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Public Health Strategies for Strengthening Prehospital Injury Responses in St. Lucia

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Walden University
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Abstract

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MPH, University of the West Indies, 2008

Dissertation Submitted in Partial Fulfillment

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Abstract

Traumatic injuries have steadily increased during the last two decades, affecting over 5.8 million persons annually and have become a global public health issue. Since 2008, 80% of all deaths from noncommunicable diseases and trauma, approximately 29 million occurred in developing countries. Sixteen thousand young adults worldwide have died due to traumatic injuries. Additionally, injuries account for over 15% of the global burden of diseases, with approximately 90% of these injuries occurring in developing countries like St. Lucia. The purpose of this qualitative descriptive study was to examine policy gaps in prehospital traumatic injury responses and explore implementing Essential Public Health Functions (EPHF), that were conceptualized by countries in the Caribbean, to strengthen prehospital injury responses in St. Lucia. Using criterion-based sampling, 13 respondents from the St. Lucia emergency room, fire service Emergency Medical Services, and the ministry of health were interviewed. Their responses indicated a general deficiency in the procedures that guide trauma responses. Respondents cited EPHF 1, 2, 3, 4, 6, 10, 11, and sections of 9, as missing, and 1, 2, 3, 5, 8 and 10 as useful to improve prehospital response procedures and policies. These EPHF can be implemented through consultation with the ministry of health once political buy-in is achieved. The results indicate that the use of EPHF as a gold standard could be enforced through quality assurance programs. The findings from this study contribute to the knowledge base of prehospital traumatic injury responses. The study also has the potential to impact social change by providing health education campaigns that sensitize citizens to the perils of unnecessary and improper movement and transportation of injured victims.

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Dedication

This dissertation is dedicated to the loving memory of my grandmother Ralda. A strong, generous, and caring soul who contributed immeasurably to my life. It is said that time heals all wounds, but the years have not lessened the pain of losing you. I love you Momma and miss you so much.

To my mother Mable, who has always believed in and encouraged me to work hard, never give up and always strive for the best. Thank you, Mom.

And to my daughter Jade Ashley, who has had to bear with me throughout the long and arduous process that commanded so much of my time. I love you Jade.

God Bless You All.

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Chapter 1: Introduction to the Study

Traumatic injuries have steadily increased during the past two decades and have become a leading global public health issue (Butchart, & Mikton, 2014; Lee, Cripps, Fitzharris, & Wings, 2013). Traumatic injuries are the ninth leading cause of death and disability globally, accounting for approximately 5.8 million injured persons per year (Altoijry, 2013; World Health Organization [WHO], 2014). Traumatic injury is also the leading cause of death for people under 45 years old (Sakran, Greer, Werlin, & McCunn, 2012; WHO, 2016). Worldwide epidemiological research has increased because of the death and disability caused by traumatic injuries both in high-income and developing countries (Jayaraman et al., 2014; Movaghar et al., 2013). Findings have resulted in timely traumatic injury prevention policies and programs (Anderson et al., 2012; Hoy et al., 2014; Stewart et al., 2016). However, research on prehospital emergency medical responses to traumatic injuries (before victims reach the emergency room) lag behind, hence the need for more prehospital trauma research.

Primary- and secondary-level strategies to reduce injury mortality and morbidity have also been the priority research agenda items for many developing countries (Butchart, & Mikton, 2014; Jayaraman et al., 2014; Lurie et al., 2013; Wolf, Gray, & Fazel, 2013). During the last 10 years, researchers and health ministries have focused on how to improve the in-hospital traumatic injury response programs (Burke et al., 2014; Liu, Liu, & Zhu, 2015; Pal et al., 2014; Skolnick et al., 2014). In-hospital trauma care research has been focused on traumatic injury equipment that can reduce deaths and disabilities. Examples include state of the art trauma centers (Liu et al., 2015; Pal et al.,

2014), with both traumatic spinal injury treatment and traumatic brain injury curative programs (Skolnick et al., 2014). Despite growing research interests in injury response, in-hospital initiatives, and injury prevention strategies, research has not extended to prehospital emergency care. Prehospital traumatic injury emergency response system care remains under-researched in developing countries (Aekka et al., 2015; Al-Shaqsi, 2010; Bakke et al., 2015; Burke et al., 2014).

The lack of research in prehospital traumatic injury responses includes developing countries like St. Lucia and other Caribbean countries (Barreto et al., 2012; Crooks, Hinds, Bissesarsingh, & Ivey, 2015; Sleet, Ederer, & Ballesteros, 2015). Research conducted in developed countries shows that an intricate emergency response system, designed with competent and efficient prehospital care providers, prevents many untimely deaths (Stewart De Ramirez et al., 2014). Evidence from the studies indicates that proficient responders minimize traumatic injury death and disability (Stewart De Ramirez et al., 2015). These responders must possess the requisite skills to triage properly, treat traumatic injuries efficiently, and transport the ill and injured to appropriate healthcare facilities (Al-Shaqsi, 2010; American Heart Foundation, 2015; Anderson et al., 2012; WHO, 2016).

The emergency response system, also called the emergency medical services (EMS) system, is an essential component of a nation's public health system (WHO, 2016). The prehospital system is comprised of the frontline team of caregivers who are an integral part of the larger EMS. Their primary roles and responsibilities include rapid response to injury scenes, stabilization of victims, and treatment of traumatic injuries on

scene (Sasson et al., 2011). Although the primary objectives are to save lives and minimize long-term disabilities, the provider's ultimate aim is to reduce morbidity and mortality rates ensuing from traumatic injuries (Aekka et al., 2015; Al-Shaqsi et al., 2010; Bakke et al., 2015).

Lately, many countries have placed greater reliance on their emergency response systems due to changes in their country's epidemiological profile (Bakke et al., 2015; WHO, 2016). Epidemiological transition during the last decade, in developing countries, noted an increase in noncommunicable diseases and traumatic injuries (Gosselin, Spiegel, Coughlin, & Zirkle, 2009; Movaghar et al., 2013). The latter is expected to surpass its current rank as the ninth leading cause of death globally to the leading cause of death by 2025 (Bakke et al., 2015; Pan American Health Organization [PAHO], 2014). Therefore, strengthening emergency response systems to effectively respond to traumatic injuries must become a global priority (WHO, 2016).

