, there are many uncertainties around characteristics such as pathogenicity and virulence of the disease, and access to useful vaccines or treatment modalities. For instance, a study expected that the worldwide death toll from an influenza pandemic could range from two million to the worst case scenario of 150 million worldwide, with accompanying severe social and economic consequences (Garoon & Duggan, 2008). In such uncommon disasters, or those with a high-level of associated uncertainty, perception

studies, which have the ability to quantify probable behavior, provide numeric predictions, and explore the expected behavior without actual event, become the most useful tool for researchers (Trainor & Barsky, 2011). Therefore, the methodology of this study uses the perception study approach.

### **3.1 Study Design**

This study uses a two-phase mixed qualitative and quantitative approach. The first phase of the study answers the first and second questions, which ask, “what are the views of EMS providers about working during disease outbreaks?”, and “what are the factors that influence the EMS providers’ decision to report for duty in case of an outbreak of an infectious disease?”. The second phase of the study answers the third and fourth questions that ask, “what is the extent to which EMS providers are willing to report for duty in case of an outbreak of an infectious disease?” and “What is the extent to which factors affect willingness to report to work?” The mixed methods approach is appropriate for this study because the first two research questions look for more in-depth information about EMS views, and thus require a qualitative approach. Whereas the third and fourth research questions look for more breadth of information from a larger sample where you can assess percentages and significance, and thus require a quantitative approach.

In the first phase of the study, the qualitative phase, I conducted face-to-face interviews with frontline EMS providers to explore, in-depth, their views about working during disease outbreaks and factors that may influence their decision-making in this context. The findings from this phase, along with the available literature, informed the design and content of the survey questionnaire, which is the second phase of the study. In the second phase, I developed a survey questionnaire and

used quantitative analysis to determine what percentage of EMS personnel would be willing to report for duty, and the degree to which identified influencing factors may affect their decisions.

Individual interviews were combined with the survey to gain a greater depth from the former and a greater breadth from the latter. This study design is known as *sequential mixed design* where the mixing of the methods occurs across chronological phases of the study (Denzin & Lincoln, 2011). The following subsections elaborate on phases of the research design.

### **3.1.1 Phase 1: Qualitative Approach**

A qualitative approach is used to address the first two research questions using face-to-face interviews. Qualitative research is an inductive form of research that focuses on process, meaning, and understanding of the phenomenon of interest, where the researcher is the primary instrument for data collection and analysis (Merriam, 2009). Since the aim of the study is to explore and understand the EMS providers' views and willingness to report for duty and the factors that affect their feeling and potential attitudes, it is important to thoroughly ascertain and document the real feelings of those workers through in-depth understanding of this phenomenon, which makes a qualitative method the appropriate choice (Berg & Lune, 2012). By exploring the real feelings, views, and insights of the participants, qualitative research design help researchers explore in detail the root causes of a phenomenon.

#### **3.1.1.1 Data Collection Method and Entrée**

Face-to-face interviews were the appropriate approach for the first phase of the study. This method helps researchers to “find out what is in and on someone else’s

mind” (Merriam, 2009). Face-to-face interviews help researchers to gain more information from the participants by capturing their words, insights, and expressions. If the participant provides incomplete information, the interviewer can probe to gain more and complete information, making it the most appropriate way to answer the first and second identified research questions for this study.

There are three types of interviews, structured/ standardized, semi-structured/semi-standardized, and non-structured/ non-standardized. The semi-structured interview is mid-way along the structured and non-structured continuum. I used the semi-structured interview approach, which is also the most common type used for interviews. Although this method employs a number of predetermined questions, it also allows the researcher to probe far beyond the answers to get more in-depth information about particular areas of study (Berg & Lune, 2012).

To prepare for semi-structured interviews, an interview guide was developed (Appendix A). This guide includes questions designed to explore the topic areas of interest. The interview questions were designed to elicit the participants’ views about working during communicable disease outbreaks, compared with both natural disasters and day-to-day operations. Questions also explored the influencing factors on predicted attitudes during such situations. These factors include demographic data, level of certification and licensing, training and education, years of experience, prior pandemic experience, confidence in employers, concerns for family safety, knowledge about infectious diseases and infection control, knowledge and compliance with PPE use, effect of disease pathogenicity and virulence of a given infectious disease on risk perception and intention to work, and finally, asked for feedback regarding any additional factors the interviewees thought may influence their attitudes toward work

during disease outbreaks or pandemics. The first two interviews were considered pilot interviews and were helpful in testing the questions of the interview guide.

To obtain access to interview participants, I contacted the state EMS medical director and the director of the office of EMS in the State of Delaware. I met with them and explained my desire to conduct the study on Delaware's EMS. The Delaware EMS office director and the state EMS medical director welcomed the study and offered to facilitate the conduction of the interviews.

To start the interviews, I sent emails to the chiefs/directors of EMS agencies in the State of Delaware (Appendix B). The email includes information about the researcher, the study plan and purposes, and a request to provide the contact information of EMS providers working in the agency in order to contact them and set appointments for interviews. I was able to access some of the EMS agencies and interview EMS providers, but, unfortunately, not all agencies granted me this access.

My professional background and experience as a nurse, EMT, and paramedic facilitated my task in exploring respondents' expected behaviors and the factors that could potentially influence their decisions. This is because I have a fair understanding of EMS work and challenges, which helped me to develop rapport with those providers and understand their work-related problems. Furthermore, my professional background was really useful in understanding the acronyms and jargon used by many participants. Being knowledgeable of the "jargonized symbolic" language used by some specific groups is highly likely to enable the researcher to implement good interviews (Berg & Lune, 2012).

### **3.1.1.2 Sampling**

Probability sampling is not necessary in qualitative studies because generalization is not a goal for qualitative studies. Rather, the understanding of the phenomenon under study is the goal. Therefore, I used a purposive sample, the sampling strategy most commonly used in qualitative studies. Qualitative researchers want to “discover, understand, and gain insight and therefore must select a sample from which the most can be learned” (Merriam, 2009, p. 77). In purposive sampling, the researcher must choose the selection criteria that are appropriate for the study of interest. For this study, frontline EMS providers from different places, experience, gender, and scope of practice were selected for interviews from the State of Delaware.

Although there are four levels of certification and scopes of practice for EMS providers as discussed in an earlier chapter, this study is conducted on EMTs and paramedics. Emergency Medical Responders (EMR) are EMS providers who are fire fighters or police officers, and are certified as EMR as a requirement for their jobs. EMR is not a stand-alone EMS profession, and these personnel were therefore not a part of this study. Advanced Emergency Medical Technicians (AEMT) are leveled between EMTs and paramedics, and are becoming a minority in the EMS, because the trend is to either become an EMT or paramedic. Therefore, EMTs and paramedics are the two EMS provider groups of interest for this study. These two provider groups have two different levels of training, certification, and differing scopes of practice, and in turn, are expected to have different views when it comes to care for patients with a possible infection from an emerging disease outbreak. Although knowledge and training are more likely to be characteristics associated with less concern around working during pandemics, there are some contradictory studies about their effect (Watt et al., 2010). This contradiction becomes more prominent when it comes to the

virulence of the infectious disease under study, as more knowledge about a virulent disease could increase the providers' concerns (Watt et al., 2010).

A review of the literature showed that experience and prior exposure may influence risk perception and willingness to work with controversial results, therefore, the recruited sample is a mix of EMS providers who experienced prior pandemics such as the 2009 swine flu and EMS providers who do not have any prior pandemic experience to explore the effects of this factor on their views and perceptions. Moreover, given the importance of family members when it comes to willingness to report for duty, the recruited sample included providers with families including spouse and children, and providers without. I focused on having a sample with diverse family status in order understand the effect of family on the EMS provider, since most research studies show that healthcare providers are more concerned about their families than themselves, and it is therefore reported to be the barrier that is most often cited by responders (Connor, 2014; Dimaggio et al., 2005).

Confidence in employer was also reported to influence workers' willingness to work, and I therefore selected responders from different EMS agencies to explore different views about the employer effect. Also, employment status (full-time, part-time, and volunteer), mentioned by the participants themselves were influencing factors, so I interviewed participants with different employment status as well.

To select a sample for the interviews and later for the survey, I needed to have different EMS agencies. The State of Delaware, while relatively small, has a diverse EMS system that addresses the range of the factors included here in the sampling section and in the previous chapters. Additionally, the close proximity and accessibility to these agencies make the EMS providers in the State of Delaware the

appropriate target population. Given that EMS systems are varied across the county and the world, below I provide an overview of the EMS system in the State of Delaware, where the interviews and later the survey were ultimately conducted. There are two subsections here: EMS organization, and training and continuing education. This brief overview provides important context for better understanding of the results to follow.

### **3.1.1.2.1 EMS Organization**

The goal of EMS system in the State of Delaware is to “provide the right level of care at the right place and the right time and transport to the appropriate care facility” (DEMSOC, 2015, p. 7). While EMS systems are varied across the states, they are also varied between the jurisdictions of each state. Delaware is a small state with a population of less than a million. There are three counties in Delaware with three different EMS systems. The Basic Life Support (BLS) services are provided by a total of 54 ambulance agencies that include paid and volunteer EMS providers. BLS services are provided by fire departments and fire companies. The vast majority of EMTs who provide the BLS services are cross trained EMTs and fire fighters. BLS providers could be full-time, part-time, or volunteers.

Advanced Life Support (ALS) services are provided by the three counties as well. Paramedics who provide ALS services have their own stations, which are distributed across the state. State regulations dictate that ALS service-provider positions are staffed as full-time. ALS services are provided through a system of chase paramedic units operated by the counties. ALS units respond in conjunction with the BLS transport units on an as-needed basis (DEMSOC, 2015). That is, in case of a 911 call for a sick or injured patient, the BLS ambulance staffed with two EMTs will be

dispatched to the scene. After assessing the case, if the patient needs an advanced care, the ALS unit will be dispatched to the scene. The ALS unit is a specialized vehicle, staffed with two paramedics, and equipped with supplies to provide ALS-level care.

The Office of Emergency Medical Services (OEMS) is the government agency that ensures the quality of emergency care services through the coordination and evaluation of the emergency medical services system. The OEMS is part of the Emergency Medical Services and Preparedness Section in the state. This section, which belongs to the Division of Public Health, includes the Office of Preparedness, and the Office of Emergency Medical Services. The Delaware Emergency Medical Services Oversight Council (DEMSOC) was formed to improve the EMS, and is charged with monitoring Delaware's EMS systems in order to ensure that all elements of the system are functioning in a coordinated, effective, and efficient manner (DEMSOC, 2015).

Scheduling of EMS providers is varied according to the EMS agency. Some EMS providers work 12 hour shifts while others may work 24 hour shifts. Due in part to the low wages of EMS providers, many of them work part-time in other locations in addition to their full-time jobs. Across the state, there are 1,506 licensed EMTs and 296 licensed Paramedics (DEMSOC, 2015).

#### **3.1.1.2.2 Training and continuing education**

EMS personnel provide patient care and transport by following standing orders under the license of the medical directors in their designated areas. These standing orders are the standard protocol of treatment for all patient presentations. Given that not all patient presentations are clear-cut, sometimes EMS providers need to call their medical director for further instructions to provide the best possible care and transport

(Delaware Office of EMS, 2014). While handling patients with infectious diseases falls generally under similar protocols (Delaware Office of EMS, 2014), during disease outbreaks new protocols and guidelines may come into play.

EMS providers are required to obtain a certain number of hours of continuing education to refresh old and learn new knowledge and skills. Continuing education is required for providers to be able to renew their professional licensing and to practice their job (NREMT, 2017). Just-in-time training, which is the training that providers receive for immediate application on the ongoing event, along with the continuing education is very important during disease outbreaks. It helps providers learn and be trained on the specifics of the newly emerging infectious disease in terms of its characteristics and how to approach and handle potential cases.

EMS providers are required to obtain a high number of hours of continuing education compared to other healthcare providers. This might be due to the high diversity of case presentations that they expected to face, and due to the scarcity of some diseases and injuries that they need to keep trained on. Disease outbreaks are among those uncommon case presentations for which EMS providers should be trained on to keep their skills sharp. EMS providers are trained to wear PPE appropriately for the day-to-day kind of patients with infectious diseases. However, when it comes to using a specialized PPE that might be required for highly infectious disease outbreaks, such as the Ebola kits, they need to have specialized training to be able to use them appropriately. These kinds of suits that used to cover the whole body requires advanced training on “donning” and “doffing”.

The first Ebola case diagnosed in the United States as in a person who had traveled from a West African country in September 2014. When two nurses contracted

the Ebola disease in a hospital in Texas, it was like a wake-up call for the healthcare system in the country (CDC, 2014). EMS systems were rushed to develop protocols and policies to handle the potential outbreak. Some EMS systems designated specialized unit(s) to dispatch to potential cases, while others provided the equipment and training for everybody in the frontlines. In the State of Delaware, EMS providers were given Ebola kits to be kept in their vehicles at all times. They were trained on how to use these kits when needed. All EMS agencies made their frontline workers aware of the potential risk and provided them with the protocols and guidelines on how to approach and manage potential cases. The dispatch centers were informed to ask certain questions to all 911 callers. These questions look for a recent travel to some West African countries or being in contact with patients known to have Ebola, which in turn help in warning the dispatched EMS providers about potential cases.

During the Ebola outbreak, EMS agencies had adopted different policies to handle patients with potential Ebola infection. For instance, in New Castle County, Delaware, specific units were assigned to respond to, and transport potential Ebola patients. They were provided with the appropriate resources along with specialized training to handle such cases. On the other hand, in Sussex County, Delaware, there were no assigned units to do the transportation, but it was only the paramedics who are supposed to dispatch and handle cases of potential Ebola infection. The reason for limiting this task to paramedics is to limit the number of EMS providers who will be in contact with potential cases while providing the best quality care. In such situations, paramedics are the best fit for this task as they are the highest trained EMS providers. Due to the role that paramedics are expected to do in case of Ebola outbreak, paramedics have received a considerable amount of training tailored to Ebola

infection. Along with the Ebola kits, every individual paramedic was trained on how to use the kit, and how to properly put on and take off the protective gear without contaminating themselves.

### **3.1.1.3 Conducting Interviews**

The first two interviews were conducted on May 18<sup>th</sup>, 2016 as pilot interviews. I conducted these two interviews, transcribed them and developed my memos and notes. I then discussed with my academic advisor the participants' views and appropriateness of the interview responses. This discussion helped me in developing my interview skills when it comes to probing questions and listening skills. Also, following the discussion, I made minimal changes to the interview guide. Interviews were conducted in-person and, with the permission of the interviewees, all were audio-recorded using two digital recorders.<sup>1</sup> Interviews were conducted in compliance with the University of Delaware's Institutional Review Board (IRB) standard, approved on April 27<sup>th</sup>, 2016. The IRB approval and the informed consent form are included in the Appendices C and D, respectively. At the beginning of each interview, I asked the participant to read and sign the informed consent before we began. Each participant was given a copy of the informed consent for their records.

To conduct interviews, I was given the contact information of the contact personnel in the assigned EMS stations that I have access to. Those contact personnel were very helpful in facilitating the conduction of interviews and in the selection of the sample. That is, before each interview, I used to ask them what type of participant

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<sup>1</sup> Two digital recorders were used to avoid any possible technological issues with audio recording.

I want to interview in terms of gender, experience, and working status, and they were helpful in finding the appropriate participant. I used emails and phone calls with the contact personnel to schedule dates and times to come to the stations and conduct interviews with the on-duty EMS providers. This was the most convenient time for participants given the fact that participants could be dispatched to a call at any time during the interview, which in fact had happened. Given that EMS stations are relatively big, I was able to conduct the interviews in isolated spaces with minimal disruptions and noises.

The interviews were conducted in three different EMS agencies. Two of them are fire-based EMT agencies in New Castle County, and the third one is a paramedic agency in Sussex County. There was no pattern of conducting interviews between these stations. All was dependent on the availability and time of the researcher and contact persons, and the potential participants in the selected agencies.

There is no specific number of interviews a researcher can adopt to answer the research question. The number of interviews needed to answer a question is rather dependent on the nature of the identified research question and study participants to reach the theoretical saturation. Once the information reached the saturation state where more interviews started to add nothing to the existing data and codes, I stopped doing more interviews. I ended data collection after having 14 interviews with EMTs and 8 interviews with paramedics, with a total of 22 interviews. The length of these interviews ranged between 25 minutes and 72 minutes with the majority of the interview lengths of about an hour. I was satisfied with the information I obtained to perform an appropriate analysis.

#### **3.1.1.4 Data Analysis**

The purpose of data analysis is to reduce the data volume, interpreting what people said, what the researcher has seen and read, and ultimately answering the research questions (Merriam, 2009). At the end of each interview, there were the interview recording, field notes, a memo of reflections, and ideas for the coming interviews. Although data analysis is described here in a separate section, in the real study, data analysis started and continued along with the data collection time. After doing a couple of interviews, I started transcribing the audio recordings while I was also doing the interviews. The transcribed interviews were entered into the ATLAS.ti, a software that assists in interview coding and analysis.

After conducting a total of 13 interviews, I stopped conducting interviews and focused more on the analysis. After analyzing these interviews and knowing the trends, themes, and gaps in information, I, again, resumed conducting interviews with minimal changes to the interview guide. The later nine interviews were more focused on the areas that were not fully explored during the former interviews. Also, in the later interviews, I addressed the gaps in participants' demographics including gender, years of experience, marital status, and employment status.

##### **3.1.1.4.1 Data Coding and Themes Development**

I adopted an inductive approach in analyzing data since there were no predetermined themes or a framework. After transcribing each interview, I thoroughly read it and noted anything that stood out to me regarding recurring themes. I started a "pre coding" by coloring and highlighting the significant participant quotes that would potentially become codes or themes after further analysis (Saldana, 2013). After that I entered the transcribed material into the ATLAS.ti software for further analysis and

coding. Once the transcriptions were in the software, I started “open coding”; a process by which all potentially useful and relevant data for answering the research question will be coded (Merriam, 2009). A code in qualitative data analysis is “a researcher-generated construct that symbolizes and thus attributes interpreted meaning to each individual datum for later purposes of pattern detection, categorization, theory building, and other analytical processes” (Saldana, 2013, p. 4).

There are several methods of coding depending on the nature of the study. My study topic looks for the differences between the participant views about the topic of interest and the factors influencing their decision making. Therefore, the methods I used in the first cycle of coding are initial coding including versus, and in vivo coding. Initial coding is appropriate as a starting point that need further exploration to determine the direction of the study (Saldana, 2013). Given that a good bulk of the interview questions was focused on comparing day-to-day operations, natural disasters, and disease outbreaks, one of the main coding methods that I used was the versus coding. I used this coding method to code material that compares natural disasters with disease outbreaks, EMTs with paramedics, fire-based and government-base EMS, and so forth. I also used the in vivo coding because the participants used some unique concepts indigenous to their culture and nature of work. For instance, “adrenaline junkies”, and “zombie outbreak” are concepts that have special meaning in the EMS culture. Some of these in vivo phrases also used as themes.

While new codes were created along with the coding process, after coding a few interviews, I started to use the existing codes and very few codes were developed thereafter. I labeled each code with a description definition so I can keep track of the exact meaning of these codes. This also helped me in using these codes for more

quotations through the process of coding. It was not uncommon to go back and refine or change the code name to make it a better fit for the new material. After coding transcripts in their entirety, there were a total of 105 codes. I, then, went back over these codes and refined them and merged similar or close codes together, which reduced the number of codes from 105 to 80. This is because it was difficult to memorize and reuse the appropriate code once the number of codes becomes large. So, the intention was not to reduce the number of codes, rather, it was to make sure that there were no codes that had similar contents.

Once I had all codes in hand, I started the second cycle of coding. Again, I reviewed the codes and their quotations and merged some of them that had low frequency to end up with 58 codes. This was done following a thorough review of the quotations in each code where close quotations merged together in one code. To make these codes more meaningful, I classified the codes into groups and categories where each category has relevant codes. This is also known as *families* in the ATLAS.ti software. The notes, memos, and codes were used to develop these categories. I used code names and definitions to determine how these codes are relevant and related so they can be grouped into categories. Having categories of all relevant codes, I started reading through the quotations of these codes to explore similarities, differences, patterns, and trends of the participant views for each code that answer a question of the interview guide. Themes were developed from the views of participants within these categories along the notes and memos. The developed themes were compared and contrasted with the literature available. Some of the developed themes are congruent with the available literature, others are contradicted, and some are new.

I used different techniques to develop themes. I was looking for transitions in the text content such as the change between paragraphs. Also, I was looking for similarities and differences within and between interview transcripts by making a systematic comparison across the material in each category. For instance, when asked about their views about working in natural disasters, many participants view this work as “the excitement part of their job.” This was a new theme that was not addressed in previous studies. In comparing natural disasters with disease outbreaks, participants show different views that sometimes contradict with each other. This also was an area of theme development.

After completing the analysis of the first 13 interviews, some of the topic areas were not fully covered and validated, and in some other areas there were some gaps in information. At this time, I went back to the field and resumed interviews with new participants. Although the process of interviews started as highly inductive, in the second phase of interviews, themes are more obvious and the new data served as giving more evidence to the presented themes and filling the gaps where needed. At this point, the process became more deductive than inductive as the interview questions became more focused and more specific.

Following each interview in the second phase, again, I developed notes and memos, and then I compared the information I gained from the interview with the codes, categories, and themes that I already have. These new interviews validated the majority of the existing codes and themes, changed some others, and created new ones. Once data analysis started to add nothing to the themes, I considered that the analysis had reached the saturation state with a total of 22 interviews.

### **3.1.1.5 Quality of Data Analysis**

Every study has its biases and threats to validity, because all research methods have their limitations (Whittemore, Chase, & Mandle, 2001). To ensure the credibility, authenticity, and integrity of this work, I used multiple techniques to overcome the inherent limitations of the research method I used. Drisko (1997) suggested and described six criteria for evaluating qualitative works. From those criteria, I applied four in my study. I specified the goals and audience of the study; I specified the methodology employed in satisfactory details as discussed in the previous sections; I maintained social work ethics by obtaining a prior written consent from each individual participant before starting the interview; and lastly, I provided consistent conclusions with the study data.

Credibility of the work is ensuring the accurate interpretation of the meaning of the data (Whittemore et al., 2001). To ensure the credibility and validity of the work, I asked qualitative research experts as well as experts in pandemic management to review the proposal and the interview guide before conducting the study. This ensured that the content and the process of data analysis are appropriate and valid. Additionally, to ensure the credibility and integrity of the analysis, after completing theme development, I asked the EMS contact personnel, and the participants who hold administrative role about the themes and findings. Some of them mentioned that they are not surprised with these findings, which means that these themes are congruent with the participants' views. This feedback was also considered a validation of the quality of the analyzed data (Ryan & Bernard, 2000).

In the presented analysis, I included extensive reporting of the raw data in the form of quotations from the participants themselves, which allows the readers to assess the accuracy of data interpretation and establish credibility of the analysis.

Also, the completeness and saturation is one of the criteria for assessing the quality of data analysis (Drisko, 1997). In this study, I stopped conducting interviews when the new interviews started to add no more information to the existing data and codes, which is known as the saturation state (Merriam, 2009).

### **3.1.2 Phase 2: Quantitative Approach**

As mentioned earlier, qualitative studies are appropriate to understand phenomena that need exploration. In the first phase I was looking to understand the views of EMS providers about working during disease outbreaks, and the factors that may influence their decisions. The quantitative approach is used to assess the breadth of the study topic by recruiting a bigger sample compared with the qualitative approach. To answer the third and fourth research questions, I needed to assess the extent to which EMS providers are willing to work during disease outbreaks and the factors that may influence their decision. The quantitative approach helps the researcher develops some statistics to assess percentages and potential significant relationships between the study variables, and ultimately answer these research questions.

There are many approaches for quantitative method. For this research study, I selected the survey questionnaire as the appropriate approach. The advantage of the survey is “the ability to generalize about an entire population by drawing inferences based on data drawn from a small portion of that population” (Rea & Parker, 2014, p. 7). Due to increased technological advances and the widespread availability of internet services, the online survey approach is becoming popular and convenient for both researchers and participants. This approach has many advantages over the traditional mailed-out survey technique. While it is a convenient and efficient way of reaching

potential participants, it also provides a rapid data collection with a significantly less cost. However, low response rate and selection bias are among the main disadvantages of the online approach (Rea & Parker, 2014). This was also the appropriate choice given the difficulty in accessing the contact information of EMS personnel in the State of Delaware and elsewhere. This is because email and mail addresses are not disclosed information and are not accessible for research purposes.

### **3.1.2.1 Questionnaire Development**

The interview analysis resulted in interesting findings that are presented in the next chapter, the interview analysis and findings. These findings were the cornerstone for the development of the questionnaire content. I also benefited from the available literature to develop the survey questions. To assess the respondents' views about working during disease outbreaks and the factors influencing their decision-making process, I developed a case study scenario at the beginning of the survey. The scenario is followed by two main questions that look for the participants' expected behavior in response to the scenario. I also developed categories of questions inspired by interview findings and covering the potential influencing factors. When I discussed the appropriate length of the survey with research experts and administrators from the EMS, I was advised to make the survey as short as possible to obtain better responses. Additionally, given that online surveys are known for their low response rate, I tried to shrink the number of the questions. I ended up with a total of 56 questions with an average length of 8 to 10 minutes to complete the online survey.

The content of the questionnaire is separated into categories that have related questions. As shown in Appendix E, it starts with a scenario of a disease outbreak happening outside the United States. The scenario outbreak escalates and by the time

it reaches the area where the provider works, and resulting in infections and an exposure in the workplace. The scenario is followed by two main multiple choice questions asking about participant's potential attitude in such situations. Both questions have five similar answer options, which express low to high willingness to work. In the second question, I exclude the exposure among co-workers from the scenario to assess the effect of the exposure variable on their decisions, and also to assess their views in case there is no workplace exposure.

The first category following the scenario includes questions that ask respondents to rate their concerns about different conditions of disease outbreaks related to the given scenario. The section has nine related Likert-scale type questions with five choices ranging between not at all concerned to extremely concerned. In the next category, there are seven questions asking about confidence in employer with five point Likert-scale type choices ranging between not at all confident to very confident. There are also additional four questions about the responsibilities of the employer with answers ranged between strongly disagree to strongly agree. Next, there are seven questions about family safety with five of them Likert-scale style with five choices ranging between strongly disagree to strongly agree. The other two questions are nominal type questions. Knowledge and training category comes next and encompasses five questions with five points Likert-scale type choices ranging between strongly disagree to strongly agree. Then, four questions about workplace culture with five point Likert-scale choices ranging between strongly disagree to strongly agree. The final category of related questions is about work obligation. Again, this category has eight questions with five points Likert-scale choices ranging between not obligated and obligated. The questionnaire ends with multiple choice questions about the

participants' demographic information. The survey starts with a scenario and kept the demographic information to the last to make the survey more attractive to potential participants and enhance better responses.

To ensure the appropriateness of the content and language of the survey, I asked expert EMT and paramedic personnel to review and comment on the content and language of the questions. I made some changes on the content, flow, language, and number of questions based on the feedback from those experts.

To design and develop the online survey, I used the UD-Qualtrics System, a software helps in developing, distributing, and analyzing online surveys. I entered the questions and categories according to the sequence mentioned earlier. Additionally, at the beginning of the survey, I developed an online informed consent, so the responders can read and agree to the conditions of the study before they start the survey questions. All questions are close ended questions, which are either Likert-scale style that have five options or multiple choice with variable number of options. In some selected questions, respondents can choose more than one option like the service area and work level. Qualtrics software is smartphone friendly, meaning that respondents can take the survey using their smartphones. The survey has also a progress bar that helps respondents to keep track of the time remains to complete it.

To ensure the confidentiality of the study respondents, the Qualtrics software is password protected, and only the principal investigator has access to the information. The study obtained the IRB approval to conduct interviews. I also applied for an IRB amendment to perform the survey, which was approved on February 24<sup>th</sup>, 2017. Additionally, there are no questions about the participant's name, place of work, or any other indefinable information.

### **3.1.2.2 Sampling**

To perform an online survey, you need to have the email addresses of the population of interest in order to be able to contact them and send the survey. The state office of EMS in the State of Delaware had already provided me with the contact information of the chiefs/directors of the EMS agencies in the state. I had previously contacted them by email and phone during the interview phase to ask about the contact information of their EMS providers. Unfortunately, I did not obtain any responses from them.

I contacted the National Registry of Emergency Medical Technicians (NREMT) and asked them to provide me with the contact information of EMS providers in the State of Delaware. They replied that they cannot disclose their members' individual information, but they can do the study on a national sample on my behalf if my request is approved by the review committee. I then submitted the request application with all required documents. Unfortunately, my request was not approved by the review committee saying that the NREMT had done a relatively similar study in 2010 (Barnett et al., 2010), and there is no need to repeat the study.

I also looked at the State of Delaware's Division of Professional Regulation. The licensing verification service discloses information to the public about EMS providers. While city, state, and zip code information are available online, the street and email addresses are not disclosed. Also, I contacted the state to obtain the information through freedom of information act (FOIA), but the office representative responded that the requested information is "not public information and cannot be disclosed".

The last option was to go back to the Office of EMS in the State of Delaware. I met with the director of the OEMS and asked her if they can provide me with the

contact information of EMS providers across the state. Again, since they cannot disclose individual information of EMS providers, and they do not have the updated contact information, they offered that I provide them with an introduction paragraph and a link to the online survey. They could send it to the EMS agencies across the state and ask them to disseminate the study link to their frontline providers through email.

To include more potential participants given the small EMS population in Delaware, and make comparative groups, I contacted an EMS administrator in the State of Maryland asking about the potential of doing the online study in Maryland as well. I obtained a positive response, and the Office of EMS agreed to do the study on their providers. The Maryland Institute of Emergency Medical Services Systems (MIEMSS) is the agency that oversees and coordinates the EMS system across the state. MIEMSS is the agency that approve and coordinate research (MIEMSS, 2017). To make the survey appropriate to Maryland EMS, I did some minimal changes in the demographic questions, and the IRB amendment.

When it comes to the population of EMS providers, according to the 2015 annual report, there are 1,506 EMT's, and 296 Paramedics in State of Delaware (DEMSOC, 2015). In the State of Maryland, the numbers are much larger as there are 19,604 EMTs, 759 CRTs (cardiac rescue technician), and 3,562 paramedics (MIEMSS, 2016). Those are the population targeted in the study. For the EMS providers in the State of Delaware all EMS providers are included in the study, and they supposed to have equal chances of participation. For the EMS providers in the State of Maryland, MIEMSS is supposed to disseminate the survey to the potential participants across its all jurisdictions.

### **3.1.2.3 Data Collection Procedure**

When the survey development was completed, I applied for an amendment to the IRB application. The amendment was approved on February 24<sup>th</sup>, 2017. Following that, I sent an email to the Delaware Office of EMS that contains the introductory paragraph and link. Also, I sent the same introductory paragraph and a different link to the Maryland Office of EMS. On February 27<sup>th</sup>, 2017, I started to receive survey responses from Delaware.

On March 15<sup>th</sup>, 2017, and after about two weeks from the first email, a reminder email was distributed to the EMS agencies in the State of Delaware in order to enhance the response rate. In this email, I notified participants that they had the chance to participate in the study until March 27<sup>th</sup>, 2017. After that date, the link became inactive for accepting additional surveys. For Maryland, the first survey response was received on March 9<sup>th</sup>, 2017. On March 25<sup>th</sup>, 2017, again, I sent a reminder email to the EMS office in Maryland so the office can remind potential participants to complete the survey before the deadline, which is set to be on April 5<sup>th</sup>, 2017 for Maryland, two weeks following the first email.

Once the survey was completed and submitted by the respondents, the response is automatically saved and protected in the Qualtrics software. The researcher needs to open the software and access the selected survey to be able to use the data available from respondents. The software enables for the transfer of the collected data into the Statistical Package for the Social Sciences (SPSS) for further analysis. SPSS is a program that is widely used for quantitative data analysis, basic and advanced.

#### **3.1.2.4 Data Analysis**

Once data collection was completed by the assigned deadlines, I changed the status of the survey to inactive mode, and no more surveys could be completed thereafter. Then, having all data saved in the Qualtrics software, I transferred these data into the SPSS, version 24, for further analysis. I cleaned the data in the SPSS, and ensured the accuracy of the data transfer before starting the analysis. To facilitate tracking and working with variables, I developed a codebook where I used shortened names to identify variables and categories (Appendix F).

There are two data sets for the survey, one from EMS providers in Delaware, and the other from EMS providers in Maryland. The questions in both surveys are similar except for some of the demographic questions. Data from both sets were merged together for analysis when appropriate.

The survey question types varied including nominal, dichotomous, interval, and Likert-scale type, with most of the questions using the Likert-scale type. In Likert-scale and nominal type questions, categorical and ordinal methods of data analyses are appropriate. While Likert-scale questions are sometimes analyzed as if collected on an interval scale, this is considered a controversial approach by many scientists (Boslaugh, 2013). This is because the increment between the alternatives is not ensured to be the same, which is a condition of interval data. Therefore, for this study, I use categorical and ordinal methods of data analysis.

After performing descriptive statistics to all variables and collapsing them when appropriate. I performed cross-tabulation to assess the relationships between variables. I also used the chi-square test for independence ( $\chi^2$ ) to explore the relationship between the independent variables and dependent variables. The chi-square test can determine whether a significant relationship between variables exists or

not. The chi-square test “seeks to identify whether any differences among the categories of the variables in the sample are genuine or merely the result of sampling error” (Rea & Parker, 2014, p. 213). The chi-square test is appropriate for interval and nominal variables, and can be used with variables that have two or more categories.