The priorities of the emergency response system during the 1990s-2000s were focused on effective cardiac arrest management and treatment. However, traumatic injury death and disability numbers continued to rise during the period (Aekka et al., 2015; Al-Shaqsi, 2010; Bakke et al., 2015). The training provided to emergency medical responders reflected this priority and have been concentrated on basic and advanced life support (American Heart Foundation, 2015; Bakke et al., 2015). Although these trainings are essential for the preservation of lives, the much needed traumatic injury response training component has been precluded. St. Lucia exemplified the consequences of an exclusive focus on emergency prehospital cardiac care where traumatic injury deaths rose

dramatically (Barreto et al., 2012: Crooks et al., 2015; Sleet et al., 2015). Few developing countries implemented training policies that included any prehospital trauma and advanced trauma life support (Aekka et al., 2015; Al-Shaqsi, 2010; Bakke et al., 2015). Although traumatic injury deaths and disabilities has increased in many Caribbean and other developing countries, the priority policy documents addressing prehospital traumatic injury response training is deficient (Bakke et al., 2015; Crooks et al., 2015; Moss, 2010; Sleet et al., 2015).

The WHO (2016) has made a global recommendation that both traumatic injury prevention strategies and training in traumatic injury prehospital responses should be priority agenda items for developing countries. This recommendation by the WHO positions this public health issue as important to policymakers and researchers alike. The PAHO/WHO (2008), ministries of health, and public health agencies have all concluded, from as early as 1999, that the Essential Public Health Functions (EPHF) are important tools to assess and monitor public health functions (Aluttis et al., 2014), including the strenghtening of responses to noncommunicable diseases and traumatic injuries. Ten EPHF are often used as best practice standards (Alwan, Puska, & Siddiqi, 2015) and are vital for reducing the impact of disasters. EPHF 11, described as "The reduction of the impact of emergencies and disasters on health," was collectively agreed on to reduce the effects of emergencies and disasters (PAHO/WHO, 2008, p. 4). Currently, this EPHF is used to address the growing concerns of re-emerging disease outbreaks such as Zika and Chikungunya, pandemic outbreaks like the 2009 H1N1, and trauma arising from mass

casualty incidents, such as the Haiti 2010 earthquake (Aluttis et al., 2014; Martin-Moreno, Harris, Jakubowski, & Kluge, 2016).

In this study, I explored how EPHF, conceptualized by the region's Ministries of Health, can be a part of the St. Lucia emergency response strategies to improve prehospital traumatic injury responses. I sought to determine how to best implement EPHF where they are not heavily used in emergency response strategies to improve the country's traumatic injury response program. I also assessed the barriers to implementation of the EPHF as well as how the island government can create interventions to faciliate them.

The impact of prehospital traumatic injury responses and other emergency medical response programs on the public health structure of Caribbean Islands is not widely researched, despite the research progress in hospital-based traumatic injury in the region and other developing countries (Butchart, & Mikton, 2014; Wolf et al., 2013). Noted also by the WHO/PAHO (2014) is the suggestion that evidence-based practices must be an integral component of injury response strategies, policies, and programs (Obermeyer et al., 2015). These strategies must address the effects of traumatic injury along the entire care continuum (Andreuccetti et al., 2012). This study assessed how EPHF can be incorporated into the emergency response system policies and programs for injury response. It is imperative to use EPHF to improve human resource capacity because improper lifting, moving, and transportation of trauma patients can increase risk or exacerbate disability secondary to traumatic injuries (Hoy et al., 2014). The need is even greater with regard to spinal injury management (Bakke et al., 2015). Improper

bleeding control and poor airway management are also significant contributors to the many cases of traumatic brain injuries (Liu et al., 2015). A more detailed discussion on traumatic injuries in developing countries, the strategies used for their, and the importance of the EPHF will be discussed in Chapter 2.

The primary focus of this chapter is the discussion on the growing issues associated with the rapid increases in traumatic injuries in the Caribbean and other developing countries. This chapter includes a description of the complications and financial burden that ensue from the absence of an effective emergency response system. Chapter 1 provides an overview of the research, outlining the significance of the study, the nature of the study, the problem statement, research questions and the study's theoretical basis. Key terms with definitions, the limitations delimitations, and social change implications are also included in Chapter 1.

Background of the Study

Previous studies have identified emergency response systems as essential components of the emergency medical service, and a vital entity for the reduction of injury mortalities and morbidities in the prehospital phase (Aekka et al., 2015; Gosselin, et al., 2009; Jayaraman et al., 2014). However, data have shown that the emergency response systems in many developing countries are among the most neglected components across the continuum of care (Aekka et al., 2015), which is an impediment to providing traumatic injury care (Sakran et al., 2012). Significant increases in injury-related deaths and morbidities have caused many ministries of health in developing countries to make the search for a solution their top agenda item (Al-Shaqsi, 2010; Sleet

et al., 2015). Crooks et al. (2015) indicated that a similar upward trend in traumatic injury death and disability exists in Caribbean countries and territories like St. Lucia. This continual increase in traumatic injury deaths and disabilities places considerable strain on the already burdened emergency response systems of many Caribbean countries (Kassebaum et al., 2016). The prevelance of traumatic injuries in the Caribbean is reflected in the disability-adjusted life years (DALY) seen among the working class of those countries (Kassebaum et al., 2016). The effects of injuries deplete the limited finances of the Ministries of Health, have negative residual effects on the Gross Domestic Income of many countries (Haagsma et al., 2015), and increases the number of patients in need of the small and static number of emergency room beds (Haagsma et al., 2015; Kassebaum et al., 2016; PAHO, 2014).

Although traumatic injury prevention measures were implemented and successfully lowered injury and death rates due to to trauma (Anderson et al., 2012; WHO, 2016), the WHO has requested that governments reinforce their emergency response mechanisms. Burke et al. (2014) pointed out that within developing countries, the emergency response systems are constrained in their provision of emergency care, including effective traumatic injury and needed to be supported.