For the purpose of this study, alpha level of 0.05 was used to assess the level of significance. This means that the chi-square result interpretation is 95% correct. There is only 5% chance of incorrectly rejecting the null hypothesis. If the chi-square test has an alpha level below the assigned 0.05, we can reject the null hypothesis that says there is no relationship between variables, and we can assume a significant association between the tested variables.

The chi-square test examines the null hypothesis that assumes that there is no relationship between the tested variables. While the chi-square test determines the presence or absence of a significant relationship, it does not determine the strength of the relationship. There are many statistics available in the crosstab procedure to assess the effect size. The most commonly used are the Cramer’s V and Phi tests (Pallant, 2011). Phi coefficient can be ranged from 0 to 1 with higher values indicating a stronger association, and is only appropriate for 2 by 2 tables. For tables larger than 2 by 2, Cramer’s V is one of the best tools of measures of association for nominal data, as it takes into account the degree of freedom (Rea & Parker, 2014). The possible values for the Cramer’s V test is the same as Phi test and range between 0 and 1, with 0 representing no association and 1 representing a perfect association. For this study, Phi and Cramer’s V results were interpreted as: .3 and below is small effect; .3 to below .5 medium effect; and .5 and above for strong effect. The Fisher Exact Test is

also used if any of the cells in the cross-tabulation has frequencies less than 5 (Boslaugh, 2013). This test, however, is only applicable for 2 by 2 tables.

## **Chapter 4**

### **INTERVIEW ANALYSIS AND FINDINGS**

This chapter discusses the views, opinions, and insights of EMS providers to work during disease outbreaks, and the factors that may influence their decisions whether or not to come to work. I start with a brief introduction about the interviews including a table of demographic characteristics of the study sample. More details about the demographics of the study sample are discussed later in this chapter. There are two main sections within this chapter. The first discusses the views and opinions of participants regarding to the decision to work during disease outbreaks, and the second discusses the factors that influence the decision to come to work. These are, in fact, the answers to the first two research questions of the study.

In the first section, I start by comparing the views of participants about working in day-to-day operations, natural disasters, and disease outbreaks in terms of risks and concerns of participants. It was necessary to start with the views about day-to-day operations and natural disasters so participants and I had a base and reference in understanding their insights and opinions on working during disease outbreaks.

In the following section, I discuss the main influencing factors for coming to work during disease outbreaks. The discussion includes an analysis of the main themes that emerged from the views of the participants, which are supported by direct quotations when appropriate. Factors that are discussed in this chapter are family obligation, training and skills, resources, self-safety, disease pathogenicity, employer, workplace culture, and work obligation. These are the main factors that could

influence the decision to come to work as discussed in the existing literature and also explored in my interviews. Following that, I describe participant demographics and their potential effects on reporting for duty. I kept demographics to the end, because I discuss more important influencing factors at the beginning like family and resources. At the end of the chapter, I provide a brief summary of the important findings.

It is important to mention here that when I started conducting the interviews in summer 2016, the Ebola outbreak was yet to be eradicated. EMTs and paramedics along with other providers from the larger healthcare system were under the alert of the Ebola outbreak that was happening in West African countries, with a handful of cases reported elsewhere including the United States. EMS agencies provided the ambulance units with Ebola kits, and some of these agencies have trained their frontline workers on how to use them. The Ebola outbreak was clear in the respondents' minds throughout the interviews, which helped by giving me an example for assessing their views.

#### **4.1 The Interview Sample**

Face-to-face interviews were conducted with EMS providers from the State of Delaware. A sample of 22 subjects participated in these interviews. Interviews' lengths ranged between 25 to 72 minutes. All interviews were conducted in the EMS stations while participants were on duty. As shown in table 4.1 below, the interviewed participants were diverse in terms of gender, employment status, work experience, marital status, and scope of practice. Demographic characteristics of the sample and their effects on the decision to work during disease outbreaks are discussed in a separate section later in this chapter.

Table 4.1: Demographic information of the interview sample

Case	Job title	Work status	Years of Experience	Gender	Marital status	Children
1	EMT/Shift supervisor	Full-time	20	Male	Long-term relation	One
2	EMT/Shift supervisor	Full-time	20	Male	Married	None
3	EMT	Full-time	3	Male	Married	None
4	EMT	Part-time	2	Male	Single	None
5	EMT	Full-time/volunteer	13	Male	Single	None
6	EMT	Full-time/part-time	11	Male	Divorced	One
7	EMT	Full-time	26	Male	Married	None
8	EMT	Full-time	13	Male	married	None
9	Paramedic	Full-time	4	Female	Married	None
10	Paramedic	Full-time	8	Female	Divorced	Two
11	Paramedic	Full-time/volunteer	14	Female	Single	
12	Paramedic	Full-time	25	Male	Married	Four
13	Paramedic/Education coordinator	Full-time	30	Male	Divorced	Four
14	EMT	Full-time/part-time	4 years	Female	Single	None
15	EMT	Part-time	<1 year	Female	Single	None
16	EMT	Full-time/part-time	16 years	Male	Marries	Three
17	EMT	Full-time/part-time	8 years	Male	Long-term relation	One
18	EMT	Full-time/part-time	7 years	Male	Married	One
19	EMT	Part-time/part-time	6 years	Female	Married	Two
20	Paramedic	Full-time	15	Male	Married	None
21	Paramedic	Full-time	15	Female	Divorced	Two
22	Paramedic	Full-time/part-time	20	Male	Married	Two

## **4.2 Responding to Natural Disasters vs. Disease Outbreaks: Is there a Difference?**

I started the interviews by asking participants about their views regarding work during day-to-day operations, and compare that with working during natural disasters like flooding and hurricanes, and working during disease outbreaks. This helps both the participant and me to have a reference and a base concerning how work during disasters and disease outbreaks is compared to day-to-day operations. All participants viewed day-to-day operations as “another day of work” where they provide care for sick and injured patients. Their call volume could vary significantly. Their work shifts could be very slow or very busy, which depends on many factors such as the time of day, day of the week, season, location of the EMS unit, and average call volume in each particular unit. Their views to working during natural disasters and disease outbreaks are dramatically different however. The next two sections discuss participants’ views about working in those two situations.

### **4.2.1 Natural Disasters: “Thrill Seeking”**

When I asked participants to express their views about working during natural disasters compared with their day-to-day operations, different views and insights emerged. Here I describe three of the most common themes in their responses. In the first theme, some participants said that they have no problems with responding to natural disasters and that they are well trained to work in mass casualty incidents like hurricanes and earthquakes. Some participants went beyond that and considered responding to natural disasters as the exciting part of their job.

P4: The huge disaster or terrorist threat that can happen, that is the exciting [part] of the job...it keeps me motivated, because this is something that I have trained to do. This is ideally what I want to do.

P4: Kind of look like adrenaline junkies...[EMTs] like the excitement... they want to be there, everybody wants to be there to get that thrill.

P12: Everybody in the EMS is pretty motivated. People who do this are motivated and they want to volunteer, they want to be part of whatever takes place, and get involved.

P12: I think [responding to natural disasters] is little more interesting. It's just a little bit different than what we do every day.

Other participants did not share the same enthusiasm about responding during natural disasters. In the second theme, participants voiced concerns about their safety and the safety of their families. It is the unknown-type situations and lack of experience that concern providers. Most of these concerns are not related to their job itself as EMS providers; rather, they are more concerned about family safety and transportation barriers and risks. However, these concerns would not keep them from performing their jobs.

P14: It is a stressful situation, so it is nerve-wracking, because if you do have an incident, then you have to make sure that we don't endanger ourselves trying to get to the place.

P18: In natural disasters, the first thing you're gonna figure out your family is okay, and then you're gonna do your job and make sure everybody else is okay. On day-to-day, I know my family is safe.

In the third theme, participants noted that EMS providers found themselves in unsafe situations virtually on a daily basis. For instance, an EMS provider could be dispatched to a routine call and end up in an active shooting scene. As such they felt that there are no real differences between working in everyday operations and working

during natural disasters. Even with communicable diseases, many participants highlighted that they are sometimes working with patients who have infectious diseases for which EMS providers have no vaccines, and still provide care for them.

P5: [Responding during] disaster isn't any different than anything else. It is just the number of people you have in the bad day.

P11: We work out in the field and anything can happen, somebody could be crazy with a gun and shoot [while you are entering] the door. You can go into a fire, and a floor fall on it, and you die. Like, there is risk with everything.

#### **4.2.2 Disease Outbreaks: “A Little More Concerning”**

When participants expressed their views and feelings to working during day-to-day operations and natural disasters, I asked them to compare that with the work during disease outbreaks, in terms of concerns and barriers. Two themes emerged from their views. In the first theme, participants were more concerned about working during disease outbreaks when compared with normal conditions or natural disasters. Participants, who consider working during disease outbreaks as a concern, mentioned the following:

P3: [EMS providers] could potentially spread [disease] to innocents who are not involved in the situation...So there is some anxiety that comes with that.

P9: Natural disasters...we can't really prevent them, you know, they just happen and you deal with it. Disease outbreak, I think a lot of people have a lot of fear, and it's a lot of uneducated fear...People don't know about it as much, and the less educated they are, the more panicky.

P1: With an outbreak, if you don't completely understand what is causing it, how [a disease] is transferred, or what's even going on, then that's where the hesitation probably comes in with EMS people.

P2: In disease outbreaks, I think a lot of us are worried about taking it back home to the families.

In the second theme, participants did not see working during disease outbreaks as a concern. This group considered the risk of working during disease outbreaks the same as working in day-to-day operations as long as the EMS provider is aware of the risk and equipped with the appropriate protective gear.<sup>2</sup>

P5: It is no different dealing with just a sick person today than it is dealing with someone during a disease outbreak.

P8: I will not say people are still excited to come, but when it comes to something like that, I mean EMS providers, we are going to [listen to] the warnings, and prepare with any type of protective equipment, gear, we need to carry, and that is all that we need to do about it.

P17: I know when I started this job, in the long run, I understand that every day I can get a thousand different diseases. So, one new disease isn't gonna scare me. New diseases can just heighten awareness, that's all. So, when Ebola came out, ok, we will take the time to learn as much about it, to protect myself as much as I can. But it didn't make me wanna think twice about going to work or anything like that. That's what I signed up for.

P5: If I come across somebody [who exhibits] all the signs and symptoms of Ebola, I'm turning [this patient] over to somebody else to take care of that.<sup>3</sup>

It is important to mention that the Ebola outbreak in the US consisted of less than 10 cases, only two of which were from local contagion. Because of this, it was

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<sup>2</sup> It is important here to mention that during disease outbreaks, EMS agencies are supposed to activate their pandemic protocols, if they have them. This helps frontline workers obtain more resources, increases their awareness of the potential threat of infections, and in turn, helps them to be more protected.

<sup>3</sup> During the Ebola outbreak, some EMS agencies had assigned specific units with extensive training and specialized resources to respond to potential cases of Ebola patients.

easy to assign specially trained units in Atlanta, Texas, and the District of Columbia (D. C.) to transport Ebola patients (suspected or confirmed). This is quite different from a potential outbreak of something like SARS or H5N1 (avian flu), which could affect hundreds of thousands of people, or more. This would mean that all EMS providers would likely come in contact with victims of the disease, not just a dozen special cases. The broad epidemic, then, would present very different dynamics for EMS personnel.

While participants expressed varying concerns about working during pandemic conditions, everyone from both groups felt willing and obligated to come to work despite the perceived high risk for some of them. Yet, they were not “excited” to do this work, such as during natural disasters. Rather, they used less energetic statements like:

P3: It is kind of your job to continue, even though there is an outbreak.

P8: This is what I chose to do, knowing the risks associated with it.

P8: I will not wake up in the morning excited to come to work.

The aforementioned views and insights were influenced by many factors. While EMS providers seem to be very dedicated and willing to come to work during disasters and disease outbreaks, there are many factors that may influence their decision to come to work. Some of the factors could potentiate their willingness while others may hinder. In the following section, I discuss the main influencing factors that affect the decision-making process of EMS providers when they are asked to report for duty during disease outbreaks.

### **4.3 Factors Influencing Reporting for Duty**

During the early interviews that I have conducted, one of the challenges that I faced was that participants showed high levels of dedication and commitment for coming to work during disease outbreaks. While this is good news for EMS agencies and emergency managers, it was challenging for me to explore the factors that may influence their decision. As mentioned in the previous section, participants used statements such as, “this is why I signed up for this job”, “this is what I chose to do”, and “somebody has to do this”. So, it was difficult to ask participants about the barriers for coming to work during disease outbreaks if their answers, in the first place, were that they are coming. To overcome this challenge, I changed the direct questions to be third person questions. That is, I asked the participants about the barriers of reporting to work for someone who may decide not to show up as expected. Then, the participants started to mention some of these barriers. In the following sections, I discuss the factors that were viewed by the interview participants as the most important. I organize these factors according to their importance from the point of participants’ views. I include interesting quotations from participants that represent their insights.

#### **4.3.1 Family Effect on EMS Providers: “The Family Has to Come First”**

In this section, I describe the views of participants about the potential effect of the providers’ families on reporting to work during disease outbreaks. This section includes a discussion about vaccination of family members during a disease outbreak, providing shelter service for families, and overall potential effects of family on worker decision.

In my interviews, participants expressed that during disasters and public health emergencies, families are the main concern for providers, and the worst-case scenario is to take home an infectious disease and infect a family member.

P6: My ultimate concern will be I will make [my family] at higher risk

P2: In disease outbreaks, I think a lot of us are worried about taking it back home to the families

P3: [family members] are pretty much in the back of your mind constantly.

Fortunately, being always concerned about family safety or self, EMS providers have the potential of becoming more aware and cautious during disease outbreaks, and in turn may take extra care.

P4: Nobody here wants to take anything home. So, all the EMS providers are gonna take the extra steps to protect themselves. Because you don't wanna take the stuff home to your family. You don't wanna take it to your kids.

P3: If you are more concern about something, the more you are willing to protect yourself against it. So, it goes hand in hand ... if I know this outbreak is out there, I will be a little more cautious, probably I will look more about the signs and symptoms of the disease, what signs I'm looking for at this patient. Possibly [I] could go through the steps and try to protect myself a little better.

P12: I think [worry] keeps you safer because it's in the back of your mind [that] you want to make sure you do all [the safe precautions] right... Being scared could be good sometimes.

Participants expressed that family safety is more important for them than self-safety and duty to work. When I asked them to rank self-safety, family safety, and duty to work per their priority, all participants said: "family comes first", and "obviously, the family has to come first". Interestingly, even participants who live

alone without family, agree that family comes first, and they understand the importance of family for their co-workers. The reason why family comes first is cited by one of the participants as:

P1: I choose to do this [job]. My family didn't choose. My son didn't choose for me to be a fireman or EMT. So, he shouldn't suffer because I contracted something.

When it comes to self-safety and duty to work, some participants prioritized self over work, while others prioritized the work first. It is interesting to know that none of the participants put self-safety as a first priority. Self-safety is always the second or third in line.

I discussed with participants whether or not they believed that EMS work put providers' families at higher risk than the general population. This is because EMS providers come in contact with sick patients on a daily basis, and during disease outbreaks they are likely to be in close contact with potentially infected patients. Four themes emerged here for day-to-day and for disease outbreaks. In the first theme, the majority of participants believe that working in the field of EMS puts their families at higher risk of infection than the general public, because they are in close contact with sick people more than the general public.

P2: We are constantly exposed to sick people. So, I think the risk is higher to the family.

P9: The people I see on the day-to-day are sick or injured, as opposed to the people who work in an office... I think [our families] are definitely at higher risk.

P9: Do you take off always your fully uniform and change and shower before you hug your loved ones? Probably not.

P11: I think if I live with my family, that would make them at higher risk, because I could possibly bring in that stuff home to them.

In the second theme, the majority of participants believe that the risk of family exposure to infectious diseases spikes up during disease outbreaks, because there is a higher possibility of providers' exposure and taking something back home. As mentioned earlier, this is what concerns participants the most in working during disease outbreaks.

P10: The chance of me taking home whatever the outbreak is would probably be higher than the general exposure would be to it.

P3: I would say [disease outbreaks] would increase the risk, especially if you are not knowing you are in the place where there's definitely an outbreak. Hopefully you have the proper PPE and vaccinations, but there is always a small chance that you can possibly still bring it home to your family.

P8: I would say the risk would increase [during disease outbreaks].

It is noteworthy to mention here that not all participants in the first theme are the same in the second theme, which creates a third theme. That is, there are those participants who believe that they, and their families, are at risk of infection on a daily basis, because they deal with sick patients regularly. This risk, however, may not increase during disease outbreaks, because in such situations, providers become more prepared and required to have extra precautions. For this group of providers, family concern during disease outbreaks is not an issue, because they know that their awareness will be heightened.

P1: I think every day it does [increase the risk], but I don't think any more during the outbreak than it is in any day, because there is stuff every single day that any EMT can contract on the ambulance and unfortunately take back to the house.

P4: [During disease outbreaks], I don't think it's gonna be bad, just because the extra steps and equipment and stuff like that that will be taken, and you are more cautious.

P9: If it is a known outbreak with a plan in place, and we have appropriate PPE, you probably won't be any more at risk than already was prior to.

The last themes emerged from a group of participants who believed that generally families are not at higher risk either during day-to-day operations or during disease outbreaks. It is all dependent on the providers themselves to keep their family safe by taking extra precautions and complying with the proper infection control practices. Interestingly, many participants in this group are among those who have children in school. They believe that schools may put their children at higher risk of communicable diseases than from the EMS work of their parents.

P5: If I come to work and I have blood and stuff all over my boot or something, and I just get through my house, then yeah, [my family become at higher risk]. If I don't wash my clothes, if I just leave my clothes hanging out dirty somewhere, then yeah, absolutely. I need to take care of myself, I need to take care of my clothes, my gear, [and] my equipment. I don't think there is any higher risk than anybody else.

P12: No, I don't feel that way, because I do what I have to do. If I come to somebody that I believe had an infectious disease or something, I'm not gonna go home with my clothes I come to work in. I cleaned up before I get home. So, I don't feel that it does.

P17: [My daughter] is gonna be exposed to it eventually. Most of the normal stuff from day to day, the flu virus, and colds, things like that, she's gonna get anyway. I'm not bringing home anything more than what she gets by going to school, with bunch of little kids.

P22: I think [children] are more apt to catch something from the school than they would from us.

It is crucial to know here that everyone from the EMS participants believes that they are working in a risky job.<sup>4</sup> Part of this risk, which is contracting diseases, could be extended to their family members. As such, all EMS providers in the interview sample believe that family safety has to have the highest priority during day-to-day operations and during disease outbreaks. EMS providers varied in their views of whether or not they are putting their families at a greater risk of contracting diseases. The majority of the interview participants believe that they are putting their families at greater risk during day-to-day work and the risk may increase during disease outbreaks. There are also those who believe that the risk is already there during day-to-day operations, but it might not increase during disease outbreaks. This is because the EMS agencies as well as individual EMS providers take extra measures of protection that help them and their families stay safe. The final group of participants expressed a different view. They believe that families should not be at greater risk than general public either in day-to-day, or in disease outbreaks if individual EMS providers comply with the standard precaution when dealing with patients in the field.

While everybody in this sample mentioned family safety as a main concern, when it comes to reporting to work, family obligation was not an issue for the majority of participants. That is, providers have their own plans to ensure the safety of their family members, or they have places for their child care if they are obligated to come to work. So, family obligation does not seem to be a barrier for willingness to come to work for those EMS providers.

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<sup>4</sup> Discussed in more detail in a later section in this chapter

The most important barrier, however, is the feeling that the family is not safe. If a disease outbreak impacted the area and an exposure in the workplace occurred that made workers feel unsafe for their families, will the willingness of those providers change? At least three participants expressed hesitation to come to work in such situations.

P16: Once it hits in the firehouse or wherever you work, you kind a step back, wait a minute, time out. It is now all over here.

P22: I'm the sole provider to my family... If there was an outbreak, I would probably be hesitant to make patient contacts.

P21: I would rather be fired from my job, than bringing something home to my kids.

#### **4.3.2 EMS Providers' Training and Skills**

This section describes the views of EMS providers about their skill set, experience, and self-confidence as potential influencing factors for working during disease outbreaks.

I asked participants about their skill set, and whether it is sufficient for handling day-to-day operations and disease outbreaks. For day-to-day operations, there is a common agreement among participants that their skill set is appropriate to handle sick patients and transporting them to the appropriate hospital. Yet they mentioned that they have not much to do during such situations. Their role is to keep the patient stable, protect the patient from spreading the disease, protect themselves from contracting the disease, and safely transfer the patient to the nearest hospital.

P9: There is similar protocol for most infectious diseases; use more isolation and personal protective equipment.

P8: I don't think personally I would be able to point [a patient with a disease outbreak]. I'm just treating a sick person... My protocols don't necessarily say this is how you are going to treat somebody who is expected having this specific disease. You may treat more of signs and symptoms, because there is not a whole lot that I can change in the back of my ambulance between now and Christiana Hospital.

Therefore, if it is a suspected case of an infectious disease, EMS providers may put masks on themselves, and perhaps on the patient as well to contain the disease and prevent it from transmission during the short transport time. It is important to mention that EMS providers are not tasked to diagnose and treat sick patients within their scope of practice, which requires sophisticated knowledge in disease pathophysiology (Bissell et al., 1999). Rather, the ultimate goal of EMS at the prehospital setting is to provide urgent care, stabilization, and transport. That being said, the views of EMS providers about their skill set for their day-to-day work show that they are confident and satisfied with it. Their views are reasonable, simply because it is every day work and they are likely to be comfortable doing their job.

When it comes to working during disease outbreaks, however, they show different views. While some of them are confident about their preparedness, the majority said it depends on the characteristics of the disease outbreak. If it is something that providers knew or already experienced, then they might be capable of handling it. However, if the outbreak is caused by a newly emerging disease that is highly contagious and virulent, then EMS providers may require additional training.

P1: I think they can provide the care and transport, but as far as a highly communicable disease, no I don't believe that we can, because of the scope of practice with the EMT.

P7: We get information about the signs and symptoms when something foreign comes in... So, first thing we ask whether if they show any sign of that, [if they] have been out of the country, and this and that. There

is not much treatment with this, basically asking questions, protecting yourself, and keeping them covered up, so they don't spread it.

As it is the case with the experience of Ebola outbreak that started in 2014, participants believe that in the event of a disease outbreak, they will be notified about the disease, provided with the appropriate training and equipment, and there will be specific and clear instructions on how to go about this situation.

P5: Like the Ebola thing, it wasn't a week, maybe less, before it was like: ok, you're gonna call this unit because this unit is outfitted with equipment to handle it. You're gonna do this, this, and this. So, it's not like we are just freestyle during disease outbreaks.

P6: For this station, I can tell you that when there are outbreaks and it is acknowledged by media and community, the office of EMS for the state will notify the station [and] every car holding EMT about the policies and the procedure, and how do you act at that point.

P9: I think in a severe outbreak, you're gonna have your hazmat teams, your strike teams, and your people who are really more specialized in dealing with that at front.

However, these views are accurate until a "severe outbreak" occurs and many thousands become sick. In such conditions it will no longer be possible to handle them all with a small number of specialized teams.

Providers who lack confidence in their skill set could hesitate to come to work, believing that such work could risk their lives or the lives of their loved ones. "I'm probably not coming if I don't feel confident". Yet, all participants show a high level of self-confidence in their skills and ability to perform their job appropriately.

P4: whatever the disease may be, you just take whatever precautions.

P4: You come to work, you know there is an infectious disease and just trying to protect yourself accordingly. Proper equipment and something like that.

While experience may play a significant role in enhancing self-confidence and decreasing providers' stress and worries, it does not necessarily refer to the number of years the provider has worked in the system. Rather, experience in EMS depends more on the call volume of the EMS station where the provider serves. Some participants mentioned that people in the EMS prefer to work in systems that have high call volume, which helps them develop and maintain their skills, and enhance their self-confidence.

P3: The less you see, [the] less experience you get.

P5: I would rather be somewhere where everybody wants to do the job, do the job all the time.

P5: This place gets so many fires and so many ambulance runs. Everybody wanna be here, because you're gonna get the experience.

P6: I have been there as a low experienced first responder being nervous or scared, not sure if [I was] giving the right thing or not.

P7: I've done [EMS] for a while, I don't tend to stress anymore. When I was young doing it, I stressed different types of situations.

P5: When I started to be an EMT, I had all the training I needed plus whatever training I went to. I had a huge confidence problem, I knew what I had to do, but it was a huge confidence issue for me taking a run. But with repetition comes the confidence.

I asked the participants who were involved in the swine flu outbreak in 2009, about their experience. Although there were some concerns of contracting the infection, there were no issues with reporting to work among the EMS stations where participants work. Nor was there any documented issue with reporting to work in the State of Delaware. Fortunately, the disease was not severe enough in terms of consequences and mortality rate to make people more concerned about their safety.

P12: there was a little bit of a concern if we go there... but we never had any real issues.

P7: Actually, I have been working with [swine flu patients]. I never contracted it, but you know, that's nerve-wracking stuff.

P8: It was mild, you go from call to call to call, [you manage the patient like] another sick person kind of thing. You're not necessarily realizing that this may be this particular disease, and of course our training was limited on it.

In sum, EMS providers, both EMTs and paramedics, generally believe in their level of training and skills to handle day-to-day work. They also believe that this level of training and skills is appropriate and adequate for handling an outbreak that does not require specialized training and protective gear. Being well trained and equipped is an important factor in the decision to work, because this enhances self-confidence in performing the job. For a new and highly infectious disease outbreaks, however, participants expressed the need for specialized training and equipment. Although paramedics generally have more skills and training than EMTs, the interviews did not show higher levels of paramedics' confidence and willingness to work during disease outbreaks than the EMTs. Both groups showed high level of willingness and obligation to perform their duty. However, even with the proper training and the presence of appropriate supplies, providers still have some concerns when providing care for potentially infectious patients.

P1: Always in the back of your mind you're gonna worry about what's gonna happen if you do, even with all the training that you get. I think you might be less worried if you're trained as much as you can, and you have been provided with the amount of PPE that you are told that you need it.

While worries and concerns from infection could influence the intention to come to work, worries and concerns could work in favor of making the providers more compliant with using the PPE, or “probably overly compliant”, and becoming more vigilant when they provide patient care.

### **4.3.3 Resources: Availability, Use, and Compliance**

During disease outbreaks, it is crucial to have protective gear available for EMS providers, so they can safely provide service. This includes the use of available or additional resources specific for the evolving outbreak. While resources are directly connected with training, here I present them separately due to their importance and to better understand the views of participants. In this section, I describe the PPE availability, use, and compliance. This includes two subsections, PPE availability and use, and PPE compliance.

#### **4.3.3.1 Personal Protective Equipment’s Availability and Use**

When I asked participants about the PPE supplies, training, compliance with using PPE, and their potential effect on reporting for work during disease outbreaks, it was clear from their responses that protective gear is a major influencing factor.

P3: Maybe the only reason that I will think, if somebody will not come to work, is he didn’t have the proper equipment. I mean, that’s something that I could think of. Other than that people will come to work as expected.

EMS providers need to feel safe while they are providing care for patients. They understand the limits of their protective gear and that it is not fully guaranteed to keep them safe. They know that there is always a risk when dealing with patients with infectious diseases, and it is in the back of their minds, which fortunately could make

them more vigilant in these situations. They understand the fact that there might be a defect in the protective gear or a human error that might lead to the provider being infected with the disease. EMS providers know these risks the first day that they start their job.

P10: I don't think the protective gear is really guaranteed.

P4: I won't say [protective gear] keeps them safe, but it said that proper protection protects you from whatever infectious disease that person may have.

P5: Everything has its faults, so, I could have all my PPE gear on, and still come in contact with something that still goes through the gear... my mistakes, mistake of someone helping me on my gear, or something rips.

Additionally, EMS providers believe that their employers should implement the best measures to ensure their safety. Providers expect no issues with the availability of supplies, notifications about diseases, and instructions on how to approach specific cases. Moreover, personnel assume that they will receive up-to-date information, and training on the new PPE. Finally, and most importantly, providers expect that dispatchers will inform them about the potential cases before they start their run. Based on these aforementioned conditions, EMS providers are willing and feel obligated to come to work even during the worst-case-scenario disease outbreak.

P8: As long as my employer provides me with what I feel is the best equipment, and best training and vaccination, as long as they provide me with what I feel is the best of what they can provide, it is my obligation to come to work. That's what I'm here to do.

P7: If there is an outbreak, usually we have information about what the signs and symptoms are and stuff like that. So, people just read the signs and symptoms.

P6: If there is an outbreak, the state, the county, will make sure that all the responders have the PPE that they're gonna need.

P7: [the dispatch center] gives us information on the computers on what's going on. If this person is vomiting, if this person is a high fever, I put the mask on, just to protect myself.

However, if the EMS provider is not provided with the appropriate PPE during disease outbreaks, there could be a great issue with reporting for duty. Although most participants did not directly mention that they are not coming to work in such situations, they expressed an issue with working in outbreak situations.

P1: So, if you feel that you're not provided with the right equipment, then that's a different story. But if we provide you with it, then it is your duty to go.

P20: If I don't have the appropriate resources to protect myself once I get there, I'm no good to anyone else anyway if I got sick or hurt, injured, killed.

P7: I'm not gonna go into someone's house without gloves on... Yeah, I would say that it would definitely affect the intention to work if that is the case. I don't see that happening, but yes, if that was the case, I would have issues with going on calls like that.

#### **4.3.3.2 Compliance in Using Personal Protective Equipment**

I asked participants about their compliance with using PPE. Interestingly, the vast majority of participants mentioned that they are compliant with using the PPE. Only one participant mentioned he had done patient care without gloves on, because in the heat of the moment that he forgot to wear gloves. While this contradicts with the findings of previous studies about compliance with using the PPE (Harris & Nicolai, 2010; Teter et al., 2014), it seems that compliance with using PPE is a misleading term among EMS providers. That is, when participants mentioned that they comply with

using PPE, they mostly meant gloves only. PPE, however, may include eye protections, masks, and gowns that needed to be used as a universal precaution. While many, if not all, participants understand that, they are satisfied with gloves only for “routine” patient calls that are not supposed to have patients with potentially infectious diseases. That being said, when it comes to gloves, all participants are using them every time they are in contact with patients, but other PPE items like face masks and eye protection are used in case by case conditions. When the EMS provider is notified by the dispatcher that the patient may have an infectious disease, or the patient shows presentation of a potentially infectious disease, then the providers are likely to wear more of PPE items.

P7: Yes, every call, at least the ones I worked with on scene, including myself, we have gloves on even before we enter a house. Depending on the call situation, we wear eye protection and the respiratory mask and stuff like that.

P3: If you’re aware of the outbreak you might be more inclined, used to hold the goggles and stuff like that, where if it is like a regular sick person you probably just put on the gloves.

P9: I know a few use eye protection on every call. Everyone wears gloves on every call. I don't need gown and gloves for every single patient I come into contact with. I think we're pretty good with adapting to what we need.

P10: I think during training they will stress wearing gloves number one. They talk about eye protection, and in reality, it isn't used very often. Some people use it fairly regularly, but most people do not use it really much at all. But I think we are all using gloves all the time.

Participants have mentioned some of the reasons for noncompliance with using PPE. For instance, being used to wearing PPE makes providers less likely to wear them appropriately, being from the first generations of EMS who used to provide

direct patient care without having PPE on, being not able to recognize the appropriate time to use the PPE, and the belief that providers do not need them since they may not directly contact the patient.

P1: Sometimes PPE is taken for granted, because we use them in such a regular basis on every call when you don't need it that you get into a habit that not using it properly, 100 percent correctly... just people get lax days sometimes.

P5: There are guys that have been doing [EMS] for 20, 30 years. And they grow up in a system where they didn't have gloves. They just, like blood in their hands, [they] just wash it off and went back to lunch.

P5: Some people just don't wear gloves just because they don't think they're gonna have a whole lot of contact. My driver might not have his gloves on, because it is my tech., especially if the person is able to ambulate or perfectly fine walking to the ambulance.<sup>5</sup>

P18: There are some [providers] that for some certain patients, they don't worry about [PPE], and then there is some that are religious about it... I've done calls without gloves because I forget to put them on, or we just walked into a situation that was a lot worse than we thought it was. We got calls, and were told this person is sick or fell down. Ok, I'm the driver, I have my gloves in my pocket, we walk in and then, oh, they are not breathing. We just start to work, and you don't think about. So, it happens sometimes.

What has been mentioned here about PPE compliance applies only for day-to-day operations. However, during disease outbreaks, the situation changes dramatically at the organization as well as frontline levels. In the case of a disease outbreak, participants expressed that EMS providers will be more likely to comply with PPE use, because they will be more cautious and concerned about the disease. In turn, they

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<sup>5</sup> The ambulance crew usually divides their work while they are on duty. Sometimes one will be the driver and the other will be the technician who provides the direct patient care. This works only for routine and stable patients.

will use PPE more strictly. “You’re gonna be more cautious and err on the safe side.” Also, the EMS agencies will announce the outbreak, ask providers to comply with PPE, and likely will provide more resources.

P4: So, in the normal situation we are not wearing face masks to cover our faces, but during outbreaks, people are more willing to wear masks and stuff like that to protect themselves.

P6: In a severe situation, they will be held accountable for not using [PPE] appropriately.

P9: I think if there is a known outbreak, we'll probably be good at [complying with PPE use]. I think almost the fear level will be hop high, [and] you gonna put on your PPE.

P10: I mean we have them available all the time, we carry them on every call, we just don't use them. But in an outbreak, I think people will be more likely to.

#### **4.3.4 Employer Responsibilities during Disease Outbreaks: “Resources, Training, and Communication”**

In this section, I describe the views of EMS providers about the roles and responsibilities of EMS agencies during disease outbreaks. Participants’ views about responsibilities of EMS agencies to provide vaccination and a “safe haven” to their families during disease outbreaks are presented here in a separate section. A discussion about confidence in the employer is included in a separate section as well.