Numerous researchers described these restraints as including but not limited to insufficient transportation (limited ambulances), inadequately equipped ambulances, poor dispatching communication systems, shortage of trauma emergency care medications, and limited equipment and supplies for basic and advanced life support trauma treatment (Aekka et al., 2015; Bakke et al., 2015; Cawich, Mitchell, Crandon, & Williams, 2007).

These listed constraints are further compounded by infrastructure challenges and a lack of available and affordable skilled emergency care providers (emergency medical technicians, paramedic or field nurses; Al-Shaqsi, 2010; Bakke et al., 2015; Burke et al., 2014). Researchers and global organizations continue to stress the need for developing countries, like St. Lucia, to strengthen their emergency response systems (Barreto et al., 2012; Crooks et al., 2015; Sleet et al., 2015). This need is emphasized by the findings that trauma and noncommunicable diseases are increasingly contributing to the global burden of disease in developing countries (Anderson et al., 2012; Haagsma et al., 2015; Kassebaum et al., 2016).

Eighty percent of all noncommunicable disease deaths in 2008 (29 million) occurred in low- and middle-income countries (Burke et al., 2014). Data also indicate that 16,000 young adults worldwide die every day due to injuries. Injuries account for over 15% of the global burden of disease (Burke et al., 2014; Kassebaum et al., 2016), with approximately 90% of these injuries occurring in the low- and middle-income countries like St. Lucia. Prehospital injury responses have changed the pattern of the emergency response system. For instance, cardiovascular and stroke responses were the primary reasons for emergency response use during the past two decades (Al-Shaqsi, 2010; Stewart De Ramirez et al., 2014). However, the WHO (2017) country profile data shows that the pattern of the emergency response systems for many developing countries, such as St. Lucia, changed from cardiac arrests to motor vehicle accidents and other trauma-related injuries. These patterns have changed the focus of health ministries toward the development of response capacities geared toward injury responses (Al-Shaqsi, 2010).

This study is significant because changes in the epidemiological profile of St. Lucia shows that road traffic injuries, unintentional injuries, self-harm, and interpersonal violence accounted for 39.1%, 36.9%, and 24%, respectively, of the country's total morbidity rate during 2013 (Global Health Healthgrove, 2017). The WHO (2016) recently urged developing countries like St. Lucia to strengthen their emergency response systems through policy development, human capital investment, and improved infrastructure. This study addresses the emergency response policy gaps by showing ways that the EPHF can be used as a policy framework for the emergency response system. Strengthening of the response systems must not only improve timely response to injuries and illnesses to the international gold standards of 3-8 minutes (Bakke et al., 2015), but involves training of competent response personnel (Al-Shaqsi, 2010). This training must be designed to support affordable national public health services. Resources must be readily available to licensed personnel, be they nurses, emergency technicians or paramedics, based on the use pattern of the geographic location similar to the EPHF mandate (Al-Shaqsi, 2010).

Strengthening emergency response systems must include policy development that fosters efficient prehospital patient assessment, a systematic evaluation procedure, and protocol for critical status EPHF 5 (Stewart De Ramirez et al., 2014). Williamson, Ramesh, and Grabinsky (2011) added to this criteria the need to advance the emergency responder training to include the administration of on-scene emergency management at accident sites and continued care during safe and timely patient transport. These recommendations for improvement of the emergency response system for the treatment

of injured patients as outlined by Al-Shaqsi (2010), WHO (2016), and Stewart De Ramirez et al. (2014) must include prioritizing the use of public health strategies such as training to address use patterns for ambulances, improvement in infrastrucure, including ambulances, and policies that address treatment and operational procedures. Stewart De Ramirez et al. emphasized that this development must involve complete governmental participation where the ministries customize their response systems based on the communities' priorities and use patterns. The WHO (2017), in their recommendation for improvement, pointed to the need for competent response teams to tackle issues such as injury-related deaths from motor vehicle accidents, poisoning, drowning, falls, burns, suicide, assault, and self-inflicted violence. Al-Shaqsi suggested that these injuries require high use of the emergency response system and necessitated improvements in the system. Similarly, the emergency response system must be effective and efficient to match both the high use and patient acuity.

Globally, motor vehicle accidents were responsible for more than 1.25 million deaths and 20-50 million nonfatal injuries in 2013; many of these deaths resulted from absent or slow-to-respond emergency response systems (WHO, 2017). The death toll increased in 2015. Motor vehicle accidents also increased in 2015, accounting for more than 1.3 million deaths globally (WHO, 2017). The demographic data for 2015 detailed that motor vehicle accident deaths accounted for 60% of total road fatalities among those15-45 years old, 76% of those deaths were men and boys, and motor vehicle accident-related deaths were the leading cause of death among those 15-29 years old (WHO, 2016). These figures reflect a need for improvement, especially for low- and

middle-income countries. Noncommunicable diseases and injuries have been neglected epidemics in the Caribbean since the 1990s (Perel, Casas, Ortiz, and Miranda, 2006). Regional noncommunicable diseases and injuries accounted for more than 69% of total deaths and 65% of DALY in the 1990s (Perel et al., 2006). Death and DALY rose in the 2000s to 73% and 76%, respectively (Perel et al., 2006). This trend is an indication that emergency response to injuries must be effective and efficient, as these deaths affect the working age group of society (WHO, 2016). In this study, I analyzed how EPHF can be used as strategies for strengthening the Island's emergency response systems, which aspects of EPHF can be used within the country's emergency response policies, and, if not used, which areas of EPHF can be employed in the response system policies and strategies. I also endeavored to assess, where EPHF were not entrenched in the emergency response strategies, how they could be implemented to improve the country's traumatic injury response program, what were the barriers to implementation, and how the St. Lucia Government can create interventions to implement the EPHF.

Problem Statement

Traumatic injuries are a leading cause of deaths and disabilities in developing countries, accounting for more than 5 million deaths each year (Crooks et al., 2015). It is a public health crisis, or a "neglected epidemic," for developing countries such as St. Lucia (Crooks et al., 2015). The deficiencies in the emergency response systems across the English-speaking Caribbean, including St. Lucia, are directly attributed to this neglected epidemic (Crooks et al., 2015; Sleet et al., 2015). In 1990, road traffic injuries in St. Lucia were the ninth leading cause of death, followed by interpersonal injuries in

10th place (St. Lucia Government, 2014). In 2013, interpersonal injuries became the fourth leading cause of death, whereas traffic injuries rose to seventh place. These increases showed that interpersonal injury deaths increased by over 60%, approximately 649 per 100,000 (Global Health Healthgrove, 2017; PAHO, 2016). The St. Lucia government has indicated that reducing mortalities and morbidities due to traumatic injuries is a public health priority (PAHO, 2016). Therefore, the Island's ability to respond to traumatic injuries depends on the efficiency and effectiveness of its emergency response systems. Additionally, the Island's public health system is based on EPHF, described as a set of fundamental activities that address several determinants of health (PAHO/WHO, 2008). The public health system in St. Lucia uses the EPHF conceptual framework to protect its population's health as well as a guide for treating diseases (PAHO/WHO, 2008).

A prehospital care system (the primary system for responding to an injured population and medical emergencies), is an essential component of any public health system (WHO, 2007). Countries are aligned with the mandate that a robust health sector would ensure the integration of EPHF into their emergency response systems as integral strategies for "improving, promoting, protecting and restoring the health of a population" (PAHO/WHO, 2008, pp. 3-5). English-speaking Caribbean countries such as St. Lucia must incorporate all the EPHF to achieve this desired effective and efficient public health system (PAHO/WHO, 2008; Vansell et al., 2015). Moss (2010) examined the legislative frameworks for emergency response systems within English-speaking Caribbean islands, including St. Lucia. Moss (2010) found that critical aspects of the EPHF such as policy

development, institutional capacity for public health functions and management, human resource development, and training in public health, were all absent (EPHF 3, 4, 5, 8, & 10). The PAHO/WHO (2008) also conducted reviews that identified the need for public health research to support impact reduction for health emergencies and disasters (EPHF 11). This impact reduction is crucial to the development of emergency response systems for the English-speaking Caribbean countries such as St. Lucia.

The application of the EPHF as an assessment tool is integral for the effective and efficient response to traumatic injuries (Sleet et al., 2015). Sleet et al. (2015) reported that traumatic injuries were the leading cause of deaths and disabilities among people 15-59 years old in the English-speaking Caribbean Islands, including St. Lucia. The rate of road traffic fatalities in the region grew from 14.75% per 100,000 in the 2000 to 17.68% per 100,000 in 2010 (Barreto et al., 2012; Sleet et al., 2015).

Specific EPHF provide guidance for an efficient and effective emergency response system, yet there is limited research and documented evidence on the effectiveness and efficiency of the emergency response system to respond to traumatic injuries in St. Lucia. Likewise, there is a lack of public health studies on effective policy framework that includes EPHF in emergency response systems. Limited study assesses whether EPHF inclusions in emergency response policies reduce traumatic injury-related deaths and disabilities in St. Lucia (WHO, 2013). This research seeks to fill this gap (see Aekka et al., 2015; see Sasson et al., 2011).

Purpose of the Study

The purpose of this study was to assess the emergency response systems in St. Lucia and determine the extent to which the St. Lucia response system incorporate pertinent EPHF (EPHF 3, 4, 5, 8, 10, & 11) at the national level. I evaluated how EPHF have been incorporated in the development of emergency response policies and strategies. Moss (2010), Vansell et al. (2015), and PAHO/WHO (2008), all indicated a need for the strengthening of emergency response systems through improvements in the development of effective emergency response policies. These researchers recommend an emergency response system built on both institutional capacity for the management and delivery of public health functions, and human resource capacity through public health training. In this study, I assessed which EPHF were currently in place to support effective and efficient emergency response to traumatic injuries. The perspectives of key officials were relied on to identify the factors that potentially influenced and impacted the implementation of EPHF in the St. Lucia emergency response systems. The Island's primary care, secondary care, epidemiology, and surveillance departments (components of a strong emergency/public health system), have made significant gains in strengthening core public health functions by building their EPHF. However, factors affecting the St. Lucia emergency response systems and its use of EPHF warrant further exploration (Moss, 2010; PAHO/WHO, 2008). A qualitative research method was used in this study.

Research Question

This study was conducted in St. Lucia, an English-speaking Caribbean territory. The public health systems of this country were developed on the foundation of EPHF. The following research questions were used to explore how the emergency response system can be strengthened for traumatic injury responses: -

1. How can the EPHF influence current emergency response policies and strategies to strengthen prehospital traumatic injury responses in St. Lucia?
2. How can components of the EPHF be used as a part of policy planning and program development to improve traumatic injury responses within the prehospital phase?
3. How does the use of EPHF as gold standard impact opportunities to develop and strengthen the St. Lucia emergency response systems workforce to improve traumatic injury responses?

Theoretical and Conceptual Framework

The theoretical framework guiding the research questions was the diffusion of innovation theory by E. M. Rogers. The theory was originally formulated 1962 and its fifth edition was updated in 2003 (Martin-Moreno et al, 2016). This theory helps explain how, over time, a proposed idea or product can gain impetus and spread throughout a specific population or social system (Martin-Moreno et al., 2016). Although EPHF are not new, assessment of their missing tenets and how they can be incorporated into the Island's emergency response systems was the innovation suggested to the stakeholders. The incorporation of these missing EPHF was communicated as new ideas using the

approach of the diffusion of innovation theory. I evaluated how the EPHF can improve responses to traumatic injuries in St. Lucia and how they can be diffused to influence change in the emergency response system policies of the Island. Key influencers were identified and their attitudes, opinions, and views obtained on how the EPHF can be successfully integrated into the St. Lucia public health strategic policies.