To explore this topic from the participants’ point of view, I asked them directly about the responsibilities of the employer during disease outbreaks. Participants mentioned a variety of responsibilities for EMS agencies, which are all to keep them safe while they are doing their job. The three most important responsibilities mentioned by participants were resources, training, and communication.

P8: I think their responsibility for that specific type of incident is to provide us with the best information, the best training, and the best equipment they possibly can to manage that type of situation.

P10: They keep us informed pretty well of what's going on. And they supply the PPE they think that we need and we had training to.

Training and resources are among the most important factors that may influence reporting for duty, and therefore are discussed in more detail elsewhere in this chapter. Here I focus the discussion on communication as a main role of the employer.

Participants understand that EMS agencies are not the primary source of information when it comes to disease outbreaks. Rather, these agencies receive information about the outbreak updates from higher levels and from different agencies. However, EMS providers expect that their employer has continuous communication with the involved agencies to obtain the updated information needed for the line workers.

P6: They should be fully aware of what is available to know. They should be in contact with whoever the higher above is.

Participants also understand that information may not come to their agencies as quickly as it should be. They understand that the delay or uncertainty of information is more likely to come from higher or external levels. They understand that their employer, the EMS agency, will disseminate the information down to the frontline workers once it is available without delay.

P4: The companies here try to provide information as much as they can. Provide it to the employee. If they get it fast, they give it fast.

P9: We really usually [are] pretty on top of that. Our director actually [is the] kind of the guy that is always sending out stuff like that.

Participants are aware of the importance of communication during disease outbreaks. They believe that keeping the frontline workers informed is one of the major factors of the relationship between the employer and the employee, and they expect the employer to provide them with “written documentation” of the situation, and what they are expected to do.

P12: If you (the employer) don't care about me, how I will care about you?

P6: There should be written documentation, there should be emails from someone... and they should be able to answer my questions.

P5: The employer has the responsibility to disseminate the information that we need in order to mitigate something from happening, or a disease from spreading in the company... Communication, I think, in a situation like that has to be completely open.

P8: I would think it is their responsibility to even, to provide us with literature available, to provide us with hands-on training opportunities.

P6: So, my supervisor, my boss is only above me. There is more and more above him. But I need to trust that he is aware completely of what's going on that he has all the information. That he has all the documentation, and he has all his questions answered about what's going on, so that we can in turn ask him.

Participants highlighted that during disease outbreaks, it is important to keep frontline providers informed about the outbreak progress. They mentioned different types of information they may need during disease outbreaks. I classified them into two categories: infectious disease information, and “guidance” information.

Infectious disease information is information regarding the disease itself. This includes signs and symptoms of the disease, how transmissible and virulent the disease is, route of transmission, incubation period, availability of treatment or vaccines, and

how it affects the body. Moreover, participants needed to know the time available between contracting the disease and when it becomes too late for cure, the number of people infected, mortality rate, and the appropriate gear.

P7: They print out paper and give it to us in packets explaining what the disease does, how to control it, how it affects the immune system, the nervous system, and stuff like that. So, we have an idea when it starts.

P13: what is known about the organism, what's it we are dealing with, how is it transmitted, how you protect yourself, what are the signs and symptoms of exposure, so you know if you start falling sick or something, if you have those symptoms.

Guidance information focuses on how to care for patients safely and effectively. This includes policies, protocols, and other guidance instructions. Guidance, which according to one participant, is different from training, is “when you are on the scene, ‘hey look’, go better from this way, you know, come in from this side. [The] situation dictates [that] we’re gonna do this.” This may include direct instructions on how to approach and handle potential patients.

P11: Keep us informed with what is happening and what risks or things that could take place, so, during Ebola I felt like it was their responsibility to say, “hey”, there is a risk that this could happen this is what we're taking, these are precaution that we're taking for this, this, and this.

Other than the mentioned roles, participants highlighted that the employer should be able to manage the situation properly, “During disease outbreaks, we’re probably gonna be very busy, so they're gonna be able to run the system.” Also, the employer may enforce using the proper PPE, and other safety precautions that keep individual EMS providers safe. Ensuring the safety of the providers and the workplace

will in turn ensure the safety of the workers' families. Also, they expected that the employer will take care of the providers who become exposed or infected.

P12: Make an order [saying that] nobody takes any uniform, equipment, or anything home, and make sure they're cleaning everything properly or you know, [someone] higher in the service will do that for you.

P13: Enforcing the use of protection, and then, if somebody gets exposed, standing behind him.

The discussion of the employer roles during disease outbreaks led to probing about the role of employer toward the families of workers, which I discuss in more detail in the next section.

#### **4.3.4.1 Employer Responsibilities for Families of EMS Providers**

In my interviews, I assessed the views of participants on whether the EMS employer should provide the vaccine to their workers' families. I asked the participants about the obligation of the employer to provide vaccines to EMS families once it is available. Their views show that they do not expect, or it is not the responsibility of the employer to do so. Rather, it is the workers' responsibility to take care of their families. Some of the participants were surprised about the question, and thought that this could be a "good thing". They said that if the employer did so, it would be "awesome", but they should not be tasked with that. The employer has the responsibility to take care of the workers, and the workers have to take care of their families. However, if a worker is exposed to an infectious disease during their shifts, then it is the responsibility of the employer to provide the vaccine and treatment, if available, to the worker, the family, the co-workers, and whoever is in need.

P4: I think it will be a good thing for the fire company to buy another vaccine for employees' families. So. It is a good idea.

P5: I don't think [the employer] has the responsibility. I think if they do, awesome, if they offer, awesome. It's kind of personal preference of the company and the administration office.

P2: If there is a concern that one of the employees has been exposed to [the infection], then I think we should provide vaccination to whoever we can. Whether it is family members, their children, co-workers, and stuff like that.

P4: This company is like any other business, and pay you fully. You're responsible of taking care of the family. If you are working in a bank that does not mean that the bank is responsible for paying for the employee's child care.

I asked participants about working during disease outbreaks without vaccination against the active disease outbreak. Responses show that participants do not have issues with responding to a disease outbreak if there is no vaccine available. They emphasized that, on a daily basis, many of the patients they handle have infectious diseases that EMS providers are not vaccinated against. Once the vaccines become available following disease outbreaks, their quantities are likely to be limited and could only be available to the first responders, but not their families. When I asked participants about their view to this issue, they did not indicate that this could affect their decision to come to work. A participant who lives with his school-age daughter mentioned that he would take the vaccine, come to work, and "probably be separated from her." Another participant mentioned that, "I don't think it will be an issue. You still wanna do what you have to do."

Some participants have highlighted the importance of assigning a "safe haven" to their families during public health emergencies as part of the employer's potential responsibilities. For instance, the employer could put them in a shelter, like the

department building, and provide them with food, supply, and protection from infected people. Yet, this was not expressed by many participants.

P9: They can provide safe haven for their family if they have a specific place. Well, if you're worried about your family safety, bring them here, so you can go to work and keep everyone together.

P10: Bring a family there to fire houses or wherever will be helpful, and that's been sort of done during blizzards, like snow storms.

#### **4.3.4.2 Confidence in Employer: “My Employer Has My Best Interest in Mind”**

While discussing the responsibilities of the employer, I asked participants to compare that with the real situation in their workplace. Typically, their answers were that their employers are doing a great job in keeping them informed. They trust their employer to share accurate and the most up to date information about a disease outbreak. Participants indicated that they do indeed trust their employers not to withhold anything that is pertinent to their work safety. They also believed that employers will share information promptly when they receive it, although a few had some reservations if employers would have access to the most accurate information.

P8: I think for the most part my employer has my best interest in mind. I think they will give me the best information they had. It is whether or not they've done enough to get the best information, and whether or not the information that has [been] related to them is the best information. But I don't believe they will withhold anything from me intentionally.

P14: I think [the employer] would tell us what we need to know and the most important things. I don't think they would downplay it... because EMTs and fire fighters are usually, we get the best information. We usually know the truth as opposed to what you find in the internet.

P15: I don't believe that there is a situation where [the employer] will put us at risk that he would allow us to be exposed to anything without really knowing what's going on; I really don't think so.

Senior EMTs and paramedics who hold administrative roles that were interviewed confirmed that they always pass whatever information they have down to the frontline workers immediately. They stated that hiding information would not do the employer nor the workers any good, given that the truth will come out through the media.

When I asked participants if they look for external resources of information to verify the information they obtain from their employers, all participants said “yes”. However, they explained that looking for external resources of information does not necessarily signal mistrust. Rather, they do so in order to obtain additional information about the disease outbreak. Some of them said they believe it is their duty to learn more about a disease, since it enables them to be better prepared.

P1: I don't believe it is an issue of mistrust, I think, it's just a soft attempt to get knowledge because you understand, there something might be missed. So, it's your duty to try to find as much as possible.

P7: If it is something bad like that, you are always trying to look for what are the signs and symptoms if we have not gotten anything yet, nothing gets passed down to us.

P9: I wouldn't say I'm googling because I don't trust what our admin is saying, but just to read more on it, you know.

Participants mentioned many websites that they use to look for more information. While there are some reliable websites like the CDC, the National Institute of Health, and the state emergency management website, there are some others that are not reliable for important information. Some participants mentioned Google, WebMD, and Wikipedia as a source to obtain more information, which could have inaccurate or misleading information that would potentially affect their views.

#### **4.3.5 Self-safety in a Risky Job: “No Scene is Ever Safe”**

EMS providers understand and accept the risks associated with their job as soon as they were hired. While they could be concerned about working during disasters or disease outbreaks, they know that this is part of their job and there should be someone to do it. That being said, participants in my study did not show high concerns or low willingness to work during disease outbreaks. Rather, they mentioned statements of accepting risks that come from their job.

P6: With this position, their own life would be held in risk always.

P7: So, there are a lot other threats out there than just an outbreak. There is so many different germs and diseases that can be contracted from just filthy houses.

P9: We have kind of an odd situation where other healthcare providers don't, because we are entering the home. So, even if we use the aseptic technique, we set our bag down in the house, things like that, other healthcare providers don't really. They have their own room which gets cleaned between other patients, and you know, they put patients in their room, and it is a controllable environment. Where us, we work in an environment that we are given.

When it comes to self-safety, although it was always ranked second or third when compared with family safety and duty to work, EMS are still worried and concerned about their personal safety. They mentioned that during their EMS training, the providers should prioritize their personal safety over the safety of the patient or the co-workers.

P1: In EMS compared to other things, your safety is always taught as the number one, because if you get sick or hurt, you can't help the people out there.

The participants explicitly mentioned their high concerns about their safety during potential disease outbreaks, and that they can be exposed to the disease and

become infected themselves. Yet, participants who are concerned about their self-safety are likely to follow that with its impact on the safety of their families.

P9: keeping yourself safe is probably the biggest concern.

P3: The last thing you wanna do is to be in contact with this and be sick yourself.

P3: Then you worry about your personal safety as well... there is this outbreak, you can contract it, there is a possibility of you gotten to the point you might [die] from this disease, and not knowing whether or not your family is gonna be taken care of after that.

P3: You are worried not only for your personal safety, but also, bringing it home to a family member, to friends.

P6: The worst is obviously not for myself, the risk potentially having my daughter grow up without father.

Participants explicitly expressed their self-safety concerns during conditions of disease outbreaks. They also highlighted the role of the employer in keeping them safe, and providing them with the appropriate PPE, which adds to the roles of employers, a section discussed previously in this chapter. Therefore, it seems that self-safety could be a major problem if the EMS agencies did not do their best to keep workers safe, and ultimately creating a relationship of mistrust between the employer and the employees.

P8: As long as I feel [the employers are] doing everything within their power to make sure that my well-being is taken care of whether it is training, education, vaccination, whatever needs to be done, as long as I feel that they are doing their part, then I'll continue to do my part.

P12: I would be out of there soon as I realize that [the employer] doesn't care about my safety, I need to work somewhere else... I'm pretty sure there is a strong trust with the safety. You know, don't concern our safety here.

#### **4.3.6 Pathogenicity of the Disease**

I asked participants to express their opinions about what concerns them the most when it comes to an unfolding disease outbreak. Participants mentioned a variety of concerns about the disease itself. These concerns include how easily the disease can transfer from person to person with more concern on airborne diseases, how deadly the disease is, how treatable the disease is, how many people have it, and how long it takes from the start of the symptoms to the time it becomes too late for recovery. Another important aspect of their concerns is the likelihood of transmission of the infection to the family members.

P8: It's how if I contract it going to affect me and my family. This is probably the number one concern.

I tried to understand which could be of more concern to providers, how easily the disease can be transmitted or how severe the consequences are if a person contracted the disease. Participants were split almost in half in their opinions. Some are more concerned about contracting the disease in the first place. Participants from this group said that if we protect ourselves from contracting the disease, then, we do not have to worry about the consequences. The other group participants showed more of concern about the virulence of the disease, and its complications. They said that we can contract an infectious disease like flu on a daily basis, and it is something that we cannot prevent, and it is not a great problem. However, the concern comes if the disease is virulent or there is no cure from it.

I assessed the participants' views on whether more information about the disease is appropriate or not. All participants expressed that the more information about the disease, the better, because they need information to understand the disease process and to take the appropriate measure to fight it.

P9: I think the culture around here is the more you know, the better. People are more afraid of things that they don't know about, and I think that's pretty well understood here.

P20: [With disease outbreaks] there is less understanding, people fear with what they don't know or poorly educated on. So, if they don't understand it, I believe they're less likely to respond to this type of incident.

While not highlighted by participants, the severity of the disease could be a major factor that could influence the decision to come to work. If the disease outbreak is something like the 2009 swine flu, EMS providers are likely to come to work without hesitation, which has happened. Participants who had experienced the swine flu did not mention high concerns or absenteeism during that outbreak. However, if a severe disease outbreak occurs where family members and co-workers become infected or dead, will EMS providers come to work? Some participants show some hesitation to come to work if an outbreak of Ebola-like disease occurs in their area as discussed elsewhere in this chapter.

#### **4.3.7 Workplace Culture: “I Can Understand, but It’s Unforgivable”**

EMS is a relatively new system compared to the fire department and other healthcare systems. Workers in the EMS are developing their own culture that is different from other cultures.

P8: There is a certain culture here, we are doing something very unique. You are immediately interjected into a chaotic situation. Nobody calls 911 because they're having a good day.

P6: Here we share those similar type of culture... So, you can't do this certain job without sharing somebody's characteristics.

EMS providers work in teams, a team of two most of the times, and supposed to trust each other to perform their job, because they work in an uncontrolled environment that may change to be unsafe at any point in time. Since providers in the EMS need to trust their partners on shifts during work to be able to perform the job comfortably and appropriately, building a relationship of trust between colleagues becomes an important element in the EMS. The relationship between co-workers is important as it may influence their perspective to work obligation, a separate section that I discuss next.

P10: We all work together a lot. If you don't like somebody in your little place like this, that would be really long 12 hours.<sup>6</sup>

While EMS providers are developing their own culture, they might be influenced by other close cultures. For instance, EMTs who, for the most part, are cross-trained fire fighters, are based in the fire stations in the State of Delaware. They are likely to be influenced by the culture in the fire stations, a culture that has been established based on a paramilitary-structure where workers follow the command and control rules. Although people in the EMS are likely to be very dedicated to the work as expressed by the participants, they may have less tolerance to those who do not follow rules when it comes to reporting for duty. That is, when I asked participants about their views to someone who may not show up to work during a disease outbreak due to safety concerns, the views of many of them were unfriendly.

P6: Yes, I think there would be some EMTs [who may not show up]. Can I understand it? I think I might understand it. Could I forgive it?

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<sup>6</sup> EMS providers work in shifts. Some agencies may work 24 hour shifts, while others may work 12 hour shifts.

No, I will not forgive it. I might understand why they wouldn't come in to work, and I might understand why they didn't call out, and I might try to be in their shoes... I can come up with all these excuses if I was in their shoes, and I'll tell them I understand, but it is always unforgiven.

P6: I personally would be OK if I never see you again, because I never made you to do this job, and then you're going to not come in, and leave us with less resource than we have before. Unforgivable.

P8: If you are not going to support me this time, because you are afraid, just because you're afraid, then what else are you afraid of that you may leave me hanging on?

P10: I think we all understand you looking up your family and all that, but if somebody just didn't come to work, I think for one: you could lose your job, but for two: I don't think it would be forgotten too quickly if you just didn't come.

P13: I have to get over myself and say understandable at some point.

I asked participants if they can express to their co-workers and supervisors their fears and concerns about working in risky conditions. Some participants expressed that in this line of work, people cannot say that they are concerned or scared of infectious diseases. They are supposed to be tough, and not be bothered by the risks. That seems to be one of the reasons why not all of the participants put self-safety as a first priority despite the fact that self-safety is taught in EMS as a first priority.

P16: The biggest thing in this profession is that nobody wants to say that they are scared. No one wants to say that they are sick. It is a culture that we can't be afraid, we can't be upset.... they gonna think you're terrible or you know, you're scared person.

P16: The culture in this profession is that you have to be a tough guy, you have to be mentally and physically tough, you can't let things bother you. For someone who say, oh, I'm not coming to work, I'm scared of, I might get sick, or I might contract this virus or whatever; this will not gonna fly well with other people.

P18: In this line of work, it is kind a hard for it to say we are not gonna come in to work, because it is a different group of people.

To understand why abandoning the work in EMS is “unforgivable”, we should also understand how the system works during day-to-day as well as during disease outbreaks. In everyday operations, as it is the case with the larger healthcare system, EMS works near its full capacity, and can easily be overwhelmed if the call volume spikes up (Bissell & Kirsch, 2013). If one EMS provider does not show up to work, this may change the smoothness of the work of the system, and make the other providers struggle to accomplish the job.

P6: One EMT calls out, everything crumbles behind it..., and now we have to wait for volunteers to supplement... You know, this [place] can be a very well operated system, but if one person can't come in, everything else will fall behind.

During disaster and disease outbreaks, people become injured or sick, including EMS providers. The demand on EMS providers will dramatically increase due to the expected increase in the call volume as well as the drop in the number of EMS providers who may directly be impacted by the event. In such situations, maintaining human resources becomes very challenging. When the EMS system falls short, the available providers have to work more shifts with more workload to keep the system functional; putting themselves at higher risk of mistakes, injuries, and stress. Feeling and response toward providers who did not show up during such situation will not be as friendly, because those who stayed in the work were directly affected by those who did not show up.

P12: I stuck this out, where were you? Where is your commitment? You didn't have our backs! I do triple shifts because you guys didn't show up!!

While not showing up to work when needed is considered a big issue for many providers, it is not the case for all. Some participants showed tolerance to potential co-workers who are concerned about the safety of their families, and in turn decided not to come to work. In their opinions, people should decide what is best for themselves and their families.

P16: If you are afraid that you gonna get sick or get your family sick and you didn't come to work, that is fine. Yeah, for me it's fine. There are other people who will do the job.

P12: As long as your road doesn't intersect mine in a negative way, you know, I'm not here to judge you, you got to live your life.

P19: If they didn't wanna come to work because of [safety concerns], that would be their choice. They have families, young families. I don't care one way or the other. I mean, they have to take care of their families... fire house is a family oriented place.

P14: I would understand, because I feel the same way almost. But if everybody else is coming to work and you don't, then you know, that kind of thing.

Finally, workplace culture in the EMS seems to have an important role in the decision to come to work during disasters and the public health emergencies. The peer pressure, the team work, and feeling that they are doing an important job seem to have important roles for providers to come to work. In this line of work, while not coming to duty as expected could be understandable by the vast majority of participants, not everybody is willing to forgive such a behavior, at least very quickly.

#### **4.3.8 Work Obligation: “This Company is Part of Me Just like I’m Part of It”**

When I asked participants about their work obligation, and whether or not they are coming to work in case of a disease outbreak, they expressed that it is their

obligation to come to work. Yet, it is likely that participants talk about others who may not show up, and the reasons that might lead them to do so. This might be due to the culture in the workplace, where people are not supposed to be scared or bothered by risks as mentioned in the previous section.

While participants expressed that they are willing and obligated to come to work during disease outbreaks, several themes emerged with regards to their views and commitments. The first group, which represents the vast majority of participants, expressed a high level of professional and ethical obligation to work. In their views, whatever happens, whatever the risk is, they are coming to work, even under the worst conditions. They feel that this is their job, somebody needs to do it, and they knew the risk associated with it when they signed up for this type of work. Therefore, they are coming to work, unless they are sick themselves. Those participants are highly dedicated and feel obligated to come to work even outside their scheduled work time, which could be mandatory during emergencies.<sup>7</sup> For this group, as long as you chose this line of work, you have no reason not to come to work in any condition. They believe that this is a unique job, and it is not appropriate for just any person. If you think you have some conditions that may prevent you from coming to work when needed, then you are in the wrong place, and you may look for another job with less commitment.

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<sup>7</sup> It is crucial to indicate here that some EMS agencies in the State of Delaware mandate their full-time workers to come to work outside their scheduled work shifts during emergencies and disasters. Also, during such conditions, some agencies mandate that EMS workers keep themselves at a certain radius distance from the work place to be able to come to work in a timely manner if needed.

P6: If I had a sick wife, sick child, like someone has MS (Multiple Sclerosis), or dying of cancer, then that person is going to need you. So, you don't have to work here. If I fall in that situation, I can go to work in McDonalds to make the same money at McDonalds and still provide for my sick one.

P6: I'll be coming to work and I might even come in early, and I might even call my supervisor and chief officer and ask whether they would like to detail overtime for me to come in, and I will do everything I can to handle custody or childcare, so that I can come in and perform the job in hand.

P7: I mean, that is our job, that's what we get paid to do. So yeah, I mean, regardless of what is going on, we should be here when we do coming to our shifts. If it is an outbreak like Ebola or SARS, we still are gonna do our job, there are other people who need help, we should be here.

P18: If you are scared or worried about being exposed to something, you're in the wrong line of work.

The second group of participants showed a “conditional obligation” to work. That is, participants highlighted three main possible barriers for not coming to work. These factors are safety of their family members, availability of appropriate protective gear, and the measures taken by their employer to ensure the safety of the employees. If there is an issue with any or all of these factors, those participants expressed that they may not come to work. Other than that, participants are coming to work as expected.

P12: It's your obligation as long as your employer is doing everything they can to protect you. I think you should show up.

P4: May be the only reason that I will think if somebody will not come to work, is he didn't have the proper equipment... Other than that, people will come to work as expected.

P12: If I'm not sure that the equipment that they gave me to protect me is gonna work, I really can't say I will [come to work]. Because if I will get [the disease], you don't care about me, how I will care about you.

A third theme is where a participant expressed an obligation to work in order to support co-workers. While only one participant explicitly expressed this feeling, her insight seems worth mentioning. This participant feels that she is more obligated to support co-workers than providing service to the public. To understand this opinion, it is crucial to put it in context. Due to the nature of their work, EMS providers partner with each other and develop a trust relationship, which is necessary to perform their job appropriately. This is because they are expected to help and protect each other in their uncontrolled work environments. Additionally, ambulance units can easily be overwhelmed if one provider did not come to work. Therefore, EMS providers feel obligated to support each other. It is interesting that the effect of this relationship, and the loyalty to co-workers could be the main reason for some EMS providers to come to work during disasters or disease outbreak.

P15: Personally, I do feel obligated, but I feel obligated not necessarily for the public, but for the co-workers. Because if I don't come up for work, we won't have another unit up...I'm sure that work day is so much harder when you have one ambulance up. Or let say that because I don't come in to work, someone else has to stay over and get mandated in. I know most of us here they have kids, they have families, so I would feel obligated for them to come in, less so for the public.

P5: Because if half of [providers] do not come to work, then we are leaving the other half hanging, so somebody has got to do it. Where they got trained to do it, while you make somebody else takes the time to get trained to do it.

P15: It is a lot harder to leave work, because you have to call and say, hey, I'm not coming to work. And now your partner, he is really a good friend of you, says why you're not coming today?...I don't think I would do this.

A fourth group of participants highlighted the financial aspect as the main reason for work obligation. While people in this group may like their job, and feel committed to some degree to come to work when needed, they feel that they have to come to work during disease outbreaks because otherwise they may lose their jobs.

P10: I mean, you're always in front of the risk of losing your job if you don't come to work.

P14: I'm very nervous about getting any kind of a disease or just germs. I guess in general, it bothers me. I would rather not deal with it if I don't have to... if I have to, you know, then I don't wanna lose my job.

P15: I wouldn't necessarily be in a financial position to be able to just say, hey I'm not going to work...yes, I'm gonna come to work. Yeah, because I need the payment.

P16: I will come to work. I need the money, you know. This profession seems to make people at a financial burden, because we don't make a lot of money. But would some people not come to work? Probably.

Overall, everybody in this sample of EMS providers feels the obligation to come to work during disasters and public health emergencies. While they understand the risk associated with this job, the majority of them is satisfied with EMS work and will come to work without any hesitation. “With this position, their own life would be held in risk always”. They also know that this job is not financially attractive. “Nationwide paramedics aren't the highest paid profession by any means”, “no one in the first responder field is rich, and most of us work multiple jobs to get by.” Yet, EMS providers do their job because they like to do this kind of work. “I am ingrained with this company. It's part of me just like I'm part of it, attached to it”. There are also those who might hesitate to come and might make up some excuses other than explicitly expressing their safety concerns. Their main concerns are family safety and

the availability of the appropriate PPE that is supposed to protect them and their families.

#### **4.3.9 Role of Demographic Characteristics**

As mentioned earlier, a sample of 22 subjects participated in these interviews. The demographics of this sample are highly diverse that cover many possible factors that may influence their views and insights. As was shown in table 4.1 displayed previously, participants are from both genders; they are part-time, full-time, and volunteer workers; they work in different stations, including both paramedics and EMTs; they have different lengths of work experience; and they have different family status. Following the table, there is a brief discussion about each of the important demographic characteristics in terms of their effect on reporting for duty.

##### **4.3.9.1 Gender**

About one third of the participants are female EMS providers, which is close the national average in this line of work. Due to the nature of EMS work that needs physical fitness and work in outside environments, female participants showed more concerns regarding working during natural disasters than their male partners. “I would be concerned about my physical safety if someone gets upset.” When it comes to working during disease outbreaks, there does not seem to be differences in their views based on gender.

##### **4.3.9.2 Age and Years of Experience**

Age does not seem to be a factor in the views of participants. The different views came from different age groups and years of experiences. While experience could support self-confidence as mentioned by some participants, other participants

with less experience did not share the same views. Although young participants are likely to have less experience in EMS than older ones, which may weaken their self-confidence, they are less likely to have families and children that make them more concerned. Therefore, different age groups have other associated factors that may come into play and influence their views to work during disease outbreaks.

#### **4.3.9.3 Family Status**

EMS providers who participated in this study are mixed between singles, married and divorced. Some of them have children, while others do not. “Families and kids” were mentioned by all participants, including singles, as the most concerning factor during disease outbreaks.

In participant views, there were no differences between singles and married with children when it comes to working during disease outbreaks. They said that obligation to come to work should not be influenced by family status. Yet, single participants who have no children highlighted that they may be more willing to work extra shifts if needed and likely to take higher risk. But this does not mean that singles are more obligated than married co-workers to come to work if mandated to do so.

#### **4.3.9.4 EMS Provider’s Type: Paramedic vs. EMT**

EMTs and paramedics in the State of Delaware work in different conditions, and in turn, different influencing factors may come into play. In the State of Delaware, EMTs are based in fire stations and the majority of them are cross-trained EMTs and firefighters. On the other hand, paramedic services are run by the county and they have their own stations. Interviews show high commitment and willingness of both

EMTs and paramedics to come to work in any disastrous situation including disease outbreaks.

I asked participants about the training that they received for the Ebola outbreak to explore how satisfied are they with their training. It was clear that paramedics and EMTs were different in their opinions. While all paramedics were satisfied with their training and preparedness to fight Ebola, not everybody in the EMT ranks shared the same stance. Paramedic participants expressed that their skill set for Ebola was more than adequate.

P9: We got already had the Ebola kits, we got trained on how to use them.

P9: I believe we are probably a little above average here.

P12: with the Ebola stuff that we had, an additional class just for that, it was mandatory. And then, a field training officer came by and we expanded upon that. So, speaking for, because I can't speak for other departments, our department does a very good job with that.

On the other hand, while the EMTs went through training during Ebola, for the most part, it was lecture-based and instructions rather than hands-on training, and was not mandatory. Some of the EMT participants were disappointed about the lack of hands-on training during Ebola outbreak, which they claim that it was not enough for them.

P8: Nobody ever got the time to say this is an Ebola kit, this what it is used for, this is how you're going to use it. It was just, here you go, figure it out.

P16: We are not trained on this stuff. I mean they tell us how to put these suits on, use gloves, and you put a gown on. To me, I'll still be concerned... there is definitely not enough hands-on training for the disease outbreak stuff like that... Now we have three or four kits of

Ebola in the ambulance, but do I know how to put them? No!! I guess, I don't know.

When it comes to the participants' feeling toward a co-worker who may not show up to work during disease outbreaks due to safety concerns, EMT participants show mixed responses that range between “unforgivable” and “that’s fine”. On the other hand, paramedic participants are more tolerant and likely to use more friendly statements like “good for him”, and “I don’t care”. These differences are perhaps related to the workplace culture. Given that EMT services are operated by fire stations, a paramilitary system, they might be influenced by the command and control and hierarchical structure of the workplace, making them less tolerant to those who may not follow commands. Also, because EMTs are also fire fighters, they perhaps believe in accepting higher levels of risks as they go into burning houses.

#### **4.3.9.5 Employment Status**

EMS providers could be full-time, part-time, or volunteer workers. In the State of Delaware, while all these forms apply for EMTs, paramedics are only full-time workers. It seems that employment status is an important factor here, at least from the point of view of full-time participants. They consider that part-time and volunteer workers have less attachment to the workplace than full-time workers, and they are working only for financial reasons. Also, they believe that part-time workers are not mandated to come to work as it is the case with full-time workers.

P6: If they are a volunteer status or they are a part time employee, they might not have the attachment here and [it] might not be worthy to them. Or, they can go to work somewhere else, away from this incident. As far as I go, I do have attachment here, this is my career, this company takes care of my benefits, takes care of my daughter, and once again, because of my attachment, I want to be here to assist and to be an extra set of hands and eyes.

P15: So it depends on who you are, part timers or full timers. So, for full timers, they can be mandated in, which means, you have to come in, doesn't matter what [or] where you're going, doesn't matter if it is not your shift. You have to come in, because they need staffing.

P17: The people that are here just for paychecks or the volunteers who have different jobs, they just volunteer to help their community when they can. I think those people are gonna be the ones who gonna think twice in the middle of the outbreak... [part-timers] are still gonna come to work, because most of the part timers that I know, are part-time doing the same thing in a bunch of different places.

According to participants, EMS agencies in the State of Delaware have policies in place, called the recall system, to mandate their full-time workers to come to work outside their scheduled shifts in times of emergencies. Full-time workers knew and agreed on these circumstances when they signed up for the job. In case of emergencies and higher demands, the agencies start with scheduling overtime. If they still need workers, they may ask for a recall. Once they ask for a recall, they will send a recall text message to all workers. Workers need to contact their agencies or their respective supervisors who may ask them to report to work. Also, during emergencies, EMS providers are expected to be within a certain radius of distance from the work location, so if they are needed, they can come in a timely manner.

When it comes to part-time employees, the interviews revealed that many EMS providers who work as full-time workers are also working as part-time workers in other agencies. This is in part because of the low wages of EMS workers. That being said, part-timers are likely to be full-timers in other places, which mean that they have the same views and opinions with regards to work obligations. Additionally, part-time workers whom I interviewed did not show obvious differences than full-timers in their commitment to come to work. Yet, they know that they are not mandated by their employer to come to work outside their scheduled time.

An interesting point here is that while part-timers and volunteers play an important role during day-to-day operations to keep the system functional, EMS agencies can't rely on those workers during disasters and public health emergencies. In the first part, the agencies can only mandate their full-time workers for a recall. Secondly, part-timers and volunteers are likely to be working as full-timers in other agencies that are likely to mandate them to come to work during emergencies, which creates a role conflict. Therefore, agencies that are heavily dependent on part-time workers to perform their day-to-day operations could face challenges in their surge capacity to meet the high demand during disasters.

#### **4.3.9.6 First Responder Generations**

Interestingly, it appears that EMS providers who are descended from generations of first responders like firefighters, police, or EMS are more committed and dedicated to work during disasters and public health emergencies. This is because they are raised in an environment that encourages the public services where their families can support them to do their job when needed.

P5: I'm fifth generation of fire fighters. My great grandfather started to do the fire company, I was raised by, hey, no matter what, you still come and do your job... I'm still come to work, if I get hurt, if I get killed, it is my job.

P11: My dad is a volunteer firefighter; my grandfather is a volunteer firefighter. They've all been [doing] the same things. So, if I was like, oh no, I need to come home and help you out, I'm sure my grandfather will be like, excuse me!! Don't you do your job? You should be doing it... I feel like I would get pushed probably to come to work.

P17: I became an EMT because it is a family thing, and now it is a passion in mine. For some people, it is just a job; Just a way to make money. So, for those people, they're saying, man, is it really worth 12 bucks an hour for me to go possibly get a disease and die. Those

people, the people that worried about making money, are the ones that are not gonna want to go to work. They gonna find a reason to stay home or to avoid that whole area.

#### **4.4 Summary**

Disease outbreaks always concern emergency managers, public health officials, and EMS administrators for their potential effects on their communities. EMS providers are among the first responders who are supposed to step up and help in containing such outbreaks. In this chapter I discussed the views, opinions, and insights of a sample of EMS providers about working during disease outbreaks compared to day-to-day operations and natural disasters. I found that all participants are more than willing to report for duty during natural disasters if they can, and some of them are even excited to work in such situations. They are excited because they like the challenge and thrill associated with these working conditions. Some of the participants expressed some concerns in working in such conditions due to self-safety and the safety of their family members. These concerns are more about the hazard itself and not related to the EMS work. For instance, if there is flooding, they may become concerned about the safety of their family, but not concerned about providing care in such conditions. Two female participants, however, expressed concerns about their physical safety during natural disasters. While participants expressed willingness to come to work, they highlighted some potential barriers to their ability to come to work like transportation and other infrastructure issues.

When it comes to disease outbreaks, people are less excited. Although many EMS providers are concerned about contracting the disease and transferring it to their family members, they feel that they are obligated to come to work as long as they are

provided with the appropriate PPE. They believe that with this line of work, you can be exposed to infectious diseases or other hazards at any time.

There are many factors that may affect EMS providers' views and willingness to come to work. Family safety is by far the most concerning factor when it comes to working during disease outbreaks. "Taking something home" is a statement mentioned by almost every single participant when asked about concerns about working during disease outbreaks. While they are concerned about the safety of their families, they do not feel that this would prevent them from coming to work as long as they are protected by appropriate PPE.

Training and resources are also mentioned along with the family safety most of the time. Participants believe that if there is an outbreak of an infectious disease, they will be provided with the appropriate PPE, training, and direct and clear instructions on what is expected from them. If there is a lack of appropriate PPE, however, the majority of participants mentioned that they cannot provide care without being protected themselves, and there is no point in exposing themselves and probably contracting the disease in such a situation.

Disease pathogenicity is an important factor to concern providers. EMS providers are especially concerned about coming to work if there is an airborne disease as opposed to other forms of disease transmission routes. Also, if the disease is virulent and causing severe symptoms or high mortality rate, it is going to scare EMS providers, and possibly make providers hesitate to come to work.

When it comes to employer roles, training, resources, and proper communication are the most important responsibilities mentioned by participants. Participants do not expect special care for their families though; rather, they consider

this a provider responsibility. Participants believe that employers should care for their employees, and the employees should care for their families. Additionally, participants show high levels of confidence in their employer to provide them with the appropriate PPE, training, and most up-to-date information about the disease progress. Many participants highlighted that as long as their employer does their job, they will come to work and do their job as well.

Workplace culture seems to have its role as well. Given that EMS providers are working in a relatively risky job, they developed a culture of accepting a particular level of risk as a normal part of their job. Also, they developed a culture where it is not acceptable to show concern or stress regarding working in risky conditions. Rather, people in this line of work are expected to be tough, and not afraid of risks.

While everybody in this sample of EMS providers feels committed to work during disease outbreaks, they are different in their views. The majority of participants feel obligated because it is their job and they have to do it. Others feel obligated as long as they are protected and their families are safe. There are also those who feel more obligated to their co-workers than to the public, or those who feel obligated because of financial needs.

Finally, the demographic characteristics of EMS providers have their effect. Obviously, participants who have children and live with their families showed more concern about their family as opposed to those who live alone. While EMTs and paramedics share the same views and insights with regards to work obligations during disease outbreaks, they did not share the same opinions when it comes to feelings toward those who may not show up as expected. Paramedics show more tolerance than EMTs, who might be influenced by the hierarchy of the fire-based EMS in the State of

Delaware. As opposed to part-time and volunteer workers, full-time workers are clearly more obligated to come to work during emergencies and disasters. This is because of the policies and regulations that mandate full-timers to report to work during emergencies even outside their work schedule. Part-timers and volunteers, however, are more likely to be full-timers in other locations within the EMS system, which makes the views toward work obligations generally the same. Interestingly, participants who are descended from first responder generations showed an exceptional dedication to work, and are likely to show, proudly, that they are coming from first responder generations.

## **Chapter 5**

### **SURVEY ANALYSIS AND FINDINGS**

This chapter describes the findings of the online survey on EMS providers that were collected from both the states of Maryland and Delaware. The survey answers the third and fourth research questions which are: what is the extent to which EMS providers are willing to work during disease outbreaks, and what is the extent to which factors influence the decision to come to work. Unfortunately, despite the efforts made to enhance participation in this survey, the response rate was very low. The response rate from EMS providers in the State of Delaware was about four percent, and much lower in the State of Maryland. This rate significantly influenced the options of statistical tools that could be used to analyze data. That is, some advance inferential statistics such as logistic regression was not used as these data cannot be generalized to the overall EMS system in the areas of study. Yet, data analysis using the appropriate tools provided significant and important information about the study participants as discussed below.

By the end of the data collection period, a total of 121 surveys were collected. However, 17 responses were removed from the study because more than half of the survey questions were not answered. Therefore, a total of 104 responses were available for analysis. From those responses, there were 76 from Delaware, and 28 from Maryland. Table 5.1 displays the demographics of the EMS providers who participated in this survey. The majority of participants are males, middle aged (35 to

54), live with spouse, have children, full-time employment status, provide emergency 911 services, and have more than eight years of experience.

Table 5.1: Demographics of study participants

Variable	N	%
<b>Gender</b>		
Male	72	76.6
Female	22	23.4
<b>Age</b>		
34 or below	26	27.4
35 to 54	56	58.9
55 or above	13	13.7
<b>Do you live with a spouse or loved partner?</b>		
Yes	77	81.9
No	17	18.1
<b>Do you have children or dependents living with you?</b>		
Yes	57	60.6
No	37	39.4
<b>Education</b>		
Some college or below	37	38.9
Two years degree	22	23.2
Four years degree or above	36	37.9
<b>Work level</b>		
EMT	54	57.4
Paramedic	40	42.6
<b>Employment Status*</b>		
Full-time	85	81.7
Part-time	24	23.1
Volunteer	42	40.4
<b>Type of service provided</b>		
Emergency 911 services	88	92.6
Non-emergency services	4	4.2
Both	3	3.2
<b>Length of service</b>		
8 years or less	14	14.7
More than 8 years	81	85.3
<b>Work area*</b>		
New Castle County	22	21.2

Delaware	Kent County	19	18.3
	Sussex County	41	39.4
Maryland		28	26.9

\*Not mutually exclusive. Total may exceed 100%, as participants can choose more than one option in the survey.

Here I start with an overview of how the number of choices for variables are collapsed in two or three groups as appropriate. The chapter then provides analysis and findings of scenario questions. This is followed by analysis and findings of the categories of factors that may influence the willingness to work during disease outbreaks. This includes the hypotheses, the statistical tests used and the presence or absence of a relationship between the variable of interest and willingness to report for duty. This is preformed to all categories of variables including levels of concern, confidence in employer, responsibilities of employer, family, knowledge and training, workplace culture, work obligation, and finally demographic information. For each section, a table of descriptive statistics, a table of significance, and a discussion of the important findings are presented.

I started data analyses by performing descriptive statistics for whole categories and questions to obtain frequencies and percentages. Then, I started to look for patterns in these data. To analyze the first two survey questions that are scenario based, I used descriptive statistics. In the descriptive statistics of ordinal and nominal variables, we are looking for the frequency and percentage of each variable. Both questions have the same five alternatives which are: 1) Turn off my cell phone so I will not be asked to come to work; 2) I'm not coming to work until I'm clear about the exposure risk; 3) Only work my scheduled shifts; 4) I will work additional shifts if asked; and 5) I will call my supervisor to ask if they need shift covered. To facilitate

further analysis and assess the relationship between the willingness to work and other variables from the rest of the survey questions, I dichotomized these five variables. That is, the first two variables represent unwillingness of the participants to work in the given outbreak scenario, so I combined them together into one group labeled “unwilling”. The last three alternatives represent willingness to work with some variations, so they are combined into another group labeled “willing”. This is also helpful because very few participants chose the first option, “turn off my cell phone...” which could make it difficult to use some important analysis tools like the chi-square test.

After performing descriptive statistics to all variables in the survey to explore frequencies and percentages, and to facilitate exploring the relationships between different variables, I collapsed the answer choices of each variable into two or three. The first category of potential influencing factors measures concerns of EMS providers to work during disease outbreaks. Nine questions ask participants to rate their concerns from one to five. The one to five Likert scale in this table can be translated as follow: One is not at all concerned, two is little concerned, three is concerned, four is highly concerned, and five is the extreme concern. I dichotomized the alternatives into “less concerned” and “concerned”. In this case, one and two were merged and labeled “less concerned”, and three, four, and, five were merged and labeled “concerned”. While three is in the middle, participants who chose this option are likely to feel concerned than not, and therefore was merged with the fourth and fifth options.

The following category is confidence in employer. To collapse the number of alternatives in this category, one and two were merged and labeled “not confident”,

four and five were merged and labeled “confident”, and three was kept as is and labeled “neutral”. The next category assesses the responsibilities of the employer with choices ranged between strongly disagree to strongly agree. To collapse the number of choices in this category, one and two were merged and labeled “not responsible”, four and five were merged and labeled “responsible”, and three was kept as is and labeled “neutral”.

The fourth category is family. The choices for the questions ranged from one to five with one represents strongly disagree and five represents strongly agree. These choices were collapsed into “agree”, “neutral”, and “disagree”, with one and two were merged and labeled disagree, three labeled neutral, and four and five were merged and labeled agree. There are two more questions belonging to this category that do not need to be collapsed. The variables in the categories of knowledge and training, and workplace were also collapsed and labeled similar to the category of family, “agree”, “neutral”, and “disagree”.

The work obligation category has eight questions with five answer choices ranging from one to five with one represents not obligated and five represents obligated. These choices were also collapsed into three with one and two were merged and labeled “not obligated”, three was labeled “neutral”, and four and five were merged and labeled “obligated”.

Finally, the demographic data category is considered. Gender was dichotomized into male and female, as the third choice, that is “prefer not to answer”, was limited to only one participant. Education was collapsed into three groups, less than some college, some college to bachelors, and more than bachelors. The rest of the

variables were kept as is. Next, I present the findings of the survey, starting with the scenario questions and followed by categories of the potential influencing factors.

## 5.1 The Scenario Questions

As mentioned earlier, the survey starts with a disease outbreak scenario (Appendix E) that is followed by two questions with the same answer choices. The scenario displays a disease outbreak happening outside the United States, and escalates and by the time it reaches the area where the participant works. This resulted in an exposure among co-workers. In the first scenario question, I asked participants to select a choice that represents their intended behavior in such conditions. In the second scenario question, I asked participants to select from the same choices in case there is no exposure in the workplace. Table 5.2 displays the finding from the scenario questions.

Table 5.2: Responses of participants to the given outbreak scenario

Variable	N	%
<b>Participants' responses to the first question*</b>		
Turn off my cell phone so I will not be asked to come to work.	1	1.0
I'm not coming to work until I'm clear about the exposure risk.	13	12.5
Only work my scheduled shifts.	15	14.4
I will work additional shifts if asked.	39	37.5
I will call my supervisor to ask if they need shift covered.	36	34.6
Total	104	100.0
<b>Participants' responses to the second question*</b>		
Turn off my cell phone so I will not be asked to come to work.	1	1.0
I'm not coming to work until I'm clear about the exposure risk.	9	8.7
Only work my scheduled shifts.	19	18.3
I will work additional shifts if asked.	45	43.3
I will call my supervisor to ask if they need shift covered.	30	28.8
Total	104	100.0

\*The scenario and the questions are discussed above.

A total of 104 participants answered the two scenario questions. In the first question, only one participant selected the first choice and indicated that he/she will turn off his/her cell phone, so he/she will not be asked to come to work. Thirteen participants (12.5%) selected the second choice as they indicated that they will not come to work unless they are clear about the potential exposure risk. While 14.4 % of participants chose the third choice and will come to work only during their scheduled shifts, 37.5% of participants indicated that they will come to work if asked. The last group of participants indicated that they will call their supervisors to ask if they need shift covered and they represent 34.6%.

In the second question, participants were asked about their decision if there was no exposure among co-workers as was the case in the first question. There are few changes in participants' choices as they show more willingness to come to work. Again, a total of 104 participants answered the second question. While "turn off my cell phone..." is selected by one, who is the same participant in the first question, the number of participants who indicated that they will not come to work until they are clear about the risk is dropped to nine instead of 13. The answer choice that is selected by the most by participants in the two questions indicates that the participant will work additional shifts if asked, and is selected by 37.5% and 43.3%, respectively, in the two questions.

The first and second answer choices indicate that participants will either turn off their cell phones or they will not come to work until they are clear about the exposure risk. That means, a participant who select any of these options is less likely to come to work. These two options were merged and labeled "unwilling". While third, fourth, and fifth answer choices indicate that participants will come to work,

they differ in their degree of willingness. These three options were merged and labeled “willing.” Therefore, the previous two questions were dichotomized into “unwilling” and “willing” groups. This is important to facilitate further analysis in assessing the effect of other variables on the participants’ decision to come to work. Table 5.3 displays the participants’ distribution in these variables.

Table 5.3: Dichotomized responses of participants to the given outbreak scenario

Variable	N	%
<b>First question</b>		
Unwilling	14	13.5
Willing	90	86.5
Total	104	100.0
<b>Second question</b>		
Unwilling	10	9.6
Willing	94	90.4
Total	104	100.0

When groups are dichotomized, 13.5% of participants indicated that they are unwilling to come to work in the first question. In the second question where no exposure among co-worker, less participants indicated unwillingness to come to work as the percentage dropped to 9.6%.

To assess the effect of the exposure among co-workers on participants’ potential behavior, it is imperative to assess the significance of the change between the response to the first and second questions. The appropriate statistical tool in this case is the McNemar’s test (Boslaugh, 2013; Pallant, 2011). This test is used to assess the intended behavior before and after the intervention, which is the exposure among co-workers in this case. The null hypothesis for this test is that there is no change in the

proportion of the willingness of the participants if there is exposure or not among co-workers. The result of the McNemar’s test indicated no significant change in the proportion of participants who are willing to work if there is an exposure among co-workers (86.5%) when compared with the proportion of participants who are willing to work if there is no exposure among co-workers (90.4%).

## 5.2 Providers’ Concerns

This category includes nine variables that assess the providers’ concerns to work during disease outbreaks like the previously given scenario. These variables address different dimensions that may concern EMS providers during disease outbreaks. Participants could choose answers from one to five, with one indicating no concern and five indicating the maximum concern. Table 5.4 displays the make-up of participant’s choices.

Table 5.4: Concerns for Working during Disease Outbreaks

Variable	Not at all concerned								Extremely concerned	
	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Becoming infected and getting ill.	1	1.0	7	6.7	43	41.3	26	25.0	27	26.0
Dying from the infection.*	3	2.9	12	11.5	28	26.9	25	24.0	35	33.7
Infecting family members.	3	2.9	3	2.9	7	6.7	22	21.2	69	66.3
Very little information is known about a newly infectious disease.*	2	1.9	5	4.8	19	18.3	39	37.5	38	36.5
Shortage in PPE supplies.	6	5.8	3	2.9	18	17.3	22	21.2	55	52.9
No known effective treatment or vaccine for infected patients.	1	1.0	5	4.8	19	18.3	30	28.8	49	47.1
The disease is easily transmissible.	1	1.0	4	3.8	12	11.5	38	36.5	49	47.1
The disease is virulent.	0	0.0	2	1.9	9	8.7	36	34.6	57	54.8

Overall, your general concern about working during such a disease outbreak.	2	1.9	5	4.8	23	22.1	43	41.3	31	29.8
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\*missing n=1, %=1.0

A total of 104 participants completed the majority of questions in this category. Participants indicated high levels of concern about working during disease outbreaks with all given variables. Participants indicated that they are concerned the most (66.3%) about infecting family members, which is more than twice their concern of becoming infected themselves (26%). More than half of the participants indicated that they are highly concerned if the disease is virulent, with no participant indicating no concern. About one third of participants indicated high concern from dying from the disease, or if there is a lack of information about the evolving infectious disease. Six participants, which is the maximum in this category indicated that they are not at all concerned if there is a shortage in PPE supplies. Yet, the majority (52.9%) of participants showed a maximum concern. Where there is no effective treatment or vaccine to infected patients, or the disease is easily transmissible, almost half (47.1%) participants indicated a maximum concern. Overall, 29.8% of participants indicated a maximum concern, whereas only 1.9% participants indicated that they are not at all concerned, and the rest in between.

To help in conducting further analysis to assess the association between variables as well as making the table easily readable, the five categories were collapsed into two. As mentioned earlier, I dichotomized variables into “less concerned” and “concerned” groups. One and two were merged and labeled “less concerned”, three, four, and five were merged and labeled “concerned”. Table 5.5 displays the frequency and percentage of participants in the two groups.

Table 5.5: Concerns for working during disease outbreaks with collapsed options

Variable	Less Concerned		Concerned		Total
	N	%	N	%	
Becoming infected and getting ill.	8	7.7	96	92.3	104
Dying from the infection.*	15	14.4	88	85.6	104
Infecting family members.	6	5.8	98	94.2	104
Very little information is known about a newly infectious disease.*	7	6.7	96	92.3	104
Shortage in PPE supplies.	9	8.9	95	91.3	104
No known effective treatment or vaccine for infected patients.	6	5.8	98	94.2	104
The disease is easily transmissible.	5	4.8	99	95.2	104
The disease is virulent.	2	1.9	102	98.1	104
Overall, your general concern about working during such a disease outbreak.	7	6.7	97	93.3	104

\*missing n=1, %=1.0

Here we have some changes to the most and least concerning variables.

Participants indicated that they are concerned the most if the disease is virulent and easily transmissible with percentages of 98.1 and 95.2, respectively. Interestingly, participants indicated that they are least concerned from “dying from the infection” with a percentage of 85.6. While they are more concerned about becoming infected than dying from the infection, they are also more concerned for their families becoming infected than themselves. Overall, 93.3% of the participants are concerned to work during disease outbreaks.

To assess the association between the variables in this category and the willingness to come to work, I developed the test hypotheses which are as follow:

1. H1: There is a relationship between willingness to come to work and concern of becoming infected and getting ill from a disease outbreak.
2. H2: There is a relationship between willingness to come to work and concern of dying from the infection from a disease outbreak.

3. H3: There is a relationship between willingness to come to work and concern of infecting family members during disease outbreaks.
4. H4: There is a relationship between willingness to come to work and concern about having very little information about a newly infectious disease outbreak.
5. H5: There is a relationship between willingness to come to work and concern about shortages in PPE supplies during disease outbreaks.
6. H6: There is a relationship between willingness to come to work and concern about having no known effective treatment or vaccine for infected patients during disease outbreaks.
7. H7: There is a relationship between willingness to come to work and concern about having an easily transmissible disease outbreak.
8. H8: There is a relationship between willingness to come to work and concern about having a virulent disease outbreak.
9. H9: There is a relationship between willingness to come to work and concern about working during such a disease outbreak.

A cross-tabulation, including the chi-square test for independence was made to test the null hypothesis (no relationship exists) and assess for the presence of a significant association between variables. Table 5.6 below displays the chi-square results of the relationships between willingness to work and variables in this category.

Table 5.6: Relationship between willingness to work and concerns to work during disease outbreaks

Concerns to work variables	$\chi^2$	df	P-value*	Phi/Cramer's V	Fisher's Exact Test
<b>Scenario first question**</b>					
Becoming infected and getting ill.	1.348	1	.246	-.114	.594
Dying from the infection.	2.762	1	.097	-.164	.213
Infecting family members.	.990	1	.320	-.098	1.000
Very little information is known about a newly infectious disease.	.003	1	.956	.005	1.000
Shortage in PPE supplies.	1.533	1	.216	-.121	.605
No known effective treatment or vaccine for infected patients.	.056	1	.813	.023	.590
The disease is easily transmissible.	.817	1	.366	-.089	1.000
The disease is virulent.	.317	1	.573	-.055	1.000
Overall, your general concern about working during such a disease outbreak.	1.167	1	.280	-.106	.590
<b>Scenario second question***</b>					
Becoming infected and getting ill.	.922	1	.337	-.094	1.000
Dying from the infection.	1.888	1	.169	-.135	.351
Infecting family members.	.677	1	.410	-.081	1.000
Very little information is known about a newly infectious disease.	.808	1	.369	-.089	1.000
Shortage in PPE supplies.	1.048	1	.306	-.100	.595
No known effective treatment or vaccine for infected patients.	.677	1	.410	-.081	1.000
The disease is easily transmissible.	.559	1	.455	-.073	1.000
The disease is virulent.	.217	1	.641	-.046	1.000
Overall, your general concern about working during such a disease outbreak.	.798	1	.372	-.088	1.000

\* The test is significant if the  $P < 0.05$

\*\*Scenario 1<sup>st</sup> question: Willingness to work during a disease outbreak if there is an exposure among co-workers.

\*\*\* Scenario 2<sup>nd</sup> question: Willingness to work during a disease outbreak if there is no exposure among co-workers.

The chi-square test for independence indicated no significant association between willingness to work and any of the concerning variables in this category. Therefore, it is difficult to reject the null hypotheses, and we can conclude that our results are not significant. This means that the proportion of participants who are willing to work and are concerned about working during disease outbreaks is not significantly different from proportion of participants who are unwilling to work and are concerned about working during disease outbreaks. There appears to be no association between willingness to report to work and concerns during disease outbreaks.

### 5.3 Confidence in Employer

This category consists of seven variables that assess the providers' confidence in their employer. Answer choices were collapsed into three groups: "not confident", "neutral", and "confident". Table 5.7 displays the variables that address different dimensions related to confidence in the employer, and the frequencies and percentages in each variable.

Table 5.7: Participants' confidence in their employer

Variable	Not confident		Neutral		Confident	
	N	%	N	%	N	%
Your employer has systems in place to warn you about infected, or potentially infected patients.*	22	21.2	25	24.0	54	51.9
Your employer will provide the most up-to-date information about the disease progress.*	14	13.5	22	21.2	65	62.5

Your employer will provide and maintain adequate supplies of protective equipment like PPE and vaccines.*	14	13.5	19	18.3	68	65.4
Your employer will provide an effective treatment and vaccine when available.*	8	7.7	23	22.1	70	67.3
Your employer will provide appropriate training to the frontline workers to handle the emerging outbreak.**	10	9.6	21	20.2	69	66.3
Your employer has systems in place to take care of family members of EMS workers when needed.*	48	46.2	26	25.0	27	26.0
OVERALL, you are confident that your employer will perform their responsibilities to keep frontline workers safe during disease outbreaks.*	20	19.2	25	24.0	56	65.8

\*missing n=3, %=2.9

\*\* missing n=4, %= 3.8

A total of 100 participants completed this category of questions. The majority of the participants expressed their confidence in the employer in all variables except one. Only 26% of participants indicated that they are confident that their employer has a system in place to provide care for their family members if needed, whereas 46% indicated that they are not confident, and 25% indicated a neutral position. On the other hand, more than two third of participants indicated that they are confident that their employer will provide them with an effective treatment and vaccine once available, and only 7.7% expressed their non-confidence. Most importantly, very few participants (13.5%, 13.5%, and 9.6%) indicated non-confidence that their employer will provide appropriate information, supplies, and training, respectively. Overall, about two thirds of participants indicated that they are confident that their employers will perform their responsibilities to keep them safe during disease outbreaks, whereas 19.2% indicated non-confidence and 24% indicated neutral position.

To assess the association between the variables in this category and the willingness to come to work, I developed the test hypotheses which are as follow:

1. H1: There is a relationship between willingness to come to work and confidence that the employer has systems in place to warn you about infected, or potentially infected, patients.
2. H2: There is a relationship between willingness to come to work and confidence that the employer will provide the most up-to-date information about the disease progress.
3. H3: There is a relationship between willingness to come to work and confidence that the employer will provide and maintain adequate supplies of protective equipment like PPE and vaccines.
4. H4: There is a relationship between willingness to come to work and confidence that the employer will provide an effective treatment and vaccine when available.
5. H5: There is a relationship between willingness to come to work and confidence that the employer will provide appropriate training to the frontline workers to handle the emerging outbreak.
6. H6: There is a relationship between willingness to come to work and confidence that the employer has systems in place to take care of family members of EMS workers when needed.
7. H7: There is a relationship between willingness to come to work and confidence that your employer will perform their responsibilities to keep frontline workers safe during disease outbreaks.

Cross-tabulation, including the chi-square test for independence was made to test the null hypothesis (no relationship exists) and assess for the presence of a significant association between variables. The association was assessed for both scenario questions. Table 5.8 below displays the chi-square results of the significance of the relationships between willingness to work and variables in this category.

Table 5.8: Relationships between willingness to work and confidence in employer

Confidence in employer variables	$\chi^2$	df	P-value*	Phi/Cramer's V	Fisher's Exact Test
<b>Scenario first question**</b>					
Your employer has systems in place to warn you about infected, or potentially infected patients.	.719	2	.698	.084	N/A
Your employer will provide the most up-to-date information about the disease progress.	2.236	2	.327	.149	N/A
Your employer will provide and maintain adequate supplies of protective equipment like PPE and vaccines.	1.562	2	.458	.124	N/A
Your employer will provide an effective treatment and vaccine when available.	10.573	2	.005*	.324	N/A
Your employer will provide appropriate training to the frontline workers to handle the emerging outbreak.	10.223	2	.006*	.320	N/A
Your employer has systems in place to take care of family members of EMS workers when needed.	4.444	2	.108	.210	N/A
OVERALL, you are confident that your employer will perform their responsibilities to keep frontline workers safe during disease outbreaks.	3.678	2	.159	.191	N/A
<b>Scenario second question***</b>					

Your employer has systems in place to warn you about infected, or potentially infected patients.	1.648	2	.439	.128	N/A
Your employer will provide the most up-to-date information about the disease progress.	4.305	2	.116	.206	N/A
Your employer will provide and maintain adequate supplies of protective equipment like PPE and vaccines.	5.645	2	.059	.236	N/A
Your employer will provide an effective treatment and vaccine when available.	10.375	2	.006*	.321	N/A
Your employer will provide appropriate training to the frontline workers to handle the emerging outbreak.	10.237	2	.006*	.320	N/A
Your employer has systems in place to take care of family members of EMS workers when needed.	3.624	2	.163	.189	N/A
OVERALL, you are confident that your employer will perform their responsibilities to keep frontline workers safe during disease outbreaks.	8.204	2	.017*	.285	N/A

\* The test is significant if the  $P < 0.05$

\*\*Scenario 1<sup>st</sup> question: Willingness to work during a disease outbreak if there is an exposure among co-workers.

\*\*\* Scenario 2<sup>nd</sup> question: Willingness to work during a disease outbreak if there is no exposure among co-workers.

The chi-square test for independence indicated significant associations between a couple of variables here. For the first scenario question, there are two significant variables. First, there is a significant association between willingness to work and confidence that the employer will provide an effective treatment and vaccine when available,  $\chi^2 (2, n = 101) = 10.57, P < 0.05, \text{Cramer's } V = .32$ . Cramer's V is used here to indicate the effect size, which is medium here (.10 for small effect, .30 for medium effect and .50 for large effect). Cramer's V is used when the table is larger than 2x2 (Pallant, 2011). The result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to

work and confidence that the employer will provide an effective treatment and vaccine when available. This means that the proportion of participants who are willing to work and confident that their employer will provide an effective treatment and vaccine when available, is significantly different from the proportion of participants who are unwilling to work and confident that their employer will provide an effective treatment and vaccine when available. This indicates that participants who are confident that their employer will provide an effective treatment and vaccine when available are more likely to come to work as indicated by the analysis.

Second, there is a significant association between willingness to work and confidence that the employer will provide appropriate training to frontline workers to handle the emerging outbreak,  $\chi^2(2, n = 100) = 10.22, P < 0.05$ , Cramer's  $V = .32$ . Cramer's  $V$  indicates a medium effect. The result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to work and confidence that employer will provide appropriate training to frontline workers to handle the emerging outbreak. This means that the proportion of participants who are willing to work and confident that their employer will provide appropriate training to frontline workers to handle the emerging outbreak, is significantly different from the proportion of participants who are unwilling to work and confident that their employer will provide appropriate training to frontline workers to handle the emerging outbreak. This indicates that participants who are confident that their employer will provide appropriate training to frontline workers to handle the emerging outbreak are more likely to come to work as indicated by the analysis.

For the second scenario question, there are three significant variables. First, there is a significant association between willingness to work and confidence that the

employer will provide an effective treatment and vaccine when available,  $\chi^2 (2, n = 101) = 10.37, P < 0.05, \text{Cramer's } V = .32$ . Cramer's V indicates a medium effect. The result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to work and confidence that the employer will provide an effective treatment and vaccine when available. This means that the proportion of participants who are willing to work and confident that their employer will provide an effective treatment and vaccine when available, is significantly different from the proportion of participants who are unwilling to work and confident that their employer will provide an effective treatment and vaccine when available. This indicates that participants who are confident that their employer will provide an effective treatment and vaccine when available are more likely to come to work as indicated by the analysis.

Second, there is a significant association between willingness to work and confidence that the employer will provide appropriate training to frontline workers to handle the emerging outbreak,  $\chi^2 (2, n = 100) = 10.23, P < 0.05, \text{Cramer's } V = .32$ . Cramer's V indicates a medium effect. The result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to work and confidence that the employer will provide appropriate training to frontline workers to handle the emerging outbreak. This means that the proportion of participants who are willing to work and confident that their employer will provide appropriate training to frontline workers to handle the emerging outbreak, is significantly different from the proportion of participants who are unwilling to work and confident that their employer will provide appropriate training to frontline workers to handle the emerging outbreak. This indicates that participants who are confident

that their employer will provide appropriate training to frontline workers to handle the emerging outbreak are more likely to come to work as indicated by the analysis.

Third, there is a significant association between willingness to work and confidence that the employers will perform their responsibilities to keep frontline workers safe during disease outbreaks,  $\chi^2 (2, n = 101) = 8.20, P < 0.05$ , Cramer's  $V = .28$ . Cramer's  $V$  indicates a small effect. The result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to work and confidence that the employers will perform their responsibilities to keep frontline workers safe during disease outbreaks. This means that the proportion of participants who are willing to work and confident that their employers will perform their responsibilities to keep them safe during disease outbreaks, is significantly different from the proportion of participants who are unwilling to work and confident that their employers will perform their responsibilities to keep them safe during disease outbreaks. This indicates that participants who are confident that their employer will perform their responsibilities to keep them safe during disease outbreaks are more likely to come to work as indicated by the analysis.

However, one of the assumptions of the chi-square test is violated here. For the test to be valid, the minimum number of cases in each cell in the table should be five or greater (Boslaugh, 2013). Due to the fact that in each of the aforementioned tests, there is at least one cell that has a frequency of less than five, one of the test assumptions is violated. The Fisher's Exact Test is an alternative to the chi-square test in such cases where one cell has a frequency less than five cases. However, this test works only on "2x2" tables where in each variable there are only two groups. In our tests, confidence in the employer has three groups for each variable, which means this

test cannot be performed here. That being said, the results of this test should be accepted with caution.

#### 5.4 Employer Responsibilities

Four variables are included in this category that assesses the responsibilities of the employers during disease outbreaks. The answer choices were collapsed into “not responsible”, “neutral”, and “responsible”. Table 5.9 below displays the distribution of participants across these groups.

Table 5.9: Participants’ views about employer responsibilities

Variable	Not responsible		Neutral		Responsible	
	N	%	N	%	N	%
Provide vaccination to family members of workers (if available) during disease outbreaks.**	14	13.5	21	20.2	63	60.6
Pay incentives to workers during disease outbreaks.*	31	29.8	29	27.9	39	37.5
Provide laundry service to workers during day-to-day operations and disease outbreaks.*	17	16.3	13	12.5	69	66.3
Take disciplinary action against workers who didn’t show up because of safety concerns for themselves and/or their families.*	44	44.3	28	26.9	27	26.0

\*missing n=5, %=4.8

\*\*missing n=6, %=5.8

Among the four variables explored in this category, providing laundry services is selected the most (66.3%) by participants as a responsibility of the employer.

Whereas taking disciplinary action against those who may not show up due to safety

concerns is selected the least (26%) as an employer responsibility. While paying incentives to workers during disease outbreaks is fairly distributed between the three choices, 60.6% of participants consider providing family members with vaccination as an employer responsibility.

To assess the association between the variables in this category and the willingness to come to work, I developed the test hypotheses which are as follow:

1. H1: There is a relationship between willingness to come to work and the employer responsibility of providing vaccination to family members of workers (if available) during disease outbreaks.
2. H2: There is a relationship between willingness to come to work and the employer responsibility of paying incentives to workers during disease outbreaks.
3. H3: There is a relationship between willingness to come to work and the employer responsibility of providing laundry service to workers during day-to-day operations and disease outbreaks.
4. H4: There is a relationship between willingness to come to work and the employer responsibility of taking disciplinary action against workers who didn't show up because of safety concerns for themselves and/or their families.

Cross-tabulation, including the chi-square test for independence was made to test the null hypothesis (no relationship exist) and assess for the presence of a significant association between variables. The association was assessed for both scenario questions. Table 5.10 below displays the chi-square test results of the

significance of the relationships between willingness to work and variables in this category.