Diffusion of Innovations Theory

Diffusion of innovations theory (Rogers, 2003) is used to examine how new ideas are spread among groups of people (Gonzalez Block, Gonzalez Robledo, & Cuadra Hernandez, 2013). Not everyone within a social system accepts new ideas at the same time. For example, innovators, also referred to as the change agents, are often described as visionaries, opinion leaders, or the early majority (Rogers, 2003). Rogers (2003) categorized the rest of the population according to their eventual acceptance of the new ideas. The pragmatists accept after the early adopters therefore avoiding risk. The late majorities, people who accept change in response to peer pressure, are often called the conservatives, laggards, or skeptics, and are the last to accept the new idea. I assessed the stakeholders' perceptions and how their views are aligned with aspects of the EPHF. Chapter 2 includes how this theory is used to assess how stakeholders can be change agents to influence the development and adoption of elements of EPHF into the St. Lucia emergency response system.

The Essential Public Health Functions

The EPHF were used as the conceptual framework for this study. They are described as "'indispensable set of actions,' which are used to improve, promote, protect,

and restore the health of the population" (PAHO/WHO, 2008, pp. 3-5). This central set of collective actions were conceptualized by the governments of the Americas as a framework, then used as an assessment tool to monitor and improve the public health systems of their countries (PAHO/WHO, 2008). McCracken (2004) described the EPHF as "flexible and dynamic concepts," indicating that they identify not just with "what the public health system currently is, but what it should and could be" (pp. 2-3). Eleven EPHF have been defined within this framework, and evaluation methodology has been developed to use the framework to assess country-level public health systems. During 2001 and 2002, countries and territories of the Americas applied the EPHF assessment instrument as a tool to strengthen performance of health systems (PAHO/WHO, 2008). Chapter 2 will include an outline of how these countries were able to "identify the strengths and weaknesses of the public health system, and, based on the results, develop interventions designed to sustain good practices and bridge gaps" (PAHO/WHO, 2008, p. 3-5).

Strengthening the Emergency Response Systems

Forty-one countries and territories adopted Resolutions CD 42. R14 and CD42 42.R5 stemming from the 1999 Public Health in the Americas Initiative and the 2000 42nd Directing Council of PAHO. These countries used the 11 EPHF as a framework to look at strengths, weaknesses, and interventions needed to develop capacity and improve public health (PAHO/WHO, 2008). Each of the 41 countries and territories (including St. Lucia) identified areas in the EPHF that needed improvement. An assessment of emergency response systems in the English-speaking Caribbean in 2004 and 2010

identified policy development, institutional capacity for public health functions and management, research in public health, human resource development, and training in public health as areas that needed strengthening (Moss, 2010). The use of the EPHF framework is critical to assess the areas of public health and emergency response systems that can be improved to ensure effective traumatic injury responses.

Nature of the Study

This qualitative study was conducted in St. Lucia. Semistructured interviews were held with key informants: policy makers in government ministries of health, emergency room providers, and the fire services emergency response system. I employed criterion-based sampling of key informants to capture their perspectives on the status of the emergency response systems in St. Lucia. Knowledge and opinions regarding expected standards, efficiencies, and effectiveness of these emergency response systems were also assessed.

Creswell's (2013) guidelines for key informant interviews was used to guide the interview format. The guidelines are the ideal approach when experts in their subject areas are interviewed in a semistructured manner. Factors such as the opinions, knowledge, and perceptions of the St. Lucia emergency response system were assessed. Information was explored from these key experts on the EPHF that were adopted and applicable but unincluded EPHF, and how they could be integrated within the emergency response systems to improve traumatic injury responses.

Definitions of Terms

The following list provides the most relevant definition of terms to ensure understanding of this study. There may be other definitions; however, they may not represent the intended use for this study.

Advanced trauma life support training: Advanced traumatic care training and certification given to doctors to be proficient in providing advanced trauma care in the hospital setting. This training includes but is not limited to advanced airway management, breathing and ventilation management, spinal immobilization procedures, neurological assessment and hemorrhage control (i.e., peripheral and central line cannulations; Jayaraman et al., 2014).

Basic trauma life support training: Basic traumatic care training given to ambulance crews to be proficient in providing care in the field before victims reach the emergency room. This care is classified as vital prehospital intervention which includes airway management, spinal immobilization, splinting of injured extremities, hemorrhage control, and oxygen management (Reynolds et al., 2017).

Disabilities: A common reference used to describe any short- or long-term health loss, such as paralysis (Vos et al., 2012).

Emergency response system: The health care response program designed to respond to, treat, and transport ill and injured patients. It is often used in the public health setting as the system that responds to disaster events. This system is often used interchangably with emergency medical services and prehospital systems (Pal et al., 2014).

Emergency Medical Services (EMS): The emergency care system responsible for caring for the sick and injured. The EMS care continuum consists of prehospital care, emergency room care, definitive diagnostic care (X-ray, CT Scan MRI etc.), and emergency surgery rehabilitation (McCoy et al., 2013).

Essential Public Health Functions (EPHF): A set of actions used to improve, promote, protect, and restore the health of the population (Hacker & Walker 2013).

Injury prevention strategies: Preventive measures that are conceptualized, discussed, tabled in parliament, and then implemented to prevent traumatic injuries and deaths (Movaghar et al., 2013).

Institutional capacity: Aims to improve the quality and quantity of public health institutions, services, human resources, facilities, equipment and supplies through plans, programs and policy direction (Uzochukwu et al., 2016).

Prevalence of traumatic injuries: The proportion of traumatic injury cases in a specific population at a given time (Lee et al., 2013).

Prehospital services: The first component of the EMS. Health care providers render early care to critically ill and injured patients in the field (Bahrami et al., 2011).

Prehospital trauma life support: Basic and advanced traumatic care given in the field before victims reach the emergency room. Training is similar to advanced trauma life support but is modified for paramedics. This care is classified as vital prehospital intervention which includes airway management, spinal immobilization, splinting of injured extremities, hemorrhage control, and oxygen management (Reynolds et al., 2017)

Public health services: Defined as the science and art of preventing disease, prolonging life and promoting health using interventions carried out in society with health as the primary goal (PAHO, 2007).

Emergency response policy: Government approved procedures, plans and programs that govern ambulance response to injury and illness (Bahrami et al., 2011).

Traumatic injury morbidity: Relates to sickness of an individual resulting from trauma (Vos et al., 2012).