Table 5.10: Relationships between willingness to work and employer responsibilities

Employer responsibility variables	$\chi^2$	df	P-value*	Phi/Cramer's V	Fisher's Exact Test
<b>Scenario first question**</b>					
Provide vaccination to family members of workers (if available) during disease outbreaks.	2.739	2	.254	.167	N/A
Pay incentives to workers during disease outbreaks.	.509	2	.775	.072	N/A
Provide laundry service to workers during day-to-day operations and disease outbreaks.	1.298	2	.523	.115	N/A
Take disciplinary action against workers who didn't show up because of safety concerns for themselves and/or their families.	3.120	2	.210	.178	N/A
<b>Scenario second question***</b>					
Provide vaccination to family members of workers (if available) during disease outbreaks.	2.841	2	.242	.170	N/A
Pay incentives to workers during disease outbreaks.	2.130	2	.345	.147	N/A
Provide laundry service to workers during day-to-day operations and disease outbreaks.	4.790	2	.091	.220	N/A
Take disciplinary action against workers who didn't show up because of safety concerns for themselves and/or their families.	2.177	2	.337	.148	N/A

\* The test is significant if the  $P < 0.05$

\*\*Scenario 1<sup>st</sup> question: Willingness to work during a disease outbreak if there is an exposure among co-workers.

\*\*\* Scenario 2<sup>nd</sup> question: Willingness to work during a disease outbreak if there is no exposure among co-workers.

The chi-square test for independence indicated no significant association between willingness to work and any of the variables in this category. Therefore, it is difficult to reject the null hypotheses, and we can conclude that our results are not significant. There appears to be no association between willingness to report to work and the employer responsibility variables.

## 5.5 Family

Seven questions were developed to assess the views of participants toward their families. The five Likert-scale questions were collapsed into “disagree”, “neutral”, and “agree”, as shown in table 5.11 below, which displays the distribution of participants across these groups.

Table 5.11: Participants’ views about family during disease outbreaks

Variable	Disagree		Neutral		Agree	
	N	%	N	%	N	%
My family is prepared to function in my absence.*	12	11.5	28	26.9	58	55.8
As an EMS provider, working during day-to-day operations put my family at risk of infection higher than the general population.*	11	10.6	18	17.3	69	66.3
As an EMS provider, working during disease outbreaks put my family at risk of infection higher than the general population.*	5	4.8	17	16.3	76	73.1
My concern for my family has a major effect on my decision whether or not to come to work. *	23	22.1	36	34.6	39	37.5
My family members can influence my decision whether or not to come to work. *	26	25.0	34	32.7	38	36.5

	Self-safety		Family safety		Work obligation	
	N	%	N	%	N	%
During disease outbreaks, who comes first?	51	49.0	44	42.3	3	2.9
			Yes		No	
			N	%	N	%
At least one of my parents or grandparents work, or ever worked, as a first responders (Police/Fire/EMS).			40	38.5	58	55.8

\*missing n=6, %=5.8

A total of 98 participants answered this category of questions. While approximately two-thirds of participants believe that they are putting their families at risk of infection greater than the general population because of the nature of their work, this risk increases to 73.1% during disease outbreaks. Even though only about one-third believe that their family could influence their decision on reporting to work. While half of participants prioritize their safety first, 42.3% prioritize family, and only 2.9 put work obligation as a first priority during disease outbreaks. Interestingly, 38.5 of the participants are descended from first responder families like police, firefighter, or EMS.

To assess the association between the variables in this category and the willingness to come to work, I developed the test hypotheses which are as follow:

1. H1: There is a relationship between willingness to come to work and having family prepared to function in your absence.
2. H2: There is a relationship between willingness to come to work and the belief that daily EMS work put your family at risk of infection higher than the general population.

3. H3: There is a relationship between willingness to come to work and the belief that during disease outbreaks your family becomes at risk of infection higher than the general population.
4. H4: There is a relationship between willingness to come to work and the belief that family has a major effect on the decision to come to work.
5. H5: There is a relationship between willingness to come to work and the belief that family members can influence the decision to come to work.
6. H6: There is a relationship between willingness to come to work and the priority ranking of self, family, and work.
7. H7: There is a relationship between willingness to come to work and having at least one parent or grandparent work, or ever worked, as first a responder.

Cross-tabulation, including the chi-square test for independence was made to test the null hypothesis (no relationship exist) and assess for the presence of a significant association between variables. The association was assessed for both scenario questions. Table 5.12 below displays the chi-square results of the significance of the relationships between willingness to work and variables in this category.

Table 5.12: Relationships between willingness to work and family

Family variables	$\chi^2$	df	P-value*	Phi/Cramer's V	Fisher's Exact Test
Scenario first question**					

My family is prepared to function in my absence.	2.073	2	.355	.145	N/A
As an EMS provider, working during day-to-day operations put my family at risk of infection higher than the general population.	.164	2	.921	.041	N/A
As an EMS provider, working during disease outbreaks put my family at risk of infection higher than the general population.	1.171	2	.557	.109	N/A
My concern for my family has a major effect on my decision whether or not to come to work.	2.559	2	.278	.162	N/A
My family members can influence my decision whether or not to come to work.	.827	2	.661	.092	N/A
During disease outbreaks, who comes first?	.554	2	.758	.075	N/A
At least one of my parents or grandparents work, or ever worked, as a first responders (Police/Fire/EMS).	5.100	1	.010 *	.260	.013
Scenario second question***					
My family is prepared to function in my absence.	6.500	2	.039 *	.258	N/A
As an EMS provider, working during day-to-day operations put my family at risk of infection higher than the general population.	1.502	2	.472	.124	N/A
As an EMS provider, working during disease outbreaks put my family at risk of infection higher than the general population.	.674	2	.714	.083	N/A
My concern for my family has a major effect on my decision whether or not to come to work.	3.174	2	.205	.180	N/A
My family members can influence my decision whether or not to come to work.	2.147	2	.342	.148	N/A
During disease outbreaks, who comes first?	.324a	2	.850	.058	N/A
At least one of my parents or grandparents work, or ever worked, as a first responders (Police/Fire/EMS).	5.896	1	.005 *	.283	.007

\* The test is significant if the  $P < 0.05$

\*\*Scenario 1<sup>st</sup> question: Willingness to work during a disease outbreak if there is an exposure among co-workers.

\*\*\* Scenario 2<sup>nd</sup> question: Willingness to work during a disease outbreak if there is no exposure among co-workers.

The chi-square test for independence (with Yate Continuity Correction) indicated a significant association in two variables in this category. For the first scenario question, there is a significant association between willingness to work and having at least one parent or grandparent work, or ever worked, as a first responder,  $\chi^2(1, n = 98) = 5.10, P < 0.05, \phi = .26$ . The phi is used here to indicate the effect size, which is a small effect (less than .30). Phi is used for 2x2 tables (Pallant, 2011). Because one cell in the table has expected count less than 5, Fisher's Exact Test is used, and is indicated a significant association as  $P < 0.05$ .

For the second scenario question, the chi-square test for independence (with Yate Continuity Correction) indicated a significant association between willingness to work and having at least one parent or grandparent work, or ever worked, as first responder,  $\chi^2(1, n = 98) = 5.89, P < 0.05, \phi = .28$ . The phi indicates a small effect.

Therefore, the results indicate that we can reject the null hypotheses, and we can conclude that there is a significant association between willingness to come to work and having at least one parent or grandparent work, or ever worked, as a first responder (Police/Fire/EMS). This means that the proportion of participants who are willing to work and have first responder parents or grandparents, is significantly different from the proportion of participants who are unwilling to work and have first responder parents or grandparents. Interestingly, this indicates that participants who are from first responder generations are less likely to come to work as indicated by the analysis.

Additionally, for the second scenario question, there is a significant association between willingness to work and having family prepared to function in your absence,  $\chi^2 (2, n = 98) = 6.50, P < 0.05, \text{Cramer's } V = .25$ . The Cramer's V indicates a small effect. This result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to come to work and having family prepared to function in your absence. This means that the proportion of participants who are willing to work and have family prepared to function in their absence, is significantly different from the proportion of participants who are unwilling to work and have family prepared to function in their absence. This indicates that participants who have family prepared to function in their absence are more likely to come to work as indicated by the analysis.

However, one of the chi-square test assumptions is violated here. There are three cells that have expected count less than five. Also, Fisher's Exact Test is not appropriate here, because this test has a table of 2x3. Therefore, the results of these tests should be considered with cautions.

## 5.6 Knowledge and Training

Five variables were used to assess the knowledge and training here. The answer choices were collapsed into "disagree", "neutral", and "agree". Table 5.13 displays the distribution of participants across these groups.

Table 5.13: Participants' views about their knowledge and training

Variable	Disagree		Neutral		Agree	
	N	%	N	%	N	%

The knowledge and training that I have learned about infectious disease is adequate for day-to-day operations.*	2	1.9	21	20.2	74	71.2
The knowledge and training that I have learned about infectious disease is adequate during severe disease outbreaks.*	14	13.5	42	40.4	41	39.4
During Ebola outbreak, I had appropriate training.*	18	17.3	17	16.3	62	59.6
Lack of confidence in knowledge and training could affect my decision to work during disease outbreaks.*	31	29.8	29	27.9	37	35.6
Generally speaking, I follow the standard precautions of using PPE during day-to-day operations.**	2	1.9	9	8.7	85	81.7

\*missing n=7, %=6.7

\*\*missing n=8, %= 7.7

A total of 97 participants answered the questions in this category. The answers show that only two (1.9%) participants do not believe that their knowledge and training are sufficient for their daily work. During disease outbreaks, however, fewer participants are confident about their skill set. While 71.2% participants believe in their skill set during the everyday work, only 39.4 did so during disease outbreaks. When it comes to the Ebola Outbreak, 59.6% of the participants agree that they had appropriate training, and the rest of the participants are almost evenly divided between disagree and neutral. Participants disagree the most (29.8%) that lack of confidence in knowledge and training could influence the decision to come to work. And finally, the overwhelming majority (81.7%) of participants considers that they are compliant with using PPE.

To assess the association between the variables in this category and the willingness to come to work, I developed the test hypotheses which are as follow:

1. H1: There is a relationship between willingness to come to work and having adequate knowledge and training about infectious disease for day-to-day operations.
2. H2: There is a relationship between willingness to come to work and having adequate knowledge and training about infectious disease for disease outbreaks.
3. H3: There is a relationship between willingness to come to work and having appropriate training during Ebola outbreak.
4. H4: There is a relationship between willingness to come to work and the belief that lack of confidence in knowledge and training could affect my decision to work during disease outbreaks.
5. H5: There is a relationship between willingness to come to work and the belief that the participant follows the standard precautions of using PPE during day-to-day operations.

Cross-tabulation, including the chi-square test for independence was made to test the null hypothesis (no relationship exists) and assess for the presence of a significant association between variables. The association was assessed for both scenario questions. Table 5.14 below displays the chi-square results of the significance of the relationships between willingness to work and variables in this category.

Table 5.14: Relationships between willingness to work and knowledge and training

Knowledge and training variables	$\chi^2$	df	P-value*	Phi/Cramer's V	Fisher's Exact Test
Scenario first question**					

The knowledge and training that I have learned about infectious disease is adequate for day-to-day operations.	2.849	2	.241	.171	N/A
The knowledge and training that I have learned about infectious disease is adequate during severe disease outbreaks.	1.728	2	.421	.133	N/A
During Ebola outbreak, I had appropriate training.	9.017	2	.011*	.305	N/A
Lack of confidence in knowledge and training could affect my decision to work during disease outbreaks.	5.961	2	.051	.248	N/A
Generally speaking, I follow the standard precautions of using PPE during day-to-day operations.	1.775a	2	.412	.136	N/A
Scenario second question***					
The knowledge and training that I have learned about infectious disease is adequate for day-to-day operations.	4.870	2	.088	.224	N/A
The knowledge and training that I have learned about infectious disease is adequate during severe disease outbreaks.	3.245	2	.197	.183	N/A
During Ebola outbreak, I had appropriate training.	11.265	2	.004*	.341	N/A
Lack of confidence in knowledge and training could affect my decision to work during disease outbreaks.	4.046	2	.132	.204	N/A
Generally speaking, I follow the standard precautions of using PPE during day-to-day operations.	1.129	2	.569	.108	N/A

\* The test is significant if the  $P < 0.05$

\*\*Scenario 1<sup>st</sup> question: Willingness to work during a disease outbreak if there is an exposure among co-workers.

\*\*\* Scenario 2<sup>nd</sup> question: Willingness to work during a disease outbreak if there is no exposure among co-workers.

For the first scenario question, there is a significant association between willingness to work and having appropriate training during the Ebola Outbreak,  $\chi^2$  (2,

$n = 97) = 9.01, P < 0.05, \text{Cramer's } V = .30$ . The Cramer's V indicates a medium effect. For the second scenario question, again, there is a significant association between willingness to work and having appropriate training during the Ebola Outbreak,  $\chi^2 (2, n = 97) = 11.26, P < 0.05, \text{Cramer's } V = .34$ . The Cramer's V indicates a medium effect.

These results indicate that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to come to work and having appropriate training during the Ebola Outbreak. This means that the proportion of participants who are willing to work and had appropriate training during the Ebola Outbreak, is significantly different from the proportion of participants who are unwilling to work and had appropriate training during the Ebola Outbreak. This indicates that participants who had appropriate training during the Ebola Outbreak are more likely to come to work as indicated by the analysis.

However, one of the chi-square test assumptions is violated here. There are two cells that have expected count less than five. Also, Fisher's Exact Test is not appropriate here, because this test has a table of  $2 \times 3$ . Therefore, the result of this test should be considered with cautions.

## **5.7 Workplace Culture**

Five questions are used in this category to assess the workplace culture of EMS. A total of 96 participants completed this category of questions. Variables were collapsed into "disagree", "neutral", and "agree". Table 5.15 displays the distribution of participants across these groups.

Table 5.15: Participants' views about workplace culture

Variable	Disagree		Neutral		Agree	
	N	%	N	%	N	%
I can <u>understand</u> the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.*	18	17.3	21	20.2	57	54.8
I may <u>forgive</u> the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.*	15	14.4	25	24.0	56	53.8
EMS providers who do not show up to work during disease outbreaks should not be in this job.*	35	33.7	22	21.2	39	37.5
EMS providers who did not show up to work during a disease outbreak due to safety reasons should receive strict disciplinary actions.*	44	42.3	32	30.8	20	19.2

\*missing n=8, %=7.7

Participants who expressed that they may not understand or forgive a co-worker who may not come to work due to safety concerns represent 17.3% and 14.4% respectively. More participants (37.5%) believe that such a co-worker should not be in this job, and 19.2% agree that such a worker should receive a strict disciplinary action.

To assess the association between the variables in this category and the willingness to come to work, I developed the test hypotheses which are as follow:

1. H1: There is a relationship between willingness to come to work and understanding the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.
2. H2: There is a relationship between willingness to come to work and forgiving the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.

3. H3: There is a relationship between willingness to come to work and the belief that EMS providers who do not show up to work during disease outbreaks should not be in this job.
4. H4: There is a relationship between willingness to come to work and the belief that EMS providers who did not show up to work during a disease outbreak due to safety reasons should receive strict disciplinary actions.

Cross-tabulation including the chi-square test for independence was performed to assess the association between willingness to work and variables in this category. The association was assessed for both scenario questions and results are displayed in Table 5.16.

Table 5.16: Relationships between willingness to work and workplace culture

Workplace culture's variables	$\chi^2$	df	P-value*	Phi/Cramer's V	Fisher's Exact Test
<b>Scenario first question**</b>					
I can understand the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.	6.202	2	.045*	.254	N/A
I may forgive the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.	3.587	2	.166	.193	N/A
EMS providers who do not show up to work during disease outbreaks should not be in this job.	5.969	2	.051	.249	N/A
EMS providers who did not show up to work during a disease outbreak due to safety reasons should receive strict disciplinary actions.	3.610	2	.164	.194	N/A
<b>Scenario second question***</b>					

I can understand the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.	5.971	2	.051	.249	N/A
I may forgive the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.	3.251	2	.197	.184	N/A
EMS providers who do not show up to work during disease outbreaks should not be in this job.	5.979	2	.050*	.250	N/A
EMS providers who did not show up to work during a disease outbreak due to safety reasons should receive strict disciplinary actions.	2.393	2	.302	.158	N/A

\* The test is significant if the  $P < 0.05$

\*\*Scenario 1<sup>st</sup> question: Willingness to work during a disease outbreak if there is an exposure among co-workers.

\*\*\* Scenario 2<sup>nd</sup> question: Willingness to work during a disease outbreak if there is no exposure among co-workers.

For the first scenario question, there is a significant association between willingness to work and understanding the behavior of a co-worker who did not show up to work due to safety concerns,  $\chi^2 (2, n = 96) = 6.20, P < 0.05, \text{Cramer's } V = .25$ . The Cramer's V indicates a small effect. This result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to come to work and understanding the behavior of a co-worker who did not show up to work due to safety concerns. This means that the proportion of participants who are willing to work and understand the behavior of a co-worker who did not show up to work due to safety concerns, is significantly different from the proportion of participants who are unwilling to work and understand the behavior of a co-worker who did not show up to work due to safety concerns. This indicates that

participants who understand the behavior of a co-worker who did not show up to work due to safety concerns are less likely to come to work as indicated by the analysis.

For the second scenario question, there is a significant association between willingness to work and the belief that providers who do not show up to work during disease outbreaks should not be in this job,  $\chi^2 (2, n = 96) = 5.97, P < 0.05$ , Cramer's  $V = .25$ . The Cramer's  $V$  indicates a small effect. This result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to come to work and the belief that providers who do not show up to work during disease outbreaks should not be in this job. This means that the proportion of participants who are willing to work and believe that providers who do not show up to work during disease outbreaks should not be in this job, is significantly different from the proportion of participants who are unwilling to work and believe that providers who do not show up to work during disease outbreaks should not be in this job. This indicates that participants who believe that providers who do not show up to work during disease outbreaks should not be in this job are more likely to come to work as indicated by the analysis.

However, one of the chi-square test assumptions is violated here. There are some cells that have expected count less than five. Also, Fisher's Exact Test is not appropriate here, because this test has a table of  $2 \times 3$ . Therefore, the result of this test should be considered with cautions.

## **5.8 Work Obligation**

This is the final category of questions, which includes eight possible barriers for coming to work. These variables assess how obligated, or not, participants feel in the presence of any of these barriers to work. A total of 94 participants completed this

category. Variables were collapsed into “not obligated”, “neutral”, and “obligated”.

Table 5.17 makes up the distribution of participants across these groups.

Table 5.17: Participants’ views about work obligation

Variable	Not obligated		Neutral		Obligated	
	N	%	N	%	N	%
There is a lack of the availability of the appropriate PPE.**	44	42.3	26	25.0	23	22.1
I mistrust the information coming from my employer regarding the progress of the disease outbreak.*	38	36.5	31	29.8	25	24.0
I did not receive appropriate training specific to the current new disease outbreak.*	42	40.4	29	27.9	23	22.1
There is no vaccine or effective treatment for the disease.*	15	14.4	37	35.6	42	40.4
I’m concerned about the safety of myself.*	15	14.4	38	36.5	41	39.4
I’m concerned about the safety of my family members.**	17	16.3	28	26.9	48	46.2
I need to take care of a sick family member.*	35	33.7	24	23.1	35	33.7
There is an exposure in my workplace.*	17	16.3	39	37.5	38	36.5

\*missing n=10, %=9.6

\*\*missing n=11, %=10.6

The situations where participants feel least obligated to work are when there is no appropriate PPE, no specific training for the current disease outbreak, and mistrust of information from the employer, with percentages of 42.3%, 40.4, and 36.5%, respectively. Interestingly, only 14.4% of participants feel “not obligated” to work if there is no vaccine or effective treatment for the disease, and if they are concerned about the safety of themselves. That is, in such situations, 85.6% of participants feel

either “neutral” or “obligated to work. The choice that is selected the most (46.2%) by the participants is that they are obligated to work even though they feel concerned about the safety of their families. If there is an exposure in the workplace, only 16.3% feel not obligated to come.

To assess the association between the variables in this category and the willingness to come to work, I developed the test hypotheses which are as follow:

1. H1: There is a relationship between willingness to come to work and obligation to work if there is a lack of the availability of the appropriate PPE.
2. H2: There is a relationship between willingness to come to work and obligation to work if mistrusting the information coming from my employer regarding the progress of the disease outbreak.
3. H3: There is a relationship between willingness to come to work and obligation to work if participant did not receive appropriate training specific to the current new disease outbreak.
4. H4: There is a relationship between willingness to come to work and obligation to work if there is no vaccine or effective treatment for the disease.
5. H5: There is a relationship between willingness to come to work and obligation to work if the participant is concerned about the safety of myself.
6. H6: There is a relationship between willingness to come to work and obligation to work if the participant is concerned about the safety of my family members.

7. H7: There is a relationship between willingness to come to work and obligation to work if the participant needs to take care of a sick family member.
8. H8: There is a relationship between willingness to come to work and obligation to work if there is an exposure in my workplace.

Cross-tabulation including the chi-square test for independence was performed to assess the association between willingness to work and variables in this category. The association was assessed for both scenario questions and results are displayed in Table 5.18.

Table 5.18: Relationships between willingness to work and work obligation

Work obligation variables	$\chi^2$	df	P-value*	Phi/Cramer's V	Fisher's Exact Test
<b>Scenario first question**</b>					
There is a lack of the availability of the appropriate PPE.	3.508	2	.173	.194	N/A
I mistrust the information coming from my employer regarding the progress of the disease outbreak.	5.703	2	.058	.246	N/A
I did not receive appropriate training specific to the current new disease outbreak.	.093	2	.954	.032	N/A
There is no vaccine or effective treatment for the disease.	1.221	2	.543	.114	N/A
I'm concerned about the safety of myself.	9.828	2	.007*	.323	N/A
I'm concerned about the safety of my family members.	6.505	2	.039*	.264	N/A
I need to take care of a sick family member.	2.324	2	.313	.157	N/A
There is an exposure in my workplace.*	3.873	2	.144	.203	N/A

Scenario second question***					
There is a lack of the availability of the appropriate PPE.	4.810	2	.090	.227	N/A
I mistrust the information coming from my employer regarding the progress of the disease outbreak.	6.650	2	.036*	.266	N/A
I did not receive appropriate training specific to the current new disease outbreak.	2.204	2	.332	.153	N/A
There is no vaccine or effective treatment for the disease.	1.217	2	.544	.114	N/A
I'm concerned about the safety of myself.	9.710	2	.008*	.321	N/A
I'm concerned about the safety of my family members.	8.304	2	.016*	.299	N/A
I need to take care of a sick family member.	1.332	2	.514	.119	N/A
There is an exposure in my workplace.	3.848	2	.146	.202	N/A

\* The test is significant if the  $P < 0.05$

\*\*Scenario 1<sup>st</sup> question: Willingness to work during a disease outbreak if there is an exposure among co-workers.

\*\*\* Scenario 2<sup>nd</sup> question: Willingness to work during a disease outbreak if there is no exposure among co-workers.

For the first scenario question, there is a significant association between willingness to work and being concerned about self-safety,  $\chi^2 (2, n = 94) = 9.82, P < 0.05$ , Cramer's  $V = .32$ . The Cramer's  $V$  indicates a medium effect. Also, there is a significant association between willingness to work and being concerned about the safety of the family members,  $\chi^2 (2, n = 93) = 6.50, P < 0.05$ , Cramer's  $V = .26$ . The Cramer's  $V$  indicates a small effect.

For the second scenario question, again, there is a significant association between willingness to work and being concerned about self-safety,  $\chi^2 (2, n = 94) = 9.71, P < 0.05$ , Cramer's  $V = .32$ . The Cramer's  $V$  indicates a medium effect. There is also a significant association between willingness to work and being concerned about

the safety of the family members,  $\chi^2 (2, n = 93) = 8.30, P < 0.05, \text{Cramer's } V = .29$ . The Cramer's V indicates a small effect. These results indicate that we can reject the null hypotheses, and we can conclude that there is a significant association between willingness to come to work and being concerned about self or family safety. This means that the proportion of participants who are willing to work and are concerned about the safety of themselves or their family, is significantly different from the proportion of participants who are unwilling to work and are concerned about the safety of themselves or their family.

Additionally, there is a significant association between willingness to work and mistrust with the employer,  $\chi^2 (2, n = 94) = 6.65, P < 0.05, \text{Cramer's } V = .26$ . The Cramer's V indicates a small effect. This result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to come to work and the mistrust with the employer. This means that the proportion of participants who are willing to work and mistrust their employers, is significantly different from the proportion of participants who are unwilling to work and mistrust their employers. This indicates that participants who mistrust their employers are less likely to come to work as indicated by the analysis.

However, one of the chi-square test assumptions is violated here. There are some cells that have expected count less than five. Also, Fisher's Exact Test is not appropriate here, because this test has a table of 2x3. Therefore, the result of this test should be considered with cautions.

## **5.9 Demographic Data**

From a total of 104 participants who started the survey, 94 participants completed the demographic information, which are kept to the last. Demographic

information is divided here into two sections: The first section presents the findings of personal information including gender, age, and family status. The second section presents the finding of education and work information.

### 5.9.1 Gender, Age, and Family Status

Gender, age, and family status, and presence (or absence) of children are grouped in Table 5.19, which displays the distribution of participants of these variables.

Table 5.19: Gender, age, and family status distribution of participants

Variable	N	%
<b>Gender</b>		
Male	72	76.6
Female	22	23.4
<b>Age</b>		
34 or below	26	27.4
35 to 54	56	58.9
55 or above	13	13.7
<b>Do you live with a spouse or loved partner?</b>		
Yes	77	81.9
No	17	18.1
<b>Do you have children or dependents living with you?</b>		
Yes	57	60.6
No	37	39.4

A total of 94 participants completed the survey. Table 5.19 displays the gender, age, and family status makeup of the sample. Males represent 76.6% of the sample and females represent 23.4%. One participant selected the choice “prefers not to answer” as being male or female, and is excluded from gender analysis. The age of participants

varies in all age groups with very few participants aged below 24. Therefore, age groups were collapsed into “34 or below”, “35 to 54”, and “55 or above”. The majority of participants are from the middle group, 35 to 54 years old. Among participants, 81.9% live with their spouses or loved partner, and 60.6% have children or dependents who live with them. In sum, male, middle age, married, and have children are the most common type of participants.

To assess the association between the variables in this category and the willingness to come to work, I developed the test hypotheses which are as follow:

1. H1: There is a relationship between willingness to come to work and gender of the participant.
2. H2: There is a relationship between willingness to come to work and age of the participant.
3. H3: There is a relationship between willingness to come to work and the living with a spouse or loved partner.
4. H4: There is a relationship between willingness to come to work and having children or dependents living with the participant.

Cross-tabulation including the chi-square test for independence was performed to assess the association between willingness to work and variables in this category. The association was assessed for both scenario questions and results are displayed in Table 5.20.

Table 5.20: Relationships between willingness to work and age, gender, and marital status

Age, gender, and marital status variables	$\chi^2$	df	P-value*	Phi/Cramer's V	Fisher's Exact Test
<b>Scenario first question**</b>					
Gender	1.424	1	.233	.123	.448
Age	.454	2	.797	.069	N/A
Do you live with a spouse or loved partner?	.444	1	.505	-.069	.450
Do you have children or dependents living with you?	1.189	1	.276	.112	.353
<b>Scenario second question***</b>					
Gender	.351	1	.554	.061	1.000
Age	1.096	2	.578	.107	N/A
Do you live with a spouse or loved partner?	.282	1	.595	-.055	.633
Do you have children or dependents living with you?	.756	1	.385	.090	.473

\* The test is significant if the  $P < 0.05$

\*\*Scenario 1<sup>st</sup> question: Willingness to work during a disease outbreak if there is an exposure among co-workers.

\*\*\* Scenario 2<sup>nd</sup> question: Willingness to work during a disease outbreak if there is no exposure among co-workers.

The chi-square test for independence indicated no significant association between willingness to work and any of the variables in this category. Therefore, it is difficult to reject the null hypotheses, and we can conclude that our results are not significant. There appears to be no association between willingness to report to work and the gender, age, marital status, and having children.

### 5.9.2 Education and Work

A total of 94 participants completed these questions. Answer choices for education were collapsed into three, “some college or below”, “two-year degree”, and

“four-year degree or above”. This helps merging cells that have few or no cases. Table 5.21 displays the distribution of participants across the education and work variables.

Table 5.21: Participants’ level of education

Variable	N	%	
<b>Education</b>			
Some college or below	37	38.9	
Two years degree	22	23.2	
Four years degree or above	36	37.9	
<b>Work level</b>			
EMT	54	57.4	
Paramedic	40	42.6	
<b>Employment Status*</b>			
Full-time	85	81.7	
Part-time	24	23.1	
Volunteer	42	40.4	
<b>Type of service provided</b>			
Emergency 911 services	88	92.6	
Non-emergency services	4	4.2	
Both	3	3.2	
<b>Length of service</b>			
8 years or less	14	14.7	
More than 8 years	81	85.3	
<b>Work area*</b>			
Delaware	New Castle County	22	21.2
	Kent County	19	18.3
	Sussex County	41	39.4
Maryland	28	26.9	

\*Not mutually exclusive. Total may exceed 100%, as participants can choose more than one option.

Participants are nearly evenly distributed over the education groups, with 38.9% of participants having some college or below. Paramedics represent 42.6% of participants. While 81.7% of participants are full-time workers, there are 23.1% part-timers and 40.4% volunteers, making the sum of the percentages exceed 100%. This is

because participants had the chance to choose more than one option, which in reality means that they work more than one job. This also applied to work area, as participants can choose more than one option. The overwhelming majority of participants is working emergency 911 services (92.6%), and has work experience more than eight years (85.3%). Finally, only 28 participants are from Maryland. The rest are from Delaware with the majority from Sussex County.

To assess the association between the variables in this category and the willingness to come to work, I developed the test hypotheses which are as follow:

1. H1: There is a relationship between willingness to come to work and educational level.
2. H2: There is a relationship between willingness to come to work and work level (EMT vs. paramedic).
3. H3: There is a relationship between willingness to come to work and employment status (full-time, part-time, or volunteer).
4. H4: There is a relationship between willingness to come to work and length of service in EMS.
5. H5: There is a relationship between willingness to come to work and working area.

Cross-tabulation including the chi-square test for independence was performed to assess the association between willingness to work and variables in this category. The association was assessed for both scenario questions and results are displayed in Table 5.22.

Table 5.22: Relationships between willingness to work, and education and work

variables		$\chi^2$	df	P-value*	Phi/Cramer's V	Fisher's Exact Test
<b>Scenario first question**</b>						
Education		1.243	2	.537	.114	N/A
Work level	EMT	.621	1	.431	-.077	.560
	Paramedic	1.703	1	.192	.128	.254
Employment status	Full-time	3.297	1	.069	.178	.128
	Part-time	.025	1	.875	.015	1.000
	Volunteer	.621	1	.431	-.077	.560
Length of service		.448	1	.503	-.069	.687
Work area	New Castle	.068	1	.795	.030	1.00
	Kent	2.980	1	.084	-.198	.102
	Sussex	4.459	1	.013*	.285	.021
Type of service (911 vs. not)		1.093	2	.579	.107	N/A
<b>Scenario second question***</b>						
Education		.018	2	.991	.014	N/A
Work level	EMT	.001	1	.979	.003	1.000
	Paramedic	.630	1	.427	.078	.515
Employment status	Full-time	3.499	1	.061	.183	.082
	Part-time	.059	1	.808	.024	1.000
	Volunteer	.001	1	.979	.003	1.000
Length of service		1.510	1	.219	-.126	.600
Work area	New Castle	.208	1	.648	.052	1.000
	Kent	3.497	1	.061	-.214	.096
	Sussex	4.161	1	.012*	.287	.018
Type of service (911 vs. not)		.695	2	.706	.086	N/A

\* The test is significant if the  $P < 0.05$

\*\*Scenario 1<sup>st</sup> question: Willingness to work during a disease outbreak if there is an exposure among co-workers.

\*\*\* Scenario 2<sup>nd</sup> question: Willingness to work during a disease outbreak if there is no exposure among co-workers.

The chi-square test for independence (with Yate Continuity Correction)

indicated a significant association between willingness to work and working in Sussex

County,  $\chi^2 (1, n = 76) = 4.45, P < 0.05, \phi = .28$ . The phi is used here to indicate the effect size, which is a small effect (less than .30). In the second scenario question, again, the chi-square test for independence (with Yate Continuity Correction) indicated a significant association between willingness to work and working in Sussex County,  $\chi^2 (1, n = 76) = 4.16, P < 0.05, \phi = .28$ . The phi is used here to indicate the effect size, which is a small effect (less than .30). Because one cell in the table has expected count less than 5, Fisher's Exact Test is used, which indicates a significant association as  $P < 0.05$ .

Therefore, the results indicate that we can reject the null hypothesis, and we can conclude that there is a significant association between willingness to come to work and working in Sussex County. This means that the proportion of participants who are willing to work and work in Sussex County, is significantly different from the proportion of participants who are unwilling to work and work in Sussex County. This indicates that participants who work in Sussex County are more likely to come to work as indicated by the analysis.

### **5.10 Other Relationships between Variables**

The previous sections displayed the relationships between the independent variables in all categories and the willingness to work, the dependent variables, which are the scenario questions. In this section, I display the relationship between the variables in these categories, and whether or not there are significant associations between them. Cross-tabulation including the chi-square test for independence was performed to assess the presence of any significance in relationships between variables of these categories, which I present in table 5.23. Here I present the test hypotheses for the significant relationships:

1. H1: There is a relationship between having children or dependents living with you and concern of having very little information about the new disease outbreak.
2. H2: There is a relationship between gender and confidence that the employer has systems in place to take care of family members of EMS workers when needed.
3. H3: There is a relationship between gender and concern about virulent diseases.
4. H4: There is a relationship between gender and the decision of who comes first, self, family, or work.
5. H5: There is a relationship between gender and training during the Ebola Outbreak.

Table 5.23: Relationships between variables within categories

	$\chi^2$	df	P-value *	Phi/Cramer's V	Fisher's Exact Test
<i>H</i> <sub>0</sub> : There is no relationship between having children or dependents living with you and concern of having very little information about the new disease outbreak.	3.289	1	.027	.229	.040
<i>H</i> <sub>0</sub> : There is no relationship between gender and confidence that the employer has systems in place to take care of family members of EMS workers when needed.	7.254	2	.027	.278	N/A
<i>H</i> <sub>0</sub> : There is no relationship between gender and concern about virulent diseases.	3.035	1	.010	-.267	.053

<i>H</i> <sub>0</sub> : There is no relationship between gender and the decision of who comes first, self, family, or work.	7.650	2	.022	.285	N/A
<i>H</i> <sub>0</sub> : There is no relationship between gender and training during the Ebola Outbreak	6.481	2	.039	.263	N/A

\* The test is significant if the  $P < 0.05$

In the concern category, I asked participants to rank their concern if there is a very little information about a newly evolving infectious disease. In the demographic information category, I asked participants if they have children or dependents living with them. The Chi-square test for independence (with Yate Continuity Correction) indicated a significant association between having children or dependents living with you and concern of having very little information about the new disease outbreak,  $\chi^2(1, n = 94) = 3.2, P < 0.05, \phi = .22$ . The phi is used here to indicate the effect size, which is a small effect (less than .30). Because one cell in the table has expected count less than 5, Fisher's Exact Test is used, which indicates a significant association as  $P < 0.05$ . Therefore, the result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between having children or dependents living with you and concern of having very little information about the new disease outbreak. This means that the proportion of participants who are "concerned" about the lack of disease information and having children or dependents living with them, is significantly different from the proportion of participants who are "less concerned" about the lack of disease information and having children or dependents living with them. This indicates that participants who have children or dependents living with them are more concerned than those who are not.

Gender has some significant and interesting results. In the demographic information, I asked participants about their gender. I also asked participants in the category of confidence in the employer if they are confident that their employer has systems in place to take care of family members of EMS workers when needed. The chi-square test for independence indicated a significant association between gender and confidence that the employer has systems in place to take care of family members of EMS workers when needed,  $\chi^2 (2, n = 94) = 7.25, P < 0.05, \text{Cramer's } V = .27$ . The Cramer's V indicates a small effect (below .30). The results indicate that we can reject the null hypothesis, and we can conclude that there is a significant association between gender and confidence that the employer has systems in place to take care of family members of EMS workers when needed. This means that the proportion of participants who are male and confident that their employer has systems in place to take care of their family members when needed, is significantly different from the proportion of participants who are females and confident that their employer has systems in place to take care of their family members when needed. This indicates that male participants are less confident that their employer has systems in place to take care of their family members when needed.

In the concern category, I asked participants about their concerns in case of a virulent disease, a disease that has bad consequences. The chi-square test for independence (with Yate Continuity Correction) indicated a significant association between gender and concern about virulent diseases,  $\chi^2 (1, n = 94) = 3.03, P < 0.05, \text{phi} = -.26$ . The phi indicates a small effect (below .30). However, one of the Chi-square test assumptions is violated here. There are two cells that have expected count less than five. Fisher's Exact Test is the appropriate tool in such a case. The result of

Fisher's Exact Test indicates no significant association between the two variables as the P-value was .053. Therefore, it is difficult to reject the null hypothesis, and we can conclude that our results are not significant. There appears to be no association between gender and the level of concerns about virulent diseases.

In the family category, I asked participants to rank self-safety, family safety, and work obligation according to their priority during disease outbreaks. The chi-square test for independence indicated a significant association between gender and the decision of who comes first, self, family, or work,  $\chi^2 (2, n = 94) = 7.65, P < 0.05$ , Cramer's  $V = .28$ . The Cramer's  $V$  indicates a small effect (below .30). The result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between gender and the decision of who comes first, self, family, or work. The crosstab indicate that male participants are more likely to choose family safety than female participants. However, one of the chi-square test assumptions is violated here. There are two cells that have expected count less than five. Also, Fisher's Exact Test is not appropriate here, because this test has a table of 2x3. Therefore, the result of this test should be considered with cautions.

In the knowledge and training category, I asked participants if they had received appropriate training during the Ebola Outbreak. The chi-square test for independence indicated a significant association between gender and training during the Ebola Outbreak,  $\chi^2 (2, n = 94) = 6.48, P < 0.05$ , Cramer's  $V = .26$ . The Cramer's  $V$  indicates a small effect (below .30). The result indicates that we can reject the null hypothesis, and we can conclude that there is a significant association between gender and having appropriate training during the Ebola Outbreak. This means that the proportion of participants who are males and agree that they had appropriate training

during the Ebola Outbreak, is significantly different from the proportion of participants who are females and agree that they had appropriate training during the Ebola Outbreak. This indicates that female participants are more likely to agree that they had appropriate training during the Ebola Outbreak. However, one of the chi-square test assumptions is violated here. There are two cells that have expected count less than five. Also, Fisher's Exact Test is not appropriate here, because this test has a table of 2x3. Therefore, the result of this test should be considered with cautions.

## **Chapter 6**

### **DISCUSSION AND CONCLUSIONS**

In the previous two chapters, I displayed the findings from the interviews and the survey. This chapter provides a discussion and conclusions of the study. The discussion reviews the interview and survey methods and integrates and synthesizes the results from the interviews and survey. In the conclusions, I present the major findings, contributions, recommendations, limitations, and future opportunities for further research.

#### **6.1 Discussion**

This study uses a mixed-methods approach to provide depth and breadth of information. Data collection was performed over two phases. In the first phase, semi-structured interviews were conducted to explore the EMS provider's views about working during disease outbreaks, and the factors that may influence their decision-making process. In the second phase, an online survey was conducted to assess the extent to which EMS providers are willing to come to work, and how factors may influence their willingness. The previous two chapters presented the findings from both the interviews and the survey. This section integrates and discusses what is found in the qualitative and quantitative analysis in the context of the available literature. This section discusses participants' views about reporting for duty, and the factors that may influence reporting for duty. A summary table about the important findings is presented for each section.

### **6.1.1 The Participants' Views about Reporting for Duty**

Willingness to work during disaster and public health emergencies is an area in which EMS agencies and emergency managers could put their plans on assumptions that are not evidence based, which ultimately could result in critical consequences (Chaffee, 2009). It is therefore imperative to understand the views of EMS providers about working during health disasters and base these plans and assumptions on them. Here I present a discussion about EMS working during natural disasters and disease outbreaks. I start by providing a brief of the findings of the existing literature when available, and discuss them with findings from both the interviews and the survey.

#### **6.1.1.1 Working during Natural Disasters**

During disasters, not everybody could be willing to come to work to provide service in conditions that could be highly unstable and unexpected. In case of natural disasters or mass casualty events, such as a tornado or a plane crash, Connor (2014) found that between 83% and 90% of healthcare providers are willing to respond.

When it comes to research on EMS, a study performed by Smith et al. (2011) assessed the risk perception of paramedics in Australia toward different kinds of hazards. The study used *fear* and *familiarity* to assess risk perception of participants. The authors found that while paramedics are not familiar with tsunamis, earthquakes, landslides, and aviation accidents, they do not fear from working in such situations. Additionally, they found that paramedics are familiar and have no fear of working in conditions of flood, cyclones, train derailments, and building fires or collapses.

In my study, *interview* participants shared the same views that they are willing and prepared to work during natural disasters like hurricanes and earthquakes. Most interestingly, working during natural disasters was viewed by many participants as the

exciting part of their job. For example, one participant said, “Everybody wants to be there to get that thrill.” Curiously, the respondents’ emphasis on excitement was not found in previous studies on healthcare providers. To understand this attitude, it is important to put it in a context. EMS providers receive a considerable amount of training on response to disasters using the Incident Command System (ICS). They are trained to provide search and rescue operations, triage, and emergency care depending on the type of the disaster. However, when it comes to day-to-day operations, the majority of the EMS calls are non-emergency, or non-life threatening calls, meaning that patients need minimal care and transport to the appropriate care facilities (Goldstein, 2014). To some extent, this type of work is routine and perhaps boring to providers. As mentioned by one of the participants, the majority of their calls “don’t necessarily need all the training that we had,” because patients in these calls are “just don’t feel well”. However, during natural disasters, they like to help “the most amount of people in the most amount of danger.” Therefore, EMS providers prefer to provide care for acute cases of sick and injured victims, which is the kind of work that they enjoy and are trained to do.

Yet, few participants expressed concerns for self-safety and safety of family members during natural disasters. Most of these concerns are not related to their job itself as EMS providers. Rather, participants expressed concerns about family safety and transportation problems and risks. These concerns are in fact barriers to ability rather than to willingness to come to work. For instance, participants emphasized that transportation and other infrastructure issues that might occur during natural disasters could hinder their ability to come to work. That being said, if EMS providers are able to come to work, participants mentioned that they will show up as expected. This view

is congruent with a previous study done on EMS in Australia. In this study, Smith et al. (2009) interviewed paramedics in Australia and found that even though paramedics were concerned about working during natural disasters, they were adamant about fulfilling their professional responsibilities.

#### **6.1.1.2 Working during Disease Outbreaks**

Maintaining staffing during health disasters is necessary to keep the system functional. While healthcare workers have an ethical and professional duty to work, these duties have limits when doing so could put them in serious danger (Singer et al., 2003). The outbreak of SARS in 2003 resurfaced the dilemma of duty to care during disease outbreaks. Many healthcare workers were infected with SARS because of their work. Of those who contracted the infection, some transmitted it to their families, and two of them died (Singer et al., 2003). Healthcare providers have different views and opinions toward working during disease outbreaks compared to natural disasters. In Connor's (2014) systematic review, he found that 25% to 82% of healthcare workers are willing to work during pandemics. When it comes to EMS, Tippett et al. (2010) found that 43.7% of EMS participants are unwilling to work during disease outbreak conditions. One third of the participants indicated that they will refuse to work with a co-worker exposed to the infection. A study by Barnett et al. (2010) showed more optimistic results. They found that 93% of EMS personnel would be willing to report for duty if required, and 88% if asked, but not required. However, their willingness falls to 48% if there is a possibility of disease transmission to a family member. A previous and relatively similar study by Mackler et al. (2007) found that 91% of the respondents would remain on duty if they have been vaccinated and guaranteed that they are protected from infection. This percentage, however, falls to 38% if their

families have not received the vaccine. Only 4% probably would remain on duty if there is neither vaccine available, nor is there protective gear. Discussion about family and other influencing factors are presented in a separate section later in this chapter.

In the study *survey*, participants did not show the high fluctuations in results as indicated in the previous studies. While 90.4% of the participants indicated that they are coming to work during disease outbreaks, their willingness falls to 86.5% if there is an exposure among co-workers. Among those who are unwilling to come to work, only one participant from a total of 104 indicated that he/she will turn off his/her cell phone to avoid being contacted to come to work. Others who are unwilling, indicated that they are not coming to work until they are clear about the exposure risk. The decision of the rest of the participants ranged between only coming to work for their scheduled shifts, to those who will come to work if they were asked, and those who will call their supervisors asking if they need shifts covered.

In *the interviews*, when I asked participants about working during disease outbreaks, two themes emerged. In the first theme, participants were more concerned about working in pandemic conditions than in natural disasters or day-to-day work. In the second theme, participants did not show concerns regarding working during disease outbreaks. Rather, they expressed that working during disease outbreaks is similar to everyday work as long as the EMS providers are aware and equipped with the appropriate gear. The *interview* participants did not show the same energy toward working in such situations as was the case in natural disasters. Yet, they were still willing to fulfill their work obligations. A participant said, “It’s kind of your job to continue, even though there is an outbreak”. This view contradicts Smith et al. (2009), who found that paramedics were less willing to work in non-conventional disasters

like pandemics. According to this study, the “unknown-type situation” and the “invisibility” of disease outbreaks are described as the main barriers to willingness to work, whereas in natural disasters, you can easily see a collapsed building or a fire.

All *interview* participants believe that there are many risks associated with this line of work, and disease outbreaks could be one of them. They also believe that they are obligated to come to work as long as they have appropriate PPE and training in place. While between 9.6% and 13.5% of *the survey* participants indicated that they are not coming to work in epidemic conditions, none of *the interview* participants explicitly indicated that they would not come to work. Although the reasons for this discrepancy are not clear, the wording and how the questions were presented to participants could influence their responses. There could also be other reasons such as the culture in the workplace. Since the culture in the EMS is that providers have to be “tough” and “not bothered by risks,” as mentioned by some interview participants, they might have showed this culture to the interviewer; whereas they expressed their real feeling in the survey where they felt anonymous. Workplace culture along with other influencing factors is presented in the next section. Table 6.1 displays the main findings in the literature, interview, and survey.

Table 6.1: Summary about reporting for duty during natural disasters and disease outbreaks

Topic area	Prior findings	Empirical foundation	Interview findings	Survey findings
1: EMS providers are more willing to work during natural disasters than disease outbreaks	Supported	(Connor, 2014), (Smith et al., 2011), (Smith et al., 2009)	Supported	-

2: EMS providers are excited to work during natural disasters	-	-	Supported	-
3: Natural disasters is a concern for EMS providers	Supported	(Smith et al., 2009)	Supported	-
4: Working during disease outbreaks is a concern to providers	Supported	(Connor, 2014), (Smith et al., 2011), (Smith et al., 2009), (Tippett et al., 2010), (Barnett et al., 2010)	Supported	Supported
5: The overwhelming majority of providers will come to work during disease outbreaks if they are protected	Supported	(Barnett et al., 2010; Mackler et al., 2007)	Supported	Supported
	Rejected	(Connor, 2014; Tippett et al., 2010)	-	-
6: EMS willingness fluctuates significantly in the presence or absence of protective gear	Supported	(Barnett et al., 2010; Mackler et al., 2007)	Rejected	Rejected

## 6.1.2 Factors that Influence Reporting for Duty

In the interviews and the online survey, I discussed many of the potential influencing factors for reporting to work during epidemics. Here in this section, I discuss them both along with the available literature that the subsections each address one factor. In the most part, these subsections follow the categories and sections in the survey and interview chapters.

### 6.1.2.1 Family

Here I describe the concern of EMS providers for their families during disease outbreaks, and its potential effect on work obligation. I also discuss vaccination of

family and workers, and the need for providing families with shelters during disease outbreaks.

Family safety during disease outbreaks is number one concern for all healthcare providers including EMS (Barnett et al., 2010; Ives et al., 2009; Mackler et al., 2007). Concerns for family were reported to be greater than concerns for self in some studies (Connor, 2014; Dimaggio et al., 2005; Ives et al., 2009). This is congruent with the findings of *the survey* as well. Participants in *the survey* indicated that they are concerned about infecting their family members (94.2%) more than their concern of becoming infected themselves (92.3%), or even dying from the contagious disease (85.6%). In *the interviews*, again, family safety was expressed by participants as by far the most concerning factor. “Family comes first” is a statement that was mentioned by every single participant during the interviews. However, when I asked participants who comes first during disease outbreaks, self, family, or work, *survey* participants indicated interesting numbers. About half (49%) of the participants prioritized their safety first, 42.3% prioritized family, and 2.9% selected work obligation as their first priority. While the reasons for this discrepancy are not clear, the wording used in the survey question might have influenced their choices. The question was: “[d]uring disease outbreaks, who comes first?” and the choices were self-safety, family safety, and work obligation.<sup>8</sup> EMS providers are taught that self-safety should be their number one priority when they are performing their job. One participant said: “In EMS compared to other things, your safety is always taught as the

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<sup>8</sup> In the online survey, self-safety, family safety, and work obligation were randomized for participants, meaning that they come in different orders. This was done to reduce the chance of selection bias if they are in the same order.

number one, because if you get sick or hurt, you can't help the people out there.” Before approaching the patient's scene, EMS providers are expected to ensure, as possible, that the scene is safe. If they feel that the scene is unsafe, EMS providers are not supposed to enter the scene and putting themselves under harm. This is the role that all EMS providers should follow based on their training (Chapleau et al., 2009). So, this might have influenced their choice selection.

In disasters, healthcare workers have a sense of duty to work that might conflict with their sense of duty to their families. This leads to role conflicts between work and family. The main source of role conflict during disasters is reported to be the uncertainty regarding the safety of family members and the feeling that first responders should protect their families (Trainor & Barsky, 2011). EMTs and paramedics provide care for sick people on a daily basis putting themselves at risk of contracting diseases at any time. Being at risk of contracting infectious diseases at all times, EMS providers perhaps put their family members at higher risk as well. In *the survey*, approximately two thirds (66.3%) of the participants indicated that they are putting their families at risk of infection greater than the general population, because of their work nature as EMS providers. Also, 73.1% of the participants indicated that this risk increases during disease outbreaks.

Role conflict and concern about family safety could influence the decision of EMS providers to work during disease outbreaks. For instance, and as mentioned in a previous section, Barnett et al. (2010) found that willingness of EMS providers fall from 93% to 48% if there is a possibility of disease transmission to a family member. In another study, Mackler et al. (2007) found that 91% of the respondents would remain on duty if they have been vaccinated and guaranteed that they are protected

from infection. This percentage, however, falls to 38% if their families have not received the vaccine. *The survey* results showed some effect of family on duty to work as well. That is, participants showed high concerns about infecting their family members (94.2%) during disease outbreak. More than one third (37.5%) of the participants indicated that their concerns for their families could influence their decision to come to work. Whereas, 22.1% of the participants indicated no influence, and 34.6% indicated a neutral position. However, the chi-square test indicated no significant association between willingness to come to work and concern of infecting family members as it is discussed in more detail in chapter five.

*Interview* participants showed their insights and views here as well. While family safety is their first priority, some of them believe that family is always at high risk of infection, and disease outbreaks may not add to this risk, because during such situations EMS providers will take extra precautions. Others do not believe that their families are at higher risk either during everyday operations or during disease outbreaks, because EMS providers should be aware of infection and take the appropriate precautions all times. In the opinion of the participants, in both cases, disease outbreaks do not seem to increase the risk on families. These views are evidence of the EMS providers' poor understanding of microbiology and epidemiology of infectious diseases. The use of *gloves* only in managing patients with infectious diseases may put the providers as well as their families at great risk of infection. Without some basic understanding of microbiology and the epidemiology of disease transmission, EMS providers are more likely to think they are doing what needs to be done, in order to remain "safe", without knowing that their methods are insufficient. This leaves them, their families, and their patients at risk. There are also

those who believe that their families are always at risk, and disease outbreaks put them at greater risk. Participants from this group are the most concerned about their families. The point here is that while family safety is first priority, it may not greatly influence reporting to work, which is what participants showed. They do not feel that family could affect their duty to work, unless they or members of their family are sick themselves.

To sum up, EMS providers are concerned the most about their families during disease outbreaks. They prioritize the safety of their families over everything else. Yet, for the most part, family obligation does not seem to be a considerable barrier for willingness to come to work during disease outbreaks. This is because they either think disease outbreaks may not increase the already existed risk, or because the EMS employers will execute more precaution measures to keep providers as well as their families safe. More discussion about the EMS employer is presented later in this chapter.

#### **6.1.2.1.1 Vaccination for Family and Workers**

When a pandemic of a newly infectious disease occurs, vaccines are likely take months to be developed and become available for such an infectious disease (Mackler et al., 2007). Once it is available, the vaccine is likely to be in limited quantity, and not available for everybody. First responders including EMS providers are among those who are entitled to receive the first shots of the vaccines. While EMS providers are eligible for receiving the vaccine in the early stages, their family members may not. Mackler et al. (2007) found that if the family members are not vaccinated against the active disease outbreak, the paramedics' willingness to come to work drops significantly from 91% to 38%.

The *survey* and the *interviews* contradict the results of this study however. In the *survey*, 94.2% indicated that they are concerned about working during disease outbreaks if there is no effective treatment or vaccine. Yet, while they are highly concerned about lack of effective treatment or vaccine, it may not influence their willingness to work. The chi-square test indicated no significant relationship between willingness to work and having no known effective treatment or vaccine for infected patients during disease outbreaks. The *interviews* were also congruent with the survey as vaccine availability is not of great importance. The majority of participants understand that at the time of disease outbreaks, it is highly unlikely that there will be a vaccine for the new infectious disease. They also indicated that in their day-to-day operations, they handle patients with known infectious diseases that EMS providers are not vaccinated against, and this is not a challenge for them *as long as they use the appropriate protective gear*.

#### **6.1.2.1.2 Family Safe Haven**

Some participants have highlighted the importance of assigning a “safe haven” to their families during public health emergencies as part of the potential employer responsibilities. “Bring a family there to fire houses or wherever will be helpful, and that’s been sort of done during blizzards, like snow storms.” This is also mentioned in Smith et al. (2009) study where participants highlighted the importance of providing childcare and eldercare during disasters. While safe haven for families of EMS providers is a great measure that can be implemented during natural disasters, it is not necessarily beneficial during disease outbreaks. During natural disasters like hurricanes or earthquakes, the infrastructure is likely to be impacted, making the communication between providers and their families a great challenge. Food, water,

and other supplies could also be disrupted. In such cases, a shelter could be an appropriate measure where you can gather families of EMS providers, provide them with food and supplies, and ensure a communication access between families and workers on duty. Whereas during disease outbreaks, the infrastructures are likely to be intact; food, water, and other supplies are likely to be available; and the communication system is functional. In such conditions, shelters are not a necessity, and EMS providers can simply call their families and ensure that they are safe. More importantly, during disease outbreaks, social gathering is not preferred as this action could increase the potential of transmission of infection between people.

#### **6.1.2.2 Training and Skills of EMS Providers**

As mentioned earlier, EMS providers are not taught or entitled to diagnose and manage infections within their scope of practice (Bissell et al., 1999). This is due to the wide array of infection types, the need for sophisticated knowledge of pathophysiology, and the need for advanced diagnostic procedures, which are not available in the prehospital setting. Moreover, Shaban (2006) indicated that EMS providers have poor knowledge of basic infectious disease mechanisms and infection control principles. Tippet et al. (2010) found that willingness to work increase significantly with adequate knowledge about the disease. When I asked the *survey* participants about their skill set, more than two third (71.2%) of them indicated that they are satisfied with their skill set during their everyday work. Whereas during disease outbreaks, only 39.4% indicated so. The chi-square test indicated no significant association between willingness to work, and the belief that the participant has appropriate knowledge and training. When it comes to the *interviews*, participants showed little difference. All participants showed that their training and skills are

appropriate for routine daily work. For a newly infectious disease outbreak, however, they mentioned that they may need additional training.

I asked the *survey* participants about their experience during Ebola preparedness, and whether they received appropriate training. The responses showed that 59.6% of the participants indicated that they received appropriate training, and the rest of them are almost evenly divided between those who disagree and those who selected a neutral position. The chi-square test indicated a significant association between willingness to work and having appropriate training during the Ebola outbreak. *Interview* participants also shared similar views. Some participants indicated that they have received an appropriate training while others did not. It was noted, however, that all paramedics were satisfied with their training and preparedness to fight Ebola, whereas not everybody in the EMT shared the same stance. As explained in a previous section, paramedics were tasked with handling expected cases of Ebola, and therefore, they underwent more extensive training on Ebola than EMTs in Sussex County, Delaware.

### **6.1.2.3 Personal Protective Equipment**

Resource availability is one of the most important factors that may influence reporting for duty. As indicated by Mackler et al. (2007), only 4% of EMS providers probably would remain on duty if there is no vaccine or appropriate gear, and no one would definitely stay on duty. I asked the *survey* participants about their obligation to come to work if there is a lack of availability of appropriate PPE. They showed more optimistic views than the study by Mackler et al. (2007). The responses indicated that 42.3% of the participants are not committed to come to work. While this is not as high as it was in the mentioned study, it was the highest percentage in its category where

participants felt not obligated to come to work during disease outbreaks. However, the chi-square test indicated no significant association between willingness to work and the availability of the appropriate PPE.

*Interview* participants shared the same views. The availability of appropriate PPE along with the training was perhaps viewed by participants as important as family safety. The availability of appropriate PPE is crucial for self and family safety, which is understandable if participants become concerned about working without appropriate PPE and training. Many participants believe that if you have the appropriate training and PPE, there is no reason for you to abandon your work under any condition. One participant said: “may be the only reason that I will think, if somebody will not come to work, is he didn’t have the proper equipment.” Lack of appropriate PPE also increases the belief that the employers are not performing their job, which in turn negatively influences the relationship of trust between the workers and their employer, which surely influences their intention to come to work. “If you (the employer) don't care about me, how I will care about you,” and “I think if you (the employer) are going to put your people at risk, we should not be mandated to respond to an incident if you can't provide the resources to keep your people safe.”

Interestingly, the overwhelming majority of the *interview* participants believe that during outbreak situations, the employer will ensure that frontline workers have appropriate training and PPE. The statement that represents the view of most participants was: “there might be some places where that happened. They don’t have the proper PPE or training, and people are not coming to work. But this will not happen here, at least in our department”. That being said, while the availability of the appropriate PPE during disease outbreaks could be one of the most important factors

that influence the decision-making to come to work, the question that arises here is: Will the EMS agencies be able to provide the appropriate PPE and training in a timely manner to all providers in a scenario of a new and highly infectious disease outbreak?

As mentioned in earlier sections, EMS providers' compliance with using PPE is universally suboptimal, which is also the case with other healthcare providers (Harris & Nicolai, 2010; Teter et al., 2014; Wright et al., 1995). This is despite the fact that EMS providers know that they are at a considerable risk of exposure if they do not protect themselves (Mathews et al., 2008). In the *survey*, the overwhelming majority (81.7%) of participants indicated that they follow the standard precautions of using PPE during their everyday work. Only 1.9% indicated that they are not, and 8.7% selected a neutral position. This is congruent with the study that found that 83% of EMS providers always wear gloves (Harris & Nicolai, 2010). Only one *interview* participant indicated that he had done patient care without gloves on. The rest of the participants indicated that they always use PPE before starting patient care. As expressed by the *interview* participants, they are more likely to mean gloves only when asked about PPE use. The good news is that in case of a disease outbreak, EMS providers will likely to comply more with PPE use. This is because they will be more cautious and concerned about the disease, and in turn, they will probably use PPE more strictly. According to one of the participants: "you're gonna be more cautious and err on the safe side." Also, the EMS agencies will warn the providers about the disease, disseminate policies and protocols to comply with PPE, and likely to provide more resources. This was the case during the swine flu, Australia, in 2009. When paramedics were given the respirators, even without fit testing, there were no additional cases of infections among paramedics (Smith et al., 2009).

Wright et al. (1995) mentioned the expected reasons for the noncompliance with using PPE. These reasons include inappropriate training, low perception of risk, inability to perform some procedures when using the recommended PPE, forgetting to use them “in the heat of the moment”, and the belief that wearing the PPE would slow down the provision of emergency care. The *interview* participants added some additional reasons for this list. For instance, being used to wearing PPE makes providers less likely to wear them appropriately, being from the first generations of EMS who used to provide direct patient care without having PPE on, being unable to recognize the appropriate time to use the PPE, and the belief that some providers do not need them since they may not directly contact the patient.<sup>9</sup> It is noteworthy to mention here that recent research found that ambulance can be a vector, not only the people (Al Amiry, 2015; Teter et al., 2014). Therefore, there is a lot more to providing appropriate protection than just wearing a mask and gloves. Given that EMS providers’ compliance with using PPE is suboptimal, the question here is whether there should be policies and regulations in place to enforce all EMS providers to comply with PPE use all times to protect them from any future exposure.

#### **6.1.2.4 Confidence in the Employer**

Confidence in employer to respond adequately to a disease outbreak and provide workers with all the necessary information also seemed to have a significant effect on the workers’ decisions whether to come to work or not. Lack of such

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<sup>9</sup> The ambulance crew usually divides their work while they are on duty. Sometimes one will be the driver and the other will be the technician who provides the direct patient care. This works only for routine and stable patients.

confidence in the employer was associated with less willingness to work during disasters (Trainor & Barsky, 2011). It is reported that healthcare employers who adopt risk-mitigation strategies in the workplace enhance their workers to take some risk as part of their duty to work (Draper et al., 2008; Ives et al., 2009). Namely, healthcare workers might be “willing to take necessary risks, but not unnecessary risks” (Damery et al., 2010). Given that pandemics are associated with a high level of uncertainty in the early stages, employers need to communicate with emergency workers about the emergency plan in place: what is known, what is unknown, and what is expected of workers (Ives et al., 2009).

Communication with workers and keeping them abreast of the available information about the evolving outbreak as it unfolds can potentiate the workers’ trust with their employer. However, a study by the Australian Centre for Prehospital Research (2008) found that about two-thirds of the ambulance personnel reported low confidence in their employer. Additionally, Ives et al. (2009), who conducted focus group sessions with physicians and nurses, found that “lack of information was a key theme across all groups.” Smith et al. (2009) found that paramedic participants reported mistrust in their employer with regard to receiving accurate information about an emerging infectious disease. These participants believed that their employer may downplay the situation by providing inaccurate or incomplete information. Paramedics mentioned that, “they would seek information from outside of the ambulance services before making their personal risk assessments.” A study by Koh et al. (2005) found contradictory results however. The authors assessed fears and anxieties of healthcare workers following SARS outbreak in Singapore in 2003. Interestingly, they found that 96% of participant were satisfied with the effectiveness of the implemented protective

measures, 93% agreed that there were clear policies and protocols, and 90% agreed that these policies and protocols “were implemented quickly enough.” It is important to take into account that Singapore is a very authoritarian society in which it would be unusual for employees to question the actions or intentions of their employer, which might make it difficult to extrapolate from one country to another.

In the *survey*, I asked participants about their confidence in their employer around several variables. These included having systems in place for warning about potential infectious diseases, and taking care of family members. Also, the *survey* asked about confidence in the employer in providing updated information, training, resources, and effective treatment and vaccine to their workers. The findings from the *survey* are congruent with the Koh et al. (2005) study findings. The majority of the participants indicated confidence in their employers. Overall, 19.2% of the participants are not confident that their employers will perform their responsibilities to keep frontline workers safe during disease outbreaks. About two thirds (65.8%) indicated confidence, and 24.0% indicated a neutral position. The chi-square test indicated significant associations here. It indicated a significant association between willingness to work and confidence that the employer will provide an effective treatment and vaccine when available. There is a significant association between willingness to work and confidence that the employer will provide appropriate training to frontline workers to handle the emerging outbreak. And, there is a significant association between willingness to work and confidence that the employers will perform their responsibilities to keep frontline workers safe during disease outbreaks.

*Interview* participants showed even more optimistic views and insights. Typically, their answers were that their employers are doing their responsibilities to

keep them informed. They also believe that in case of a disease outbreak, the employer will provide them with the PPE, training, and clear policies and instructions on how to handle potential cases. Additionally, they believe that their employer may not put them in harm's way and risk their lives during disease outbreaks, because this action could do more harm than good for both the employer and the employees. "I think for the most part my employer has my best interest in mind", "I don't believe that there is a situation where [the employer] will put us at risk", and "I think [the employer] would tell us what we needed to know and the most important things." This is because employers need their employees to stay safe and healthy, so they can keep providing service and keep the system functional. Confidence in the employer is directly connected with confidence in the supervisor at work, or the boss. That is, many participants highlighted that they trust that their supervisor will not put them in harm, because they "know him very well." Also, they know that safety of workers is a first priority and a culture in the workplace.

#### **6.1.2.5 Self-safety**

EMS providers face a high risk of occupational injury or death, and some of the risks they exposed to are unique to their profession (Maguire & Smith, 2013). Reichard et al. (2011) found that the fatality rate of EMS providers is 7.0 per 100,000 per year, which is higher than the fatality rate for the fire fighters. Maguire and Smith (2013) also found that the injury rate of EMS providers in the United States is about three times more than the national average of all occupations, making it one of the most dangerous professions. While EMS providers acknowledge their job-related risks, they may not explicitly show their concerns. Ives et al. (2009) found that participants are reluctant to explicitly express their concerns about self-safety. Rather,

they stressed more about the importance of being provided with appropriate PPE. While the majority of the *interview* participants shared the same views of Ives et al. (2009) study, some of them explicitly expressed their concerns about working during disease outbreaks. A participant said that, “keeping yourself safe is probably the biggest concern.” Yet, it is also noted that participants who are concerned about their self-safety are likely to follow that with its impact on the safety of their families. One participant said that, “the worst is obviously not for myself, the risk potentially having my daughter grow up without father.” This was also mentioned in a previous study where participants showed more of concern to family than self (Ives et al., 2009).

It is also important to note that the *interview* participants linked self-safety to the employer responsibilities. That is, they expressed that the employer should ensure their safety by providing them with the appropriate communication, training, and protection resources. If they feel that their employer is not doing his best to ensure the safety of the employees, this creates a relationship of mistrust that ultimately influences reporting for duty. One participant said that, “I would be out of there soon as I realize that [the employer] doesn't care about my safety.”

#### **6.1.2.6 Disease Pathogenicity**

Disease characteristics are very important when it comes to pandemics or disease outbreaks. Some communicable diseases are highly infectious and can easily be transmitted from person to person. An example of such highly infectious diseases could be the 2009 swine flu. Other diseases are virulent, meaning that they have bad consequences and high mortality rates. An example for that could be the Ebola outbreak of 2014. There are also diseases that could be both virulent and highly

infectious at the same time. An example for these types of diseases could be the 1918 Spanish flu or the measles.

More knowledge about the disease characteristics is crucial for EMS providers to enable them to stay safe, use the appropriate protective measures, and make them less concerned (Watt et al., 2010). While paramedics have more knowledge and skills than EMTs because of their training and scope of practices, both EMTs and paramedics are not taught the pathophysiology of diseases, nor are they trained or tasked to diagnose patients in the prehospital setting. So, they are not expected to have appropriate information about disease characteristics and pathophysiology. That being said, lack of knowledge about the disease could increase their concerns about working in such conditions. This demonstrates the importance of information sharing and just-in-time training that are tailored to the specifics of the evolving disease outbreak, which would alleviate the concerns of EMS providers.