Traumatic injury mortality: Refers to death of an individual resulting from trauma (Vos et al., 2012).

Assumptions

The study of how to strenghten emergency response systems to effectively respond to traumatic injury required basic assumptions. One assumption was that EPHF concepts were well known and emergency responders, emergency room healthcare providers, policymakers, and disaster management specialists understood their relevance to public health services. Another assumption was that these public health service policymakers and political directorate wanted to see improvements in traumatic injury responses at the prehospital level and were willing to incorperate any missing EPHF concepts into emergency response system policy documents. The most significant assumption was that the assessment strategies, monitoring, and restructuring of public health services through the EPHF concepts (WHO/PAHO, 2008) were still relevant and applicable to the emergency response system (a part of the public health services).

Scope and Delimitations

The issues highlighted in EPHF 7 (evaluation and promotion of equitable access to necessary health services) were not assessed in this study. There is no data supporting issues of equitable access concerns in St. Lucia. The territory operates their ambulance services through a universal health care system, hence access to health care is not presumed to be a public health concern (PAHO, 2014).

Limitations

The EPHF encompasses 11 tenets. Some concepts were not applicable to the emergency response systems. Although aspects of EPHF are useful tools for the emergency response systems, EPHF 1, monitoring, evaluation, and analysis of health status, and EPHF 2, surveillance, research, and control of the risks and threats to public health, are not primary roles and responsibilities of the response systems. EPHF 9, quality assurance in personal and population-based health services, encompasses an area that extends beyond the scope of the emergency response system.

Significance

This research is important, as it contributes to the body of evidence on how emergency response systems within the Caribbean region can be strengthened by incorporating relevant EPHF. These findings can contribute as evidence to inform policy development inclusive of EPHF to strengthen emergency response systems in St. Lucia. The findings can contribute to the development of the public health workforce necessary in the English-speaking Caribbean for efficient emergency response systems. This will involve assessing the availability of the appropriate resources (in most cases only one

ambulance is available in small countries). These findings can be used to develop specific response protocols to train firefighters, community emergency response teams, and public health nurses, to respond to injury pertinent to geographic location. The EPHF were previously used to assess public health nurses, doctors, and inspectors during 2001-2008 (PAHO/WHO, 2008). However, the emergency response system was not a part of this assessment. It is my hope that for the next WHO EPHF Review, the study findings may contribute to future development of a regional assessment tool specific to the English-speaking Caribbean. The tool will assess the quality of emergency response systems within the ambit of the EPHF framework.

Social Change Implications

Surveillance data indicated that prehospital injury responses in many parts of the Caribbean are lacking or nonexistent (WHO, 2013). In several Caribbean countries, there are no structured or well-organized ambulance services as seen in many developed countries. For the most part, victims are taken from the accident site without proper spinal precautions and in the first available vehicle, which often results in paralysis, other long-term morbidities, and even death. Many of these good Samaritans are ignorant of the dangers of improper and unnecessary movement of an injured person. The social change implications expected from this study involve the development of injury response protocols to reduce paralysis from the improper movement and transportation of motor vehicle accident victims. It will include the development of health promotion and/or health education programs to sensitize citizens to the consequences of improper moving and transporting of trauma victims. These protocols and strategies will aide in the

reduction of injury morbidities and deaths. Country-specific profile data also suggested that underdeveloped and/or missing emergency response systems in some Caribbean countries stemmed from resource constraints (PAHO/WHO, 2008). Social change implications can inform the development of country-specific emergency response systems, tailored to fit the needs of the target population. The initial system could be built with existing resources. Most countries have utility vehicles available, which could be repurposed and staffed with nurses trained in injury response protocols developed from the findings of the study.

Summary

Traumatic injuries are a leading cause of deaths and disabilities in developing countries like St. Lucia (Crooks et al., 2015), creating significant strain on the limited human and financial resources of the ministries of health. Crooks et al. (2015) concluded that traumatic injuries are a neglected epidemic for developing countries such as St. Lucia, and unless strategies for improvements are implemented, this epidemic will continue for another decade. Weaknesses in the emergency response systems such as inadequate and poorly stocked ambulances, lack of centralized emergency medical dispatch, and deficiencies in training across the English-speaking Caribbean region, are some of the factors that are attributed to this neglected epidemic (Crooks et al., 2015; Sleet et al., 2015).

The application of EPHF as an assessment tool in the public health services is integral to an effective and efficient response to traumatic injuries, which must be recognized as an important element of the public health services (Sleet et al., 2015).

Barreto et al. (2012) pointed out that most traumatic injury deaths occur within the prehospital phase; therefore, improvement of this phase is significant. The health ministries of the Caribbean must recognize the value of prehospital care and implement stategies to improve traumatic responses. I assessed the missing tenets of EPHF and how these principles can be incorporated into the Island's emergency response systems. An evaluation of the emergency response systems to determine the extent to which they incorporate pertinent EPHF (3, 4, 5, 8, 10 & 11), at the national level, was the primary aim for this study.

Surveillance data indicated that prehospital injury responses in many parts of the Caribbean are lacking or nonexistent (WHO, 2013). In many countries there are no structures ambulance responses and the injured are moved from the accident site without proper spinal precaution and transported in the first vehicle available. The social change implications expected from this study will involve the development of injury response protocols and campaign messages to reduce paralysis from improper movements of traumatic injury patients. This chapter included an overview of the study and provided insights to the theoretical base and conceptual framework that were used. Chapter 2 will include a review of current literature on traumatic injury responses in developing countries including the English-speaking Caribbean Islands such as St. Lucia. The methodology for the study and how data were collected and analyzed will be presented in Chapter 3.

Chapter 2: Literature Review

Introduction

In this chapter, I review public health and social sciences literature. The review includes scholarly opinions supporting the need for improvement in prehospital traumatic injury responses in developing countries such as St. Lucia and other areas of the English-speaking Caribbean. The literature includes strategies that can be used to strengthen emergency response systems for efficient traumatic injury responses. However, research needs to improve regarding injury responses by the emergency response systems of developing countries (Callese et al., 2015; Williamson et al., 2011). The recommendations throughout the literature indicate that developing countries like St. Lucia need to use research evidence as best practice strategies to improve their injury response systems (Callese et al., 2015; Williamson et al., 2011).