Watt et al. (2010) found that more knowledge about infectious diseases makes providers less likely to perceive high risks. Yet, in the same study, the authors interestingly found that in the case of an avian influenza, a highly contagious disease with high mortality rate, participants are more likely to perceive high risk. All *interview* participants expressed that the more information about the disease, the better, even with the worst-cases-scenario disease outbreak. “If [the EMS providers] don't understand it, I believe they're less likely to respond to this type of incident.”

It is important to mention here that in case of a virulent and contagious disease outbreak, like Ebola for instance, some *interview* participants expressed some hesitation to come to work. Again, this demonstrates the importance of additional

resources, training, and information sharing, which are the responsibilities of the employer.

#### **6.1.2.7 Culture in the Workplace**

When I started the interviews, I did not ask information about the culture in the EMS work, and how it may influence the decision to come to work. To the best of my knowledge, I was not able to find research studies that address the culture in the EMS workplace with regard to work concerns and reporting to work during disasters. Culture in the workplace perception was shaped while I was doing the interviews. According to the *interview* participants, EMS providers have their own culture that is distinct from others: “There is a certain culture here, we are doing something very unique. You are immediately interjected into a chaotic situation.”

The culture in the workplace has its effect on the decision-making of reporting to work during disasters and disease outbreaks. The relationship built between EMS co-workers is also important when it comes for reporting to work. That is, while the *interview* participants expressed their dedication to work during disease outbreaks, they also showed intolerance to those who may not show up. One participant said that, “I’ll tell [the co-workers who did not show up] I understand, but it is always unforgiven.” As expressed by some participants, EMS providers cannot say that they are concerned or scared of infectious diseases. They are supposed to be “tough” and not being bothered by the risks. “You have to be mentally and physically tough, you can’t let things bother you.” Additionally, given that EMS systems work near their full capacity during their daily work, they can be overwhelmed if a provider did not come to work, which make the situation difficult for those on duty. “This [place] can be a very well operated system, but if one person can't come in, everything else will fall

behind.” Yet, this intolerance is not the major theme among participants. The majority of the participants expressed that people should decide what is best for themselves and their families. “Yeah, for me it's fine. There are other people who will do the job.”

When it comes to the *survey*, participants shared the same views. Participants who indicated no understanding and forgiveness to a co-worker who may not come to work due to safety concerns represent 17.3% and 14.4% respectively. More participants (37.5%) indicated that such a co-worker should not be in this job, and 19.2% agree that such a worker should receive a strict disciplinary action. Interestingly, this percentage is very close to the study by Damery et al. (2010) who indicated that 18.3% of the study respondents agree to discipline healthcare workers who do not come to work.

The point here is when the relationship between EMS workers is based on trust and commitment, during disasters and disease outbreaks providers may feel more obligated to come to work to fulfill their commitment and trust to their co-workers. In the work obligation section, which comes next, I provide more discussion about the peer pressure.

#### **6.1.2.8 Work Obligation**

Based on the code of conduct that governs the practices of healthcare workers, they have ethical duty to work during disease outbreaks (Damery et al., 2010). There are two positions with respect to the ethical obligation to work during disasters. Some argue that healthcare personnel are obligated to maintain their health in order to be able to care for others and not to be victims. Also, they believe that it is not reasonable that healthcare workers threaten their lives and the life of their families to care for others (Damery et al., 2010). Others believe that professionals should have limited

self-regard and should accept a potential harm in performing their job. An interesting study performed by Koh et al. (2005) assessed the impact of SARS on healthcare workers in Singapore. While the majority (76%) of participants felt at great risk of exposure to SARS, more than two thirds (69.5%) accepted the risk of contracting the disease as part of their job. Dimaggio et al. (2005) found that sense of responsibility and ability to provide care are the two main reasons that enhance willingness to respond to a terrorist-related disaster.

*Interview* participants shared the same views. Some mentioned that EMS providers should accept the risk of exposure, while others said that there is no point for EMS providers to expose themselves to the disease and becoming ill. That is, while there were many views, the vast majority of participants expressed a high level of professional and ethical obligation to work. In their views, whatever happens, whatever the risk is, they are coming to work, even under worst conditions. They feel that this is their job, somebody has to do it, and they know the risk associated with it. Therefore, they are coming to work, unless they are sick themselves. The second theme was a group of participants who showed a “conditional obligation” to work. They will come to work if they ensured the safety of themselves and their families by having appropriate PPE. The third theme is a group of participants who interestingly showed an obligation to work because of their commitment to their co-workers, and less for the public. The last group showed obligation to work due to financial needs.

In the *survey*, I did not ask participants directly about their work obligation during disease outbreaks. Rather, I asked about their obligation to work in the presence of barriers like the lack of training or resources, or if the providers are concerned about themselves or families. The scenario questions per se that ask

participants about their willingness to come to work may give some indication about their obligation to come to work during disease outbreaks. In this case, 90.4% of the *survey* participants indicated that they are willing to come to work.

With the presence of barriers to work, participants indicated different levels of obligations. The situations where participants feel least obligated to work are when there is no appropriate PPE and there is no specific training for the current disease outbreak, with percentages of 42.3 and 40.4, respectively. Only 14.4% of participants feel not obligated to work in case of a lack of a vaccine and effective treatment. The same percentage works if the workers are concerned about the safety of themselves. If there is an exposure in the workplace, only 16.3% of participants indicated that they are not obligated to come. It is interesting to note that in the scenario question where there is an exposure among co-workers, 13.5% of the participants indicated that they are unwilling to come to work, which, to some degree, validates the results here. The chi-square test indicated a significant association between willingness to work and the obligation to work when the worker mistrusts the information coming from the employer.

Additionally, Damery et al. (2010) found that about 30% of nurses, 25% of hospital doctors, and 18% of GPs (general practitioner) think they do not have to report for duty if doing so would risk themselves and their families. Those healthcare workers also consider that they should not receive a disciplinary action if they did not report to work. In the *survey*, I asked participants about their work obligation if they are concerned about the safety of their family members. Interestingly, about half (46.2%) of the participants, which is the highest in its category, indicated that they are obligated to come to work. Whereas 16.3% feel not obligated and the rest were neutral

in their choice. When inferential statistics applied using the chi-square test, it indicated a significant association between willingness to work and the obligation to work when concerned about safety of both self and family.

#### **6.1.2.9 Provider's Demographics**

The study participants from both the interviews and the survey are diverse in their age, gender, marital status, experience, employment status, scope of practice, and work area. These differences in the study sample were assessed for their potential effect on the decision-making process of reporting for duty. Previous studies show some effects of these factors on reporting to work. According to Devnani (2012), being a male, full-time worker, and having prior experience are factors associated with willingness to work, whereas being a female and part-time worker are associated with less willingness to work. Age and race have contradictory findings in some studies (Devnani, 2012). Also, Watt et al. (2010) found that volunteer workers in EMS are reported to be less likely to perceive high risk during disease outbreaks than paid workers, meaning that volunteer workers are more likely to endanger themselves and taking more risk.

For the *interview* sample, some female participants, who represent about one third of the sample, showed more of concern for their physical safety during natural disaster than their male partners. Participants said that unlike during natural disaster, during every day work EMS participants can ask for additional support and help, which for female EMS providers is important for their safety. When it comes to the *survey*, female participants represent about one quarter of the sample. Gender differences in the *survey* showed interesting and significant findings. While the chi-square test indicated no significant association between gender and the willingness to

work during disease outbreaks, it indicated association with other variables. First, the chi-square test indicated a significant association between gender and confidence that the employer has systems in place to take care of family members of EMS workers when needed. The crosstabs indicated that male participants are less confident that their employer has systems in place to take care of their family members when needed. Second, the chi-square test indicated a significant association between gender and training during the Ebola Outbreak. The crosstabs indicated that female participants are more likely to agree that they had appropriate training during the Ebola Outbreak. Third, the chi-square test indicated a significant association between gender and the decision of who comes first, self, family, or work. Interestingly, the crosstabs indicated that male participants are more likely to choose family safety than female participants. Finally, the chi-square test indicated a significant association between gender and concern about virulent diseases.

Age and experience of the *interview* participants varied. Age ranged between the 20s and 50s with work experience ranged between less than a year and 30 years. Age by itself does not seem to have effect on participants' views and insights. However, older participants are more likely to have more work experience and holding administrative roles, which are other factors that have potential effect on self-confidence and work commitment. Those participants are also more likely to have families and children that potentially make them more concerned about working in disease outbreak situations. Therefore, age and experience are associated with other factors that makes it difficult to assess their effects. For *survey* participants, the chi-square test indicated no significant association between age and work experience, and other variables.

Family status of the interview participants was mixed between singles, married, and divorced. Some of them have children, while others do not. “Families and kids” were mentioned by all participants, including singles, as the most concerning factor during disease outbreaks. When it comes to working during disease outbreaks, all participants indicated that family status has nothing to do with work obligation. Yet, single participants highlighted that they may be more willing to work extra shifts if needed and likely to take higher risk, but this should not mean that single EMS providers are more obligated than their married co-workers. The *survey* participants shared the same views. The chi-square test indicated no significant association between family status and willingness to work. Yet, the chi-square test indicated a significant association between having children or dependents living with you, and concern of having very little information about the new disease outbreak. In other words, if there is a lack of information about the disease outbreak, EMS workers with families are likely to show more concerns than single workers.

EMS provider’s type (paramedic vs. EMT) was also assessed for its possible effect on reporting to work. In the State of Delaware, EMTs are based in fire stations, and the majority of them are cross-trained EMTs and firefighters. On the other hand, paramedic services are run by the county and they have their own stations. Interviews showed high commitment and willingness of both EMTs and paramedics to come to work during disease outbreaks. There are two distinct differences between those two groups. First, while all paramedics are satisfied with their training during the Ebola outbreak, not all EMTs do so. This is thought to be due to the scope of practice where paramedics received more training and are the ones who were supposed to handle Ebola cases. The second difference is the views toward a co-worker who may not

come to work due to safety concerns. EMT participants showed mixed responses that ranged between “unforgivable” and “that’s fine”. On the other hand, paramedic participants are more tolerant and likely to use more friendly statements like “good for him”, and “I don’t care”. In the *survey*, no significant association was noticed between EMTs and paramedic with regard to reporting for duty.

The employment status (full-time, part-time, or volunteer) showed interesting views with regard to work obligation. EMTs who are fire-based could be full-time, part-time, or volunteer, whereas, paramedics can only be full-time workers in the State of Delaware. Full-time workers consider that part-time and volunteer workers have less attachment to the workplace than full-time workers. Additionally, EMS agencies in the State of Delaware have policies in place, called the recall system, that mandate their full-time workers to come to work outside their scheduled shifts in times of emergencies. Part-timers and volunteers cannot be mandated to come to work. However, part-timers and volunteers are more likely to be EMS full-timers in other areas or agencies. This means that they have the same views and opinions with regards to work obligations. Moreover, part-time workers whom I interviewed did not show obvious differences than full-timers in their commitment to come to work. The important point here is that while part-timers and volunteers play an important role during day-to-day operations, EMS agencies can’t rely on them during disasters and public health emergencies. In the first part, the EMS agencies can only mandate their full-time workers for a recall. Secondly, part-timers and volunteers are likely to be working as full-timers in other agencies that are likely to mandate them to come to work during emergencies, which would result in a role conflict. Therefore, agencies that are heavily dependent on part-time and volunteer workers to perform their day-to-

day operations could face challenges in their surge capacity to meet the high demand during disasters. When it comes to the *survey*, participants are also mixed between full-timers, part-timers, volunteers, or a combination of that. The survey tests indicated no significant association between the working status and any other variable.

During the *interviews*, it was noticed that participants who are descended from first responder generations showed more dedication and commitment to work during disaster conditions than others. They also proudly showed that they are from first responder generations. “I became an EMT because it is a family thing.” In exploring this theme in the *survey*, the chi-square test indicated a significant association between willingness to work and having at least one parent or grandparent work, or ever worked, as a first responder. Interestingly, the crosstabs indicated that participants who are from first responder generations are less likely to come to work than others.

Finally, the working area. Due to the challenges in accessing the EMS systems to conduct the interviews, the sample of EMT participants was taken from New Castle County, and the sample of paramedics was taken from Sussex County. So, it was difficult to compare their views and insights based on working area. The *survey* participants, however, are from the three Delaware counties in addition to 28 participants from the State of Maryland. The chi-square test indicated a significant association between working in Sussex County and willingness to work. This result should be taken with cautions because the sample is not evenly distributed across the three counties. This is because only three paramedics participated from New Castle County, while the majority is from Sussex County. Table 6.2 below summarizes the important findings in this study in terms of influencing factors in the context of empirical foundations.

Table 6.2: Summary of the factors the can potentially affect reporting to work

Topic area	Prior findings	Empirical foundation	Interview findings	Survey findings
<b>Family</b>				
Family comes first	Supported	(Barnett et al., 2010; Connor, 2014; Dimaggio et al., 2005; Ives et al., 2009; Mackler et al., 2007)	Supported	42.3% Supported 49% Rejected
Family safety during disease outbreaks is number one concern for all healthcare providers including EMS	Supported	(Barnett et al., 2010; Connor, 2014; Dimaggio et al., 2005; Ives et al., 2009; Mackler et al., 2007)	Supported	Supported
EMS providers put their families at higher risk of infection greater than the general public	-	-	Mixed findings	66.3% Supported
Disease outbreaks increase the risk on family	-	-	Mixed supported and rejected	73.1% Supported
Concern for family safety could influence the decision of EMS providers to work during disease outbreaks	Supported	(Barnett et al., 2010), (Mackler et al., 2007),	Rejected	Rejected
Vaccination of family members can hugely influence the decision to work	Supported	(Mackler et al., 2007)	Rejected	Rejected
<b>Knowledge and training</b>				
The willingness to work increase with adequate knowledge about the disease	Supported	(Tippett et al., 2010),	Supported	-
Participants had appropriate training during Ebola	-	-	Mixed findings	59% Supported
<b>Personal Protective Equipment</b>				

The lack of availability of PPE could significantly influence the intention to work	Supported	(Mackler et al., 2007), (Smith et al., 2009), (Tippett et al., 2010)	Supported	Rejected
EMS providers are compliant with using PPE	Rejected	(Harris & Nicolai, 2010), (Wright et al., 1995)	Supported	81.7% Supported
<b>Confidence in employer</b>				
Confidence in employer could influence reporting to work	Supported	(Trainor & Barsky, 2011), (Damery et al., 2010), (Ives et al., 2009)	Supported	-
EMS providers are confident about their employer	Rejected	(Smith et al., 2009)	Supported	Supported
Employer will communicate appropriately during disease outbreaks	Supported	(Koh et al., 2005)	Supported	Supported
	Rejected	(Ives et al., 2009), (Smith et al., 2009)	-	-
<b>Self-safety</b>				
Providers are reluctant to express their concerns	Supported	(Ives et al., 2009)	Supported	Rejected
<b>Disease pathogenicity</b>				
More knowledge about a virulent disease outbreak lessen concerns	Supported	(Watt et al., 2010)	Supported	-
	Rejected	(Watt et al., 2010)	-	-
<b>Culture in the workplace</b>				
Relationship of trust in co-workers can bolster reporting to work	-	-	Supported	-
Workers who may not come to work should receive a disciplinary action	Rejected	(Damery et al., 2010)	Mixed findings	Rejected
<b>Work obligation</b>				
Providers are obligated to work during disease outbreaks	Supported	(Smith et al., 2009), (Ives et al., 2009), (Singer et al., 2003)	Supported	Supported
	Supported	(Koh et al., 2005)	Supported	-

Providers should accept the risk of exposure during disease outbreaks	Rejected	(Damery et al., 2010)	-	-
Workers are obligated to work even if there is an exposure among co-workers	Rejected	(Damery et al., 2010)	Supported	Supported
<b>Provider demographics</b>				
Male, full-time, and prior experience associated with willingness to work	Supported	(Devnani, 2012)	Rejected	Rejected
Volunteers are less concerned to work during disasters	Supported	(Watt et al., 2010)	Rejected	Rejected
EMTs are different than paramedic in their willingness to work	-	-	Rejected	Rejected
Providers descended from first responder families are more willing to come to work	-	-	Supported	Rejected

## 6.2 Conclusions

The Spanish flu pandemic of 1918-1919 infected one third of the world's population and killed an astonishing 50 million people. Since this pandemic, the deadliest in recorded history, several other disease outbreaks have swept through the world, including Severe Acute Respiratory Syndrome (SARS) in 2003 and Ebola in early 2014.

Among those who became ill or lost their lives during these more recent disease outbreaks were a disproportionate number of healthcare providers. For instance, 21 percent of SARS victims were healthcare workers, and some of them transmitted the disease to their family members (Smith et al. 2009). When it comes to

Ebola, a recent report from the World Health Organization shows that healthcare workers are 21 to 32 times more likely to be infected with Ebola than people from the general population (WHO, 2015b). This report also shows that about two-thirds of infected healthcare workers died. These recent outbreaks of Ebola and SARS have brought renewed attention to a dilemma medical professionals are faced with: should they respond to disease outbreaks if this means risking their own and their family's health?

Research studies show that healthcare workers are—besides radiation events—least willing to work during epidemics (Qureshi et al., 2005). Safety of family and self, uncertainty, and a lack of confidence in an employers' response to a disease outbreak are all associated with unwillingness to report for duty during such events (Devnani, 2012; Ives et al., 2009). Little work has been done on EMS providers, despite the fact that they are an essential component of the larger healthcare system (Watt et al., 2010). EMS personnel are working in highly unstable environments relative to their counterparts at hospitals, and they are the ones who are likely to first contact patients with acute cases. They are at higher risk of injury and death than their “cousins” firefighters, and the national average (Maguire, Dean, Bissell, Walz, & Bumbak, 2007; Maguire & Smith, 2013; Reichard, Marsh, & Moore, 2011; Silverman, Simor, & Loutfy, 2004). This dissertation examines EMS providers' views about working during disease outbreaks, and discusses the main factors that may influence their decision to keep working during such situations. This study begins to address the gaps in literature by contributing to our understanding of the views of EMS providers, and “what's in their minds” when it comes to working in pandemic situations. This work provides insights on the factors that may influence the decision-making process

of EMS providers who may face several and interrelated barriers and challenges to report for duty.

EMS providers in my sample are generally dedicated to their job, and willing to come and perform the duties that are expected of them. For natural disasters' response, they even showed an excitement and thrill due to challenges and out-of-routine type work. For disease outbreak situations, while not as thrilled compared to natural disasters, they showed high willingness in both the interviews and the survey. This study discussed many factors that may influence their decision to come to work during disease outbreaks. What is discussed here are the major influencing factors that were expressed by the participants themselves. Yet, there might be many other minor factors that may add to and influence the decision-making process. Family safety, information sharing, training, availability of PPE, and confidence in employer are explored to be the most important factors to influence reporting for duty. Overall, the findings of this study revealed that influencing factors do not seem to have major effects on the EMS providers' decision to report for duty. This is based on the context of previous studies that showed dramatic changes in the willingness to work in the presence of different barriers such as family safety and vaccination (Barnett et al., 2010; Mackler et al., 2007).

One of the major findings in this study, which contradicts previous research, is the confidence in employer. Previous studies showed a relationship of mistrust between the employer and the employee when it comes to information sharing during disasters (Australian Centre for Prehospital Research, 2008; Ives et al., 2009; Smith et al., 2009). The *interviews* and the *survey* in this study showed high levels of confidence in their employers. Additionally, the survey indicated a significant

association between willingness to work and confidence that the employers will perform their responsibilities to keep frontline workers safe during disease outbreaks. Therefore, it seems that the employer has the main role in influencing other factors and in turn the decision to report to work. This is because EMS workers believe, and it is perhaps true, that the employer should provide them with the best information, training, and protective gear to keep them and their families safe. Given that these factors are the responsibility of the employer in the first place, any change in the relationship of trust between both the EMS employer and the workers could significantly influence EMS workers' views and decisions to report to work.

The main factors that may influence the worker's decision to work during disease outbreaks are discussed separately in the discussion and previous chapters. In reality, however, these factors may influence one another making them interdependent and interconnected. For instance, EMS providers understand that their family safety is directly connected to their self-safety. Self-safety is also directly dependent on the availability of the appropriate PPE and training that should be provided by the employer. The survey analysis also indicated a significant association between these factors. To mention a few, there is a significant association between having children living with you and lack of information about the disease outbreak. Also, there is a significant association between gender and concern about virulent diseases. Figure 6.1 demonstrates a simplified diagram of the factors that may influence reporting to work. Future studies, however, could explore in more depth the interconnections between these variables, and how these relationships could influence one another and ultimately the decision-making process.

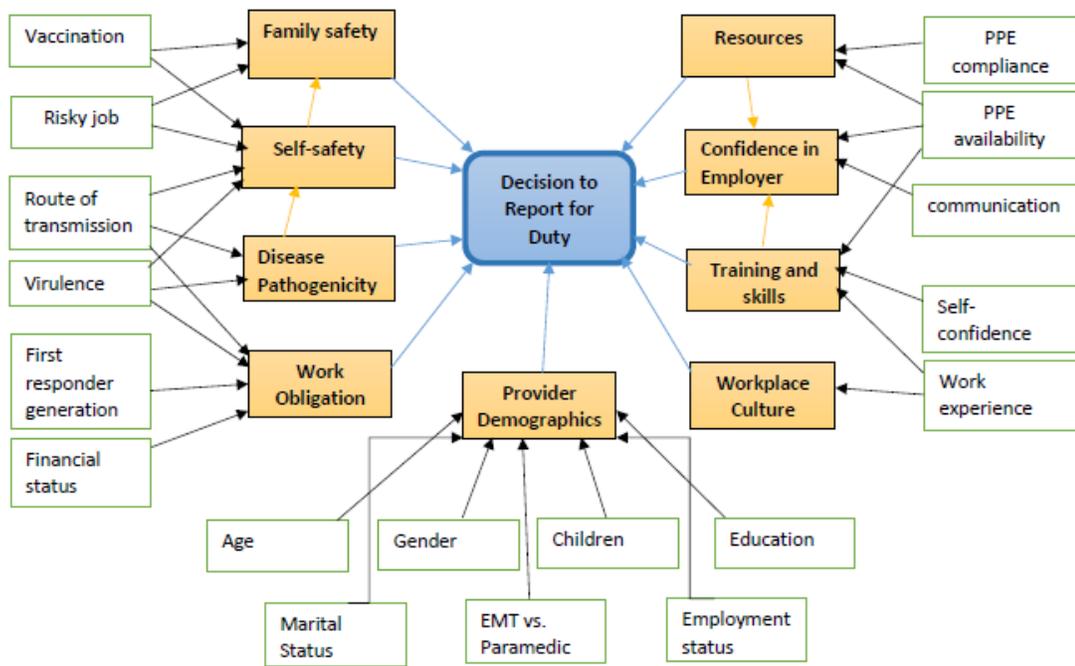


Figure 6.1: A simplified diagram of the potential influencing factors on reporting for duty

As mentioned earlier, EMS systems are varied across the country and the world. Although EMS is varied within each state and across the states, the individual EMS providers generally provide the same services and are exposed to same risks. Whatever the EMS system is, the EMS providers are still in the forefront, providing direct patient care, and at risk of exposure should a disease outbreak or any other hazard occurs. This perhaps makes their views to the risks associated with their job relatively similar regardless of their locations or the EMS agencies that they work for. While the interviews and the survey were conducted on a localized area with a limited

response rate from the survey, the views of those participants are perhaps similar to all EMS providers within the state and probably across the country. The availability of resources, training, and information sharing, which are the responsibility of the employer in the first place, can probably determine whether providers from other EMS systems have the same views or not.

It seems that during a severe disease outbreak, the challenge will be the ability of the employer to manage the situation, and the degree to which the EMS providers are directly impacted by the outbreak, either themselves or their family members. With little, if any, previous disease outbreak experience, it is challenging to anticipate with confidence the expected behavior of EMS participants. While some of these findings are either congruent or contradict with previous studies on EMS, there are many findings that are new and have not been discussed in previous EMS research.

During pandemics, the uninfected personnel are the people who are needed the most in providing patient care, public education, surveillance, and many other duties. During the outbreak of SARS in 2003 in Toronto, Canada, EMS personnel were among the first healthcare workers to be exposed to the disease outbreak, which resulted in a dramatic decrease in their workforces as well as logistical problems. This in turn negatively impacted the healthcare system in the area by reducing its surge capacity. Paramedics in the State of Delaware are part of the human resources, should a mass vaccination warranted; a policy that is not uncommon in other states. That is, in addition to their EMS work, paramedics have another task to be trained on and involved in mass vaccinations across the state if needed. This highlights the importance of understanding the views, intentions, and challenges of those invaluable providers during health disasters.

Finally, the findings of this study can put emergency managers, public health officials, and EMS administrators at ease. However, it is difficult to draw a conclusion about the real behavior of EMS providers during disease outbreaks using perception studies (Trainor & Barsky, 2011). EMS providers in the State of Delaware, and generally in the United States, have not experienced real epidemics during their career. Although some of them had witnessed the 2009 swine flu, this outbreak was not severe in terms of virulence and mortality rate, and in turn, it did not scare healthcare providers, particularly EMS personnel. The 2014 Ebola outbreak helped in examining the preparedness of the EMS systems, but was not a real experience of disease outbreak in the United States. This outbreak devastated many areas in the West African region. In one of the outbreak documentaries, an EMS provider had separated himself from his family and children for five months to keep them safe from the infection, while he was doing his job (Solomon, 2014). This is an example of how the dedication and commitment of EMS providers could be, and how difficult it also could be to take the decision whether or not work in such situations. Therefore, we cannot definitively predict the behavior of EMS providers until such a crisis occurs.

### **6.2.1 Contributions**

This study provides one of the first mixed-methods explorations of this topic in EMS. Other research studies performed in the United States, while scarce, addressed this issue using the survey approach only. The findings of this study provide one of the first empirical examinations of the risk perception of EMS providers toward disease outbreaks. To the best of the researcher's knowledge, only one study performed in Australia that explored this topic using a qualitative approach (Smith et al., 2009).

This research study is potentially useful for a wide array of professionals and stakeholders. The study can benefit individual EMS providers, EMS agencies, public health, and emergency management. I explored the views of EMS providers to work during disease outbreaks, and the potential factors that may influence their decision-making to come to work. In the recommendation section, I provide some areas of potential improvement that, if implemented by the EMS employers, could make the EMS safer and less stressful place for work. Therefore, this study provides benefits to individual EMS providers.

At the organizational level, it is necessary in the first place to understand if the EMS agencies have their surge capacity plans for disasters and disease outbreaks. It is necessary also to understand if these plans are inspired from or considered previous research studies that assessed the willingness of providers to come to work in such situations. Given that there is a lack of studies in this area, this study provides important information to EMS agencies. EMS agencies need to know their potential workforce, the expected number of personnel who may, or may not, show up, and the factors that led to their absenteeism. Knowing the intended behavior of EMS personnel is crucial to mitigate the psychological and operational effects of such events (Tippett et al., 2010), and enables those decision makers to plan for them and to implement measures that enhance willingness to report for duty. Therefore, the findings of this study provide the base for developing plans to enhance preparedness of one of the key assets during disasters and disease outbreaks.

Public health officials, emergency managers, and EMS administrators could obtain significant insights when it comes to planning and responding to emerging infectious diseases and pandemics. Contingency planning, national preparedness, and

healthcare outcomes will be improved if influencing factors to report for duty are well studied and addressed (Draper et al., 2008). This study explored the views of EMS providers about working in disease outbreaks, which gives the stakeholders the basics about the potential behavior of EMS providers. The study also explored many factors expressed by EMS providers themselves as potential barriers for them to come to work. While these factors are expressed to be of less influence than expected based on previous studies, these factors could be addressed to potentiate the relationship of trust between the employer and the employee, which ultimately enhances the belief in the work obligation. It is unthinkable what the consequences would be if EMS providers did not commit with their social and ethical responsibilities to do what is expected of them during crisis. Therefore, EMS needs to be efficient when it comes to plan for, respond to, and recover from an outbreak of infectious disease.

Human societies face an increasing number and intensity of hazards that threaten their life and livelihood (Schoch-Spana et al., 2006). Community resilience depends on the ability of its systems and assets to adapt and absorb the effect of any external or internal hazard. This depends on the integrity of their contingency plans and mitigation strategies to prevent or ameliorate the potential devastation.

### **6.2.2 Recommendations**

Confidence in the employer is found to be a cornerstone for the willingness to report to work. That is, the EMS employer is responsible for providing workers with resources and training, and to keep them informed, which are needed to keep EMS providers and their families safe. The direct supervisor or the “boss” is the first line of contact between the frontline workers and the higher levels of their EMS agency. It is necessary, therefore, that supervisors and bosses build and maintain relationships of

trust with their workers by putting their safety and the safety of their families as the agency's highest priority. Keeping frontline workers updated with the information regarding the progress of the disease, providing clear policies and instructions, and providing training and resources if required, can maintain and strengthen this relationship of trust.

My supervisor, my boss, is only above me. There are more and more above him. But I need to trust that he is aware completely of what's going on that he has all the information. That he has all the documentation, and he has all his questions answered about what is going on, so that we can in return ask him.

EMS providers do not expect their employers to provide care for their families. Rather, they consider it a responsibility of the individual providers. However, participants mentioned laundry services in the workplace as one of the important measures EMS agencies can implement to keep workers' families safe. Many participants mentioned that they would not wash their work uniform with their clothes at home. The survey participants also shared the same opinions. About two thirds (66.3%) of participants consider providing laundry service to workers during day-to-day operations and disease outbreaks as an employer responsibility. While this service is available in some EMS stations, it is recommended that this service provided to all agencies. EMS agencies can also mandate that providers not taking their uniforms home, as it should be washed at the workplace during periods of disease outbreaks.

Given that EMS providers will look for external resources of information should a disease outbreak occurs, it is better that employers provide the most up-to-date information to workers on the frontlines and educate them about reliable resources and where to find them. In other words, when employers disseminate

information to the frontline workers, it is recommended that they point workers who wish to obtain more information into the right direction in terms of reliable resources (such as the Centers for Disease Control and Prevention's official website). This is because many interview participants reported use of some unreliable resources that may have mistaken or misleading information. By doing so, they can strengthen the bonds of trust between employer and employee, and ensure that their workers obtain the correct information.

As mentioned previously, EMS agencies can only mandate their full-time providers to work outside their scheduled time during emergency conditions. While part-timers and volunteers expressed to have the same dedication to work, they cannot be mandated to work outside their scheduled times. Additionally, part-timers and volunteers are more likely to be full-timers in other EMS agencies where they are obligated to work. It is necessary, therefore, that these agencies base their surge capacity plans on their full-time workers. Some fire-based EMS agencies in the State of Delaware have very few, if any, full-time EMS workers. These agencies will face critical challenges in keeping their systems functional during emergencies and disasters. Therefore, it is recommended that such agencies consider having full-time workers that they can depend on during such events.

Some EMTs mentioned that they have the Ebola kits in their ambulances, but they are not confident that they can use them appropriately. These kits are still in the ambulances despite that fact that the disease had been eradicated by June 2016 (WHO, 2016), about eight months from the last interview. It is true that tropical diseases, like Ebola, disappear for a period of years, and then pops up somewhere else. If these kits were kept in the ambulances in purpose as an extra precaution, there should be a

regular training on how to use them. Otherwise there is no point in keeping them in ambulances. These kits may even put more stress than comfort on EMS providers who do not feel confident in their ability to use them.

Continuous education is crucial to keep the skills of EMS providers sharp. While paramedics seem to be satisfied with their skill set, not all of the EMT participants shared the same opinion. Some participants also mentioned that infectious diseases, infection control, and PPE use are not well covered in the continuing education programs. Therefore, it is recommended that these areas be covered by such programs. Additionally, Dimaggio et al. (2005) found that sense of responsibility and duty to work are the main two reasons that enhance reporting for duty. In the interviews, some participants showed that they will come to work because of financial or co-worker obligations rather than sense of responsibility and duty to work. This highlights the importance of reinforcing the sense of responsibility and duty to work during training and continuing education programs.

Finally, policymakers and public officials may provide more support and encouragement to the EMS agencies that are doing a satisfactory job in disaster and public health preparedness, from the view point of these research participants. This support helps these agencies improve, or at least maintain, their preparedness to handle health disasters. While the EMS is a small portion of the larger healthcare system, their performance during disease outbreaks and disasters is invaluable in saving lives and protecting the community they serve. Although this system has not been tested at a large-scale disease outbreak for decades, it would be very beneficial to implement or coordinate the implementation of a large-scale drill or exercise where all

stakeholders become involved. This helps in testing the current preparedness of the EMS and the larger healthcare system, and explores areas that need improvement.

### **6.2.3 Limitations**

This study uses a mixed methods approach. The qualitative phase helped in providing depth of information, and the quantitative phase helped in providing breadth of information to the topic. However, as it the case with most studies and research methods, this study has some limitations that worth mentioning here.

As mentioned earlier, studies that look for the potential attitude of people after receiving hypothetical situations are called perception studies (Trainor & Barsky, 2011), which is used in both phases of this study, the interviews and the survey. One of the weaknesses of such an approach is the difficulty of simulating the real-life situations for participants, which may influence the real feelings and views of them. That is, in real disease outbreaks, there will be many coincidental situations for each individual EMS providers that the researcher cannot bring about in a simple case scenario. Therefore, the prediction of the real behavior of individuals from such studies should be limited and accepted with caution.

In the first phase, the interviews, there were challenges in accessing all EMS agencies. The interviews were only performed on EMS providers from the agencies that I obtained access to. The interview participants provided encouraging views and insights about their training, resources, and trust in their employers. These are among the most important factors that may influence the decision whether or not to come to work during disasters and public health emergencies. I was not able to interview paramedics from New Castle County. It is possible though that some of the agencies that refused to give me access expect that their EMS providers might give negative

views about their agencies. If this is true, it might change the views and findings of this study. While the survey helped in providing information at a bigger picture, due to confidentiality reasons, there were no questions asking about the agency name. Yet, it was also noticed that three paramedic participants were from New Castle County, which means that the EMS agency likely disseminated the survey to the paramedics.

The survey was performed in two states, Maryland and Delaware. The state EMS offices took the lead and distributed the survey to their EMS agencies that supposed to send it to EMS providers. It is possible that one or more of the agencies denied sending the survey to their EMS providers. In case of Delaware, there is one paramedic agency in each county, and there are participants from each county. This means that all paramedics in the State of Delaware had the chance to participate in the survey. When it comes to the EMT agencies, there are many of them in each county, and therefore, it is difficult to ensure that all agencies disseminated the link of the survey to their providers. In the State of Maryland, only 28 EMS providers participated in the study, most of them are paramedics and from one region. It is likely that the link was not disseminated to all agencies across the state. In this case, EMS providers from these agencies did not have the same chance as others to participate in the survey. Therefore, there could be a selection bias in the sampling method of this study.

The survey had a relatively low response rate. Only 104 participants were included in the survey. The EMS population in Delaware are about 1,800, and in Maryland are about 24,000. In Delaware, the response rate was about 4%, and it was much less in Maryland. As such, the findings from this study have limited generalization potential. Unfortunately, the request of performing this survey on a

national sample through the NREMT was disapproved. Had the study performed on a national sample, the findings would have been more appropriate for generalization purposes.

Due to lack of experience in real epidemics, it was difficult to assess views, feelings, and insights of the participants to work in such conditions. While the 2009 swine flu was a pandemic that affected almost every country in the world due to its ease of transmission, it was not virulent and in turn did not scare healthcare providers including the EMS. The 2014 Ebola outbreak was very contagious and virulent and resulted in many illnesses and deaths. The outbreak impacted the West African region and resulted in many infections and deaths among healthcare providers. Ebola outbreak was clear in their minds throughout the interviews, which helped me making it as an example for assessing their views. However, given that they did not experience handling real cases of Ebola, their views were more about preparedness, concerns, and self-confidence in handling such cases. Therefore, with lack of real experience, it was difficult to assess the real views and insights of participants.

When I developed the survey, I used the Likert-scale type in most of the questions. There were five choices for participants to choose from that ranged from one to five, with one represents the most negative view and five represents the most positive view. It was noted that many participants chose three, which is the neutral choice. To collapse the data for analysis, I had to make three groups, negative, neutral, and positive groups. Due to the relative small sample size, it was difficult to assess the significance between variables without violating the required minimum number of cases. For instance, one of the chi-square assumptions is to have at least five cases in each cell of the cross-tabulation table. In such cases, Fisher's Exact Test should be

used to assess for significance. However, this test can only be done for 2x2 tables. Therefore, the significant results of the chi-square tests where assumptions were violated should be accepted with caution.

The EMS systems in the United States and across the world are highly diverse and different from one place to another, which is based on many factors like resources, needs, and population density to mention a few. Therefore, the findings of this study have limited generalization potential, and should be accepted with caution, based on how close the EMS system of interest is to the ones that were studied here.

#### **6.2.4 Future research**

While this study answered many research questions, it perhaps created more. The EMS is generally under researched in almost all areas. This study is the first in its approach to be performed in the United States on the EMS. This study provides the basis for much additional research.

This study is conducted on frontline EMS providers to assess their personal views about working during disease outbreaks. What about the employers' views about this issue? What they think about their worker views or potential attitudes? Do they have plans in place for a situation where many workers may not show up as expected? This could be an interesting area for future research.

While the availability of the appropriate PPE and the training during disease outbreaks could be one of the most important factors that influence the decision to come to work, a future research could explore the ability of the EMS agencies to provide the appropriate PPE and training in a timely manner to all providers in a scenario of a new and highly infectious disease outbreak.

Given that EMS providers' compliance with using PPE is suboptimal, should there be policies and regulations in place to enforce all EMS providers to comply with PPE use all times to protect them from any future exposure? If they comply, will this protect them from all kinds of disease outbreaks, including the worst-case scenario? What are the consequences in terms of costs and benefits? These are some questions that may need further future research.

EMS providers are perhaps at higher risk of infection from disease outbreaks due to their work in uncontrolled environments and frequent contact with ill patients. Research also showed that they are not fully compliant with using PPE to keep themselves and their families safe. The question that may be worth further research is whether the families of healthcare workers in general and EMS providers in particular are acquiring infectious diseases more frequently than the general population because of their parents' nature of work?

EMS personnel, as well as some other kinds of health care workers, are in a position of unwittingly acting as vectors that can transfer infections to their family members. It is this potential of becoming a vector of disease that changes the focus of EMS providers' fears away from self and patients, and toward their families. Other emergency response personnel such as firefighters (who are not EMTs) and police officers do not have a transferable exposure while on the job. A question for future studies is to compare EMS providers with other emergency response personnel in terms of their concerns for family safety and the expression of high priority of family well-being.

Among the interview participants, there were those EMS providers who are descended from generation(s) of EMS, fire, or police. It was obvious during the

interviews that they are significantly more dedicated to their work. They also highlighted that they love their job because it is a family job, meaning that multiple generations of their families have the same job. Future projects could focus on this group of EMS providers and compare them with others to understand more about the support provided by parents and probably grandparents to those highly dedicated providers. This also could help in developing strategies and plans on how to make families a supporter rather than a barrier to working during disasters and public health emergencies. Interestingly, the survey contradicts the findings in the interviews and indicated that this group of EMS providers is significantly less willing to report for duty.

The factors that mainly influence the worker's decision-making process were discussed separately in the previous section. In reality, however, these factors are interconnected and may influence one another. The relationships are so interconnected with each other that it become too difficult to put them in a simple and easily understandable model. It is recommended, therefore, that a future research explore the relationships between the factors that influence the decision to come to work during disease outbreaks, and how these relationships could bolster or hinder one another and in turn the willingness to report to work.

Finally, this research presents several unique contributions, including a comprehensive review of the literature, overview of the context of EMS work environments during day-to-day work, natural disasters, and disease outbreaks. It also provides an extensive discussion about the major factors that may influence the decision to come to work during health disasters. This provides a better understanding of the potential challenges that could face EMS providers who are invaluable

resources of aid during the outbreak of a newly infectious diseases. The study findings provide a motivation to the EMS organizations to consider measures that can better facilitate the safety and well-being of EMS providers, which ultimately benefit individual EMS providers as well as the community they serve.

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## Appendix A

### INTERVIEW GUIDE

**Date:** \_\_\_ / \_\_\_ / 2016

**Start time:**

**Research question for this interview guide:** What are the factors that influence the EMS providers' decision to report for duty?

#### Introduction

Thank for time,

“This is a study about the perspectives of EMS providers to work during disease outbreaks and how factors can influence their decision-making to work in such events. The questions I would like to talk about deal with information about you, your work culture and environment, confidence in employer, education and training, and disease outbreaks. There are no right or wrong answers. Interviews are normally audio-recorded, and this simply provides for accurately keeping track of information. Subsequently the audio record will be deleted. Your participation in this study is strictly confidential and important. However, should you at any time want to stop, you may do so without prejudice to you, and at any time you should feel free to ask me questions concerning the interview or the study. May we begin?”

#### Background Information

- Interviewee:
- Marital status:
  - Number of children (if any):
- EMT or paramedic:
  - Cross trained EMT and fire fighter?
  - Years of experience:
- Employment Status: full-time, part-time, volunteer
  - Other jobs:
    - If yes, first responder or not.

#### Natural Disasters and Outbreaks

- First, could you please tell me the differences between working during everyday operations and working during disasters, with respect to how much

comfortable and confident are you to work during disasters? By disasters I mean natural disasters like a hurricane or an earthquake.

- What would be the main concerns for working during such disasters?
- What about public health disasters like disease outbreaks or epidemics? Do you think it is going to be different situation?
  - What do you think of working in such conditions?
  - In your view, what are the things that make EMS providers *more* concerned during disease outbreaks than natural disasters?
  - Do you think these concerns could affect your decision to come to work?
  - What other things that could affect your decision to work?
- So, what we discussed is all about things that may make EMS providers more concerned to work. Now, what about things that may facilitate and enhance you to come to work during an epidemic?

Having discussed the main factors that could influence EMS workers' decision to work during disease outbreaks, I'd like to discuss some of these factors in more details. Let us start with training and skills.

### **Training and Skills**

- What do you think about the training that EMS providers receive about infectious diseases, infection control, and PPE use?
- During disease outbreaks, do you think just-in-time training would be helpful?
  - Have you had training for Ebola?
- What is your view about providers' compliance with PPE use during day to day operations?
  - What would be the situation during disease outbreaks as far as compliance with PPE use?
- Do you see any effect of the non-compliance of PPE use on the decision to work with outbreaks patients?

### **Confidence in employer**

Having discussed the training and skills, let us talk about the employers.

- In your view, what are the responsibilities of the employers during disease outbreaks?
  - Communication with workers about the outbreak progress
  - Provide appropriate supplies and PPE
  - Training
- One of the employer responsibilities is to communicate with workers about the progress of the disease outbreak. What do you think will happen in reality in EMS/ Fire agencies?

- Do you think the employer could withhold some information about the disease in an attempt to downplay the situation?
- Will you seek additional information from external resources about the progress of the disease outbreak?
  - Is this a mistrust issue, a validation of the reliability of the given information, or just to get more information?
  - Do you think the issue of mistrust in employer could affect the decision to work?
- In your view, what are the things that the employer could do to enhance their employees to work in such conditions?
  - Rewards (Incentives) and/or punishments.

### **Severity of the Disease**

Now I'd like to talk about the severity of the disease causing the outbreak.

- What is the thing that would concern you the most when you hear about a severe disease outbreak?
  - What else would concern you?
- What are the things that could make you less concerned to provide care during such an outbreak?
  - Resources (PPE, vaccination, and antivirals)
  - Knowledge and training
- EMTs and paramedics have different training and skills, do you think this have anything to do with their view to the severity of the disease? I mean, because paramedics supposed to have more knowledge about diseases, will this be a more of comfort for them?
- What do you think of working in Ebola like situation where the disease is widely spread in your area?
  - Will you come to work?
- What if there are appropriate protective measures (PPE, vaccine, and antivirals)? Do you think disease severity still matter? Why?

### **Family obligations**

Let us talk about family of EMS providers.

- So, do you think working as an EMS provider put your family at risk of infection higher than the general population?
- What about during disease outbreaks, will the risk increase or decrease? Why?
- What could be the employer role for providers' family during outbreaks?
  - Vaccination, child care

- What do you think of the idea that a single EMS provider is more obligated to work than a provider who has a family?
  - What about concerns of a single provider vs. a provider with a wife and kids?

### **Workplace culture**

- What do you think about workers' obligation to work during disease outbreak?
- Where is the point where you feel you are no longer obligated to come to work during disease outbreaks?
  - Lack of resources, PPE and vaccination
  - Family obligation conflicted with work obligation
  - Exposure or infection among colleagues or in the workplace
- What do you think of workplace culture as far as not showing up to work?
- What's your view about a provider who may not show up to work because he is concerned about his safety and the safety of his family?
  - What do you think the employer action should be?
  - What do you think the co-workers' views to such behavior?

Thank you for your time and assistance. What questions didn't I ask you that I should have?

I want to repeat how much I really appreciate your time. Your perspective on the issue was very enlightening, and I have learned so much from you.

## **Appendix B**

### **EMAIL TO EMS AGENCIES**

*To: EMS Agency Director/ Fire Chief*

*CC: State EMS Medical Director*

*Subject: Doctoral Student doing research on EMS*

To whom it may concern,

My name is Mahmoud Alwidyan. I am a doctoral student at the University of Delaware (UD) pursuing a Doctor of Philosophy in Disaster Science and Management program. Currently, I am working on my dissertation on the topic of “willingness of EMS providers to report for duty during disease outbreaks”. The study will be conducted in two phases. In the first phase, I will be **interviewing** a number of frontline EMS providers in trying to understand and shape the factors that facilitate and hinder their decisions to report for duty. In the second phase, I will send a survey **questionnaire** to a representative sample of EMS providers (EMTs and paramedics) in the state of Delaware to look for the extent to which EMS providers are willing to report for duty during disease outbreaks.

The findings of this study have the potential to benefit EMS providers, EMS administrators, Public health, and emergency management. The findings can help in planning and responding to an outbreak of an infectious disease, as EMS administrators need to know the expected number of EMS personnel who may, or may not, show up during such an event, and the factors that led to their absenteeism.

I have contacted the state EMS medical director to ask for assistance in conducting this study. He welcomed the study and provided me with your contact information. I need your assistance in performing this study by having the contact information for EMS providers in your agency. Their participation in the study is totally voluntary and

they can withdraw from the study at any time without any consequences. I need to start contacting those providers by early May of 2016.

If you have any questions about the project or about me, please contact me by email at [alwidyan@udel.edu](mailto:alwidyan@udel.edu), or by phone at 443 527 5712. If you like to meet with me personally to discuss the proposed project, I will be more than happy to do so at your convenient time. You can also contact my academic advisor, Professor Joe Trainor by email at [jtrainor@udel.edu](mailto:jtrainor@udel.edu).

Sincerely,

Mahmoud Alwidyan

**Appendix C**  
**IRB APPROVALS**



RESEARCH OFFICE

210 Halliher Hall  
University of Delaware  
Newark, Delaware 19716-1551  
Ph: 302/831-2136  
Fax: 302/831-2828

DATE: April 27, 2016

TO: Mahmoud Alwidyan, PhD  
FROM: University of Delaware IRB

STUDY TITLE: [898161-1] WILLINGNESS OF EMS PROVIDERS TO REPORT FOR DUTY DURING AN OUTBREAK OF A NEWLY INFECTIOUS DISEASE

SUBMISSION TYPE: New Project

ACTION: APPROVED  
APPROVAL DATE: April 27, 2016  
EXPIRATION DATE: April 26, 2017  
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # (6,7)

Thank you for your submission of New Project materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.



RESEARCH OFFICE

210 Hulihan Hall  
University of Delaware  
Newark, Delaware 19716-1551  
Ph: 302/831-2136  
Fax: 302/831-2828

DATE: February 24, 2017

TO: Mahmoud Alwidyan, PhD  
FROM: University of Delaware IRB

STUDY TITLE: [898161-2] WILLINGNESS OF EMS PROVIDERS TO REPORT FOR DUTY DURING AN OUTBREAK OF A NEWLY INFECTIOUS DISEASE

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED  
APPROVAL DATE: February 24, 2017  
EXPIRATION DATE: April 26, 2017  
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # (6,7)

Thank you for your submission of Amendment/Modification materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or [nicolefm@udel.edu](mailto:nicolefm@udel.edu). Please include your study title and reference number in all correspondence with this office.



RESEARCH OFFICE

210 Hulihan Hall  
University of Delaware  
Newark, Delaware 19716-1551  
Ph: 302/831-2136  
Fax: 302/831-2828

DATE: April 12, 2017

TO: Mahmoud Alwidy, PhD  
FROM: University of Delaware IRB

STUDY TITLE: [898161-3] WILLINGNESS OF EMS PROVIDERS TO REPORT FOR DUTY DURING AN OUTBREAK OF A NEWLY INFECTIOUS DISEASE

IRB REFERENCE #:  
SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: Approved for Data Analysis Only

APPROVAL DATE: April 12, 2017  
EXPIRATION DATE: April 26, 2018  
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # (6,7)

Thank you for your submission of Continuing Review/Progress Report materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or [nicolefm@udel.edu](mailto:nicolefm@udel.edu). Please include your study title and reference number in all correspondence with this office.

**Appendix D**  
**INTERVIEW INFORMED CONSENT FORM**

University of Delaware  
Statement of Informed Consent

Title of Project:

*Willingness of EMS Providers to Report for Duty during an Outbreak of a Newly Infectious Disease*

Principal Investigator (s):

Mahmoud Alwidyan (doctoral student), Joe Trainor (dissertation advisor)

You are being asked to participate in a research study. This form tells you about the study including its purpose, what you will do if you decide to participate, and any risks and benefits of being in the study. Please read the information below and ask the research team questions about anything we have not made clear before you decide whether to participate. Your participation is voluntary and you can refuse to participate or withdraw at any time without penalty or loss of benefits to which you are otherwise entitled. If you decide to participate, you will be asked to sign this form and a copy will be given to you to keep for your reference.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this study is to explore the EMS providers' views about working during the events of the outbreaks of newly infectious diseases, which is aimed at improving planning for surge capacity of EMS workforce during such events. This project is also part of Mahmoud Alwidyan's doctoral dissertation research. Certain data collected during this study will be used in the final version of the doctoral dissertation, which will be published and maintained by the University of Delaware.

WHAT WILL YOU BE ASKED TO DO?

You are being asked to take part in this study because of your uniqueness as a frontline EMS provider. This research uses semi-structured and focus group interviews as a primary approach to data collection. The interviews and focus groups will be performed face-to-face. All interviews and focus groups will be conducted in a pre-determined location convenient to the study participant(s). With the participant's permission, interviews will be audio recorded. Interviews will last no longer than one hour and will consist of questions and discussion surrounding the subject's view about working during disease outbreaks and factors influencing the intended behavior of working in such situations.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

This study is governed by strict ethics of confidentiality. Neither the researcher nor the University of Delaware will reveal the names of individual participants or organizations involved in this study. As this research involves face to face, there is no additional risk to subject participation in these interviews. As such, the subject(s) assumes no physical, social, psychological, financial, or legal risk through participation in this study.

**WHAT ARE THE POTENTIAL BENEFITS?**

You may not benefit directly from taking part in this research. However, the knowledge gained from this study may contribute to our understanding of willingness to report for duty and the influencing factors. Knowledge gained from this study could benefit a wide spectrum of stakeholders. Frontline EMS providers, public health officials, emergency managers, and EMS administrators could get significant benefits when it comes to planning and responding to an outbreak of an infectious disease.

**HOW WILL CONFIDENTIALITY BE MAINTAINED?**

We will make every effort to keep all research records that identify you confidential to the extent permitted by law. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

Your research records may be viewed by the University of Delaware Institutional Review Board, but the confidentiality of your records will be protected to the extent permitted by law.

**WILL THERE BE ANY COSTS RELATED TO THE RESEARCH?**

There are no costs associated with participation in this study.

**WILL THERE BE ANY COMPENSATION FOR PARTICIPATION?**

No monetary or other such form of financial compensation will be offered to participants of this study.

**DO YOU HAVE TO TAKE PART IN THIS STUDY?**

Taking part in this research study is entirely voluntary. You do not have to participate in this research. If you choose to take part, you have the right to stop at any time. If you decide not to participate or if you decide to stop taking part in the research at a later date, there will be no penalty or loss of benefits to which you are otherwise entitled. Your refusal will not influence current or future relationships with the University of Delaware or any other entity.

**WHO SHOULD YOU CALL IF YOU HAVE QUESTIONS OR CONCERNS?**

If you have any questions about this study, please contact the Principal Investigator's dissertation advisor, Professor Joe Trainor at [jtrainor@udel.edu](mailto:jtrainor@udel.edu)

If you have any questions or concerns about your rights as a research participant, you may contact the University of Delaware Institutional Review Board at 302-831-2137.

---

Your signature below indicates that you are agreeing to take part in this research study. You have been informed about the study's purpose, procedures, possible risks and benefits. You have been given the opportunity to ask questions about the research and those questions have been answered. You will be given a copy of this consent form to keep.

By signing this consent form, you indicate that you voluntarily agree to participate in this study.

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name of Participant

## **Appendix E**

### **SURVEY CONTENT**

#### **Welcome email and link**

Dear EMS providers,

We are hoping for your valued participation in our research by completing this survey. Your feedback is important. This survey designed to assess the views of the EMS providers in the State of Delaware about working during disease outbreaks of highly infectious diseases, and the factors that may influence their decision whether or not to come to work in such situations. Findings of this study may help in making EMS a safer place to work.

Please, click on the link below to start the online survey. The survey should take about 8 to 10 minutes to complete.

<https://>

Your response and time is greatly appreciated. Thank you!

Sincerely,

#### **Informed Consent**

This survey assesses the EMS providers' views about working during disease outbreaks, and the factors that influence their decision whether to come to work or no in such situations.

There is no anticipated risk or inconvenience by taking this survey, so risk is minimal. Your participation is strictly voluntary, and responses will be kept anonymous. You may withdraw your participation at any time without penalty. All information collected from this survey will be used for research purposes only and will be kept confidential.

If you have any questions about the research, please contact the principal investigator, Mahmoud Alwidyan via email at [alwidyan@udel.edu](mailto:alwidyan@udel.edu), or the faculty advisor, Dr.

Joseph Trainor at jtrainor@udel.edu, or by phone at 302 831 6618. The study has obtained the Institution Review Board's approval from the University of Delaware on April 27<sup>th</sup>, 2016.

By clicking on the red arrows below, I have read the above information and agree to participate in this research project.

-----  
**Introduction**

This survey starts with a scenario about a disease outbreak followed by two questions. Next, will be more questions related to the scenario and ask your views in different areas including your employer, your family, training and skills, workplace, and obligation to come to work. Please click next to read the scenario.

-----  
**Scenario**

Please read the following scenario and select the choices that best fit your expected response.

A disease outbreak is unfolding in a country outside the United States with very limited information about its characteristics. Early reports show that it is an airborne disease with flu-like symptoms. It happens that one case of the disease was reported in the United States for a traveler from the stricken country, but not in your town. According to some reports, the disease seems highly infectious and has severe symptoms with high mortality rates. Your EMS agency has alerted the staff and provided them with enough supplies of PPE. No vaccine or effective treatment is available.

You hear from a friend that co-workers were exposed to the disease outbreak after transporting potentially exposed patients to a nearby hospital. Those exposed co-

workers are now in quarantine. In this situation, it is expected that your workplace will be under staffed due to quarantine and you will experience higher work volume.

1. Your response to such a situation will be:
  - Turn off my cell phone so I will not be asked to come to work.
  - Only work my scheduled shifts.
  - I'm not coming to work until I'm clear about the exposure risk.
  - I will work additional shifts if asked.
  - I will call my supervisor to ask if they need shift covered.
2. If there is no exposure among your colleagues, but there are a number of cases of the outbreak reported in the area where you serve, what would be your response:
  - Turn off my cell phone so I will not be asked to come to work.
  - Only work my scheduled shifts.
  - I'm not coming to work until I'm clear about the exposure risk.
  - I will work additional shifts if asked.
  - I will call my supervisor to ask if they need shift covered.

-----  
**Concerns about Disease Outbreaks**

Based on the previous scenario, please rate your concern from 1 to 5, with 1= Not at all concerned and 5= Extremely concerned:

3. Becoming infected and getting ill.  
1      2      3      4      5
4. Dying from the infection.  
1      2      3      4      5
5. Infecting family members.  
1      2      3      4      5
6. Very little information is known about a newly infectious disease.

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
7. Shortage in PPE supplies.
- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
8. No known effective treatment or vaccine for infected patients.
- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
9. The disease is easily transmissible.
- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
10. The disease is highly virulent (has bad consequences).
- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
11. **Overall**, your general concern about working during such a disease outbreak.
- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|

-----

**Employer**

Based on the previous scenario, please rate your confidence level from 1 to 5, with 1=Not at all confident and 5= Very confident.

12. Your employer has systems in place to warn about infected, or potentially infected patients.
- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
13. Your employer will provide the most up to date information about the disease progress.
- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
14. Your employer will provide and maintain adequate supplies of protective equipment like PPE and vaccines.
- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
15. Your employer will provide an effective treatment and vaccine when available
- |  |   |   |   |   |   |
|--|---|---|---|---|---|
|  | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
16. Your employer will provide appropriate training to the frontline workers to handle the emerging outbreak.

1 2 3 4 5

17. Your employer has systems in place to take care of family members of EMS workers when needed.

1 2 3 4 5

18. **Overall**, you are confident that your employer will perform their responsibilities to keep frontline workers safe during disease outbreaks.

1 2 3 4 5

-----  
You believe that the following are the responsibilities of your employer. Please rate your answer from 1 to 5, with 1=Strongly disagree and 5=Strongly agree.

19. Provide vaccination to family members of workers (if available) during disease outbreaks.

1 2 3 4 5

20. Pay incentives to workers during disease outbreaks.

1 2 3 4 5

21. Provide laundry service to workers during day-to-day operations and during disease outbreaks.

1 2 3 4 5

22. Take disciplinary action against workers who didn't show up because of safety concerns for themselves and/or their families.

1 2 3 4 5

-----  
**Family**

Please rate your answer from 1 to 5, with 1=Strongly disagree and 5=Strongly agree.

23. My family is prepared to function in my absence.

1 2 3 4 5

24. As an EMS provider, working during day-to-day operations put my family at risk of infection higher than the general population.

1      2      3      4      5

25. As an EMS provider, working during disease outbreaks put my family at risk of infection higher than the general population.

1      2      3      4      5

26. My concern for my family has a major effect on my decision whether or not to come to work.

1      2      3      4      5

27. My family members can influence my decision whether or not to come to work.

1      2      3      4      5

28. At least one of my parents or grandparents work, or even worked, as first responders (Police/Fire/EMS)

- Yes
- No

29. During disease outbreaks, who comes first?

- Self-safety
- Family safety
- Work obligation

-----  
**Knowledge and Training**

Please rate your answer from 1 to 5, with 1=Strongly disagree and 5=Strongly agree.

30. The knowledge and training that I have learned about infectious disease is adequate for day-to-day operations.

1      2      3      4      5

31. The knowledge and training that I have learned about infectious disease is adequate during severe disease outbreaks.

1 2 3 4 5

32. During Ebola outbreak, I had appropriate training.

1 2 3 4 5

33. Lack of confidence in knowledge and training could affect my decision to work during disease outbreaks.

1 2 3 4 5

34. Generally speaking, I follow the standard precautions of using PPE during day-to-day operations.

1 2 3 4 5

-----  
**Workplace**

Please rate your answer from 1 to 5, with 1=Strongly disagree and 5=Strongly agree.

35. I can understand the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.

1 2 3 4 5

36. I can forgive the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family.

1 2 3 4 5

37. EMS providers who do not show up to work during disease outbreaks should not be in this job.

1 2 3 4 5

38. EMS providers who did not show up to work during a disease outbreak due to safety reasons should receive strict disciplinary actions.

1 2 3 4 5

-----  
**Obligation to come to work**

Based on the previous scenario, please rate your obligation to come to work from 1 to 5, with 1=Not obligated and 5=Obligated:

39. There is a lack of the availability of the appropriate PPE.

1 2 3 4 5

40. I mistrust the information coming from my employer regarding the progress of the disease outbreak.

1 2 3 4 5

41. I did not receive appropriate training specific to the current new disease outbreak.

1 2 3 4 5

42. There is no vaccine or effective treatment for the disease.

1 2 3 4 5

43. I'm concerned about the safety of myself.

1 2 3 4 5

44. I'm concerned about the safety of my family members.

1 2 3 4 5

45. I need to take care of a sick family member.

1 2 3 4 5

46. There is an exposure in my workplace.

1 2 3 4 5

---

**Demographic data**

47. What is your gender?

- Male
- Female
- Prefer not to answer

48. What is your age?

- Under 18
- 18 – 24
- 25 – 34

- 35 – 44
- 45 – 54
- 55 – 64
- 65 or above

49. Do you live with a loved one?

- Yes
- No

50. Do you have child(ren) or dependent(s) living with you?

- Yes
- No

51. Please select the highest education completed.

- Less than high school
- High school graduate
- Some college
- 2 year degree
- 4 year degree
- Professional degree
- Doctorate

52. Work level (You can choose more than one option)

- EMR
- EMT
- Firefighter
- Paramedic

53. Current employment status. (You can choose more than one option)

- Full-time
- Part-time
- Volunteer
- Not working as an EMS provider

54. Type of service provided

- Emergency 911 services
- Non-emergency services

55. Length of service in EMS

- Less than one year
- 1 to 8 years
- More than 8 years

56. Area of service in Delaware (You can choose more than one option)

- New Castle County
- Kent County
- Sussex County

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Thank you for participating. You may now close your browser window.

## **Appendix F**

### **VARIABLES CODEBOOK**

Codebook for questions:

#### Scenario

- Scen\_1: question one of the scenario
- Scen\_2: question two of the scenario

#### Concerns

- Conce\_1: becoming infected and getting ill
- Conce\_2: dying from infection
- Conce\_3: Infecting family member
- Conce\_4: very little information is known about the infection
- Conce\_5: shortage in the PPE supplies
- Conce\_6: no known effective treatment or vaccine for infected patients
- Conce\_7: disease is easily transmissible
- Conce\_8: the disease is virulent
- Conce\_9: overall, your general concern about working during such a disease outbreak.

#### Employer confidence

- Emp\_conf\_1: Your employer has systems in place to warn about infected, or potentially infected patients
- Emp\_conf\_2: Your employer will provide the most up to date information about the disease progress
- Emp\_conf\_3: Your employer will provide and maintain adequate supplies of protective equipment like PPE and vaccines
- Emp\_conf\_4: Your employer will provide an effective treatment and vaccine when available
- Emp\_conf\_5: Your employer will provide appropriate training to the frontline workers to handle the emerging outbreak
- Emp\_conf\_6: Your employer has systems in place to take care of family members of EMS workers when needed

- Emp\_conf\_7: **Overall**, you are confident that your employer will perform their responsibilities to keep frontline workers safe during disease outbreaks

#### Employer responsibilities

- Emp\_res\_1: Provide vaccination to family members of workers (if available) during disease outbreaks
- Emp\_res\_2: Pay incentives to workers during disease outbreaks
- Emp\_res\_3: Provide laundry service to workers during day-to-day operations and during disease outbreaks
- Emp\_res\_4: Take disciplinary action against workers who didn't show up because of safety concerns for themselves and/or their families

#### Family

- Fam\_1: My family is prepared to function in my absence
- Fam\_2: As an EMS provider, working during day-to-day operations put my family at risk of infection higher than the general population
- Fam\_3: As an EMS provider, working during disease outbreaks put my family at risk of infection higher than the general population
- Fam\_4: My concern for my family has a major effect on my decision whether or not to come to work.
- Fam\_5: My family members can influence my decision whether or not to come to work
- Fam\_6: At least one of my parents or grandparents work, or even worked, as first responders (Police/Fire/EMS)
- Fam\_7: During disease outbreaks, who comes first?

#### Knowledge and training

- Knldg\_1: The knowledge and training that I have learned about infectious disease is adequate for day-to-day operations
- Knldg\_2: The knowledge and training that I have learned about infectious disease is adequate during severe disease outbreaks
- Knldg\_3: During Ebola outbreak, I had appropriate training
- Knldg\_4: Lack of confidence in knowledge and training could affect my decision to work during disease outbreaks
- Knldg\_5: Generally speaking, I follow the standard precautions of using PPE during day-to-day operations

#### Workplace

- Workp\_1: I can understand the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family

- Workp\_2: I may forgive the behavior of a co-worker who did not show up to work due to safety concerns for himself or his family
- Workp\_3: EMS providers who do not show up to work during disease outbreaks should not be in this job
- Workp\_4: EMS providers who did not show up to work during a disease outbreak due to safety reasons should receive strict disciplinary actions

#### Work obligation

- Work\_oblg\_1: There is a lack of the availability of the appropriate PPE
- Work\_oblg\_2: I mistrust the information coming from my employer regarding the progress of the disease outbreak
- Work\_oblg\_3: I did not receive appropriate training specific to the current new disease outbreak.
- Work\_oblg\_4: There is no vaccine or effective treatment for the disease
- Work\_oblg\_5: I'm concerned about the safety of myself
- Work\_oblg\_6: I'm concerned about the safety of my family members
- Work\_oblg\_7: I need to take care of a sick family member
- Work\_oblg\_8: There is an exposure in my workplace

#### Demographics

- Gender
- Age
- Live\_partner: Do you live with a spouse or loved one?
- Children: Do you have child(ren) or dependent(s) living with you?
- Education
- Work\_level
- Empl\_status: employment status
- Serv\_provid: Type of service provided
- Serv\_leng: Length of service in EMS
- Serv\_area

#### Collapsing variables

- Answer choices of the first two questions were dichotomized into willing and unwilling and labeled Scen\_1\_dic, and Scen\_2\_dic.
  - Unwilling : 1) Turn off my cell phone so I will not be asked to come to work; 2) I'm not coming to work until I'm clear about the exposure risk.
  - Willing: 3) only work my scheduled shifts; 4) I will work additional shifts if asked; and 5) I will call my supervisor to ask if they need shift covered.
- Concern questions dichotomized into:

- Less concerned: 1 and 2
  - Concerned 3, 4, and 5
- Confidence in employer collapsed into three groups:
  - Not confident: 1 and 2
  - Neutral: 3
  - Confident: 4 and 5
- Employer responsibility collapsed in three groups:
  - Not responsible: 1 and 2
  - Neutral: 3
  - Responsible: 4 and 5
- Family variables collapsed into three groups:
  - Disagree: 1 and 2
  - Neutral: 3
  - Agree: 4 and 5
- Knowledge and training collapsed into three groups:
  - Disagree: 1 and 2
  - Neutral: 3
  - Agree: 4 and 5
- Workplace collapsed into three groups:
  - Disagree: 1 and 2
  - Neutral: 3
  - Agree: 4 and 5
- Work obligation collapsed into three groups:
  - Not obligated: 1 and 2
  - Neutral: 3
  - obligated: 4 and 5
- demographics:
- gender:
  - male
  - female
- education:
  - less than some college
  - some college to bachelors
  - more than bachelors