Researchers have identified emergency response strategies used in first-world, developed countries that have helped to reduce the injury mortality and morbidity rates (Borgohain & Khonglah, 2013; Williamson et al., 2011). Studies have been conducted on emergency response systems appointed with well-trained emergency responders, ambulances outfitted with the latest technology, and short response times to transport patients to multifaceted trauma centers (Bakke et al., 2015). But few studies have been conducted in developing countries on assessing and designing prehospital interventions for response systems with inadequate resources, untrained responders, and long response times (Aekka et al., 2015; Bakke et al., 2015; Cawich et al., 2007).

In this chapter, I will begin by expounding on the search criteria used. The conceptual and theoretical frameworks was explored to identify the constructs employed by previous authors and assess their applications to prehospital injury responses in St Lucia and other developing countries. A synthesis of the literature relevant to traumatic injury responses for emergency response systems will then be presented. A combination of the strategies used to strengthen prehospital injury responses, with a focus on developing countries within the Caribbean, will also be presented. This chapter also includes the methodologies and research designs used in similar studies and how they support this qualitative study.

Search Criteria

The literature review inquiry was conducted using current peer-reviewed studies on traumatic injury responses in developing countries. Minimal references were cited for traumatic injury response strategies used by emergency response systems of developed countries. The search engines included Google Scholar, Medline, EBSCO, CINAHL Plus, Science Direct, ProQuest Nursing and Allied Halth Sources, ProQuest Health and Medical Collection, PubMed, and Science Citation Index Expanded. All included literature is full-text. Keywords and phrases used in the search terms include *emergency response system, emergency medical services, injury mortality and morbidity, traumatic injury rates, traumatic injuries in the Caribbean, ambulance services in the Caribbean, traumatic injuries in developing countries, injury preventative strategies, public health strategies, diffusion of innovation, strategies for improving prehospital responses, implementation barriers to prehospital system improvement,* and *essential public health*

functions. I selected only articles published within a 5-year period of this current study, containing peer-reviewed arguments and conclusive ideas on how to curtail injury responses, reduce injury mortality, and improve emergency response systems. The Walden Literature Review Matrix was used to organize articles in a logical format. The review matrix guided the review process, as it shows the research questions studied, the methodologies and research designs used by other authors, as well as the types of analyses conducted. The findings and recommendations of previous research on traumatic injury responses were organized in a matrix to help this review.

Conceptual Framework

There are a limited amount of studies on emergency response systems in the Caribbean. My search yielded a small number of articles on prehospital traumatic injury responses within the Caribbean. This lack of scientific evidence is recognized as a major challenge (Thind et al., 2015). Hence, I had challenges finding peer reviews that included the EPHF to support prehospital care.

Essential Public Health Functions

The EPHF are widely used in the Caribbean to define the remit of public health (Martin-Moreno et al., 2016). Public health professionals and academics defined the EPHF as the evaluation of the functions, services, and operations provided at the local and national levels (Martin-Moreno el al., 2016). Martin-Moreno el al. (2016) conducted a meta-analysis, reviewing over 100 articles across all continents. They compared the EPHF and Essential Public Health Services globally, and discovered that in 1999, the Latin American Center for Health Research (the Caribbean and Latin American Regional

Research Interest Group), in partnership with the PAHO/WHO and the Centers for Disease Control and Prevention, conceptualized what was known as "The Public Health in the Americas Initiative." Forty-one countries in the Americas committed to work with the PAHO/WHO. Collaboratively, leaders in the region designed 10 concepts that were essential to strengthening their public health systems (Gonzalez Block et al., 2013). This working document was designed to streamline public health activities such as vaccination and other essential roles for public health nurses, as well as vector control and food safety for the public health inspectors.

Both Martin-Moreno el al. (2016) and Gonzalez Block et al. (2013) discovered that during the 1990s, the region embarked on what was called a health reform agenda. Both of their studies revealed that public health and the roles and functions of public health were missing from this reform agenda, hence the need to strengthen the region's public health systems. Gonzalez Block et al., in an online survey with 83 organizations across the Caribbean, concluded that primary care services that have the mandate for emergency services at the community level in most Caribbean countries, are need modernized roles and responsibilities in the public health system. Gonzalez Block et al. suggested that many of the countries' leaders did not use research evidence to design policies for public health or to combat noninfectious diseases. Gonzalez Block et al.'s results indicate that the EPHF that addressed communicable diseases, such as surveillances and monitoring, received good performance ratings. The EPHF, however, that would address trauma injury patterns, treatments and responses from evidence base findings were lacking.

Caribbean Emergency Response System and the EPHF

EPHF allow for defining roles and functions. The 41 countries in the Americas working with the WHO/PAHO in the design of the EPHF concepts as a framework also defined public health job descriptions. However, the prehospital roles and functions as a part of EPHF and how they fit within the public health arena were not defined. Policymakers and ministers of governments did not seek to use EPHF to clarify the regional emergency response systems, and their job descriptions intertwined with the local level public health systems (Williamson et al., 2011). Although this conceptual framework depicts the professional and academic definitions of the public health remit with clearer job descriptions for the public health workforce, the emergency response systems have been neglected entities. Throughout the Caribbean and many countries of the Americas, the emergency response systems have been and are still operating under primary care systems as essential public health structures of the health services but without policy and protocol direction (Martin-Moreno el al., 2016).

Williamson et al. (2011) reviewed prehospital systems, advancements made over the past decade, trauma care, and the reduction of public health morbidity and mortality rates. The results were that prehospital care for traumatic injury patients was lacking and in need of public health reform. The researchers found discrepancies in the training of emergency response providers, the need for advancement in technology, and restructuring of the prehospital services for alignment with essential public health functions that can appropriately respond to traumatic injuries.

The EPHF as Caribbean Public Health Gold Standards

Martin-Moreno et al. (2016) defined public health functions as essential for the general reduction of morbidity and mortality. They indicated that during 2001 and 2008, 41 countries within the Caribbean and Latin America fully embraced EPHF, first as a conceptual framework to operationally define public health functions for the region. Martin-Moreno et al. suggested that officials in the region felt that one additional function should be added to their 10 essential functions. This function namely; *the reduction of the impact of emergencies and disasters on health*, was added as the 11th essential function (see Table 1), but this function only includes morbidity from traumatic injuries sustained during disasters. The day-to-day traumatic injuries that prehospital services respond to were not conceptualized in any policy, injury response strategy, or program within this framework.

Table 1.

The Caribbean 11 Essential Public Health Functions

EPHF 1	Monitoring, evaluation, and analysis of health status
EPHF 2	Surveillance, research, and control of the risks and threats to public health
EPHF 3	Health promotion
EPHF 4	Social participation in health
EPHF 5	Development of policies and institutional capacity for public health planning and management
EPHF 6	Strengthening of public health regulation and enforcement capacity
EPHF 7	Evaluation and promotion of equitable access to necessary health services
EPHF 8	Human resource development and training in public health
EPHF 9	Quality assurance in personal and population-based health services
EPHF 10	Research in public health
EPHF 11	Reduction of the impact of emergencies and disasters on health.

Note. PAHO/WHO, 2008 Health Systems Strengthening in Latin America and the Caribbean

Gonzalez Block et al. (2013) analyzed how countries in Central America and one Caribbean island performed EPHF. They indicated that the Caribbean and Central American countries used EPHF as an assessment template (see Figure 1). Holder (2007)

also reviewed the region and the Eastern Caribbean's use of EPHF to strenghten the public health system. Holder and Gonzalez Block et al. found that many of the English-speaking Caribbean countries used EPHF as an assessment tool only but failed to move to the second stage of implementation. Both study results showed that many of the English-speaking Caribbean countries did not implement EPHF as a tool to build their public health system until 2006-2007. In the results of the PAHO/WHO assessment, Holder found that there was a need for the ministries of health to reprioritize EPHF. According to Holder, the EPHF must be integral in the planning of health priorities used as a part of strategic development and reform of the health sector according to use profiles, which Gonzalez Block et al. also concluded in their study.

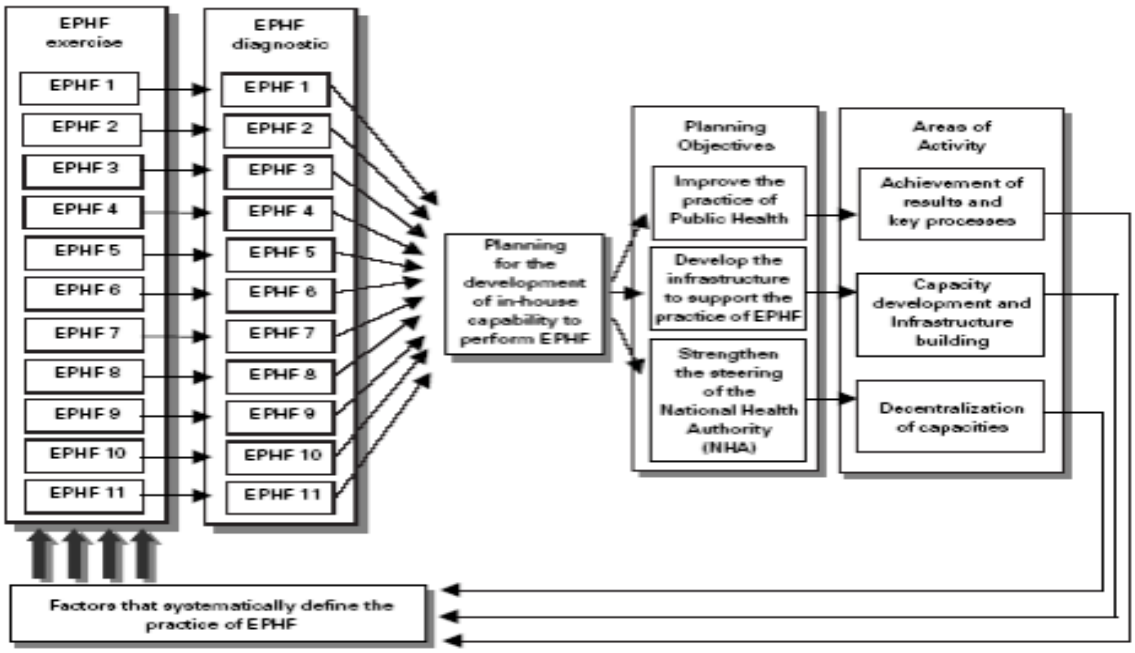

Figure 1. Assessment templates of EPHF, planning, and intervention. This figure shows the use of the EPHF as an assessment exercise template used in the Caribbean and Latin America (PAHO/WHO, 2008, p. 5).

Martin-Moreno et al. (2016) suggested that the Caribbean region still lacked in the implementation of strategies from EPHF. These authors reinforced Holder's (2007) views of the region, indicating that many countries needed to strenghten their public health systems by moving from the assessment stage to a policy enforcement stage. Despite the limitations to find evidence to support the effectiveness of EPHF, Martin-Moreno et al. indicated that they served as assessment and monitoring tools for public health services, including trauma responses by over 100 countries globally for the last 20 years. Martin-Moreno et al. recommended to follow the assessment of how to strengthen public health responses with policy improvements. They suggested that for there to be success in the response systems, there must be shared ownership between local and national stakeholders, public participation in the policy cycle from the onset, and the availability of experts to guide the assessment and implementation reform.

The assessment template that was used in the surveyed countries to measure the strengths and weakness in the public health systems, and to evaluate the performance of the overall public health functions and operations. Martin-Moreno et al. (2016) also showed that the ministries of health and health authorities of the countries designed remedial strategies to strengthen their public health roles and functions after reviewing the assessment results. This template is now the acceptable regional measurement for public health (Gonzalez Block et al., 2013; Martin-Moreno et al., 2016). In reviewing the literature surrounding the assessment tools used; however, no provision was referenced for prehospital care. The assessment tool helped to review and provide recommendations for public health strategies such as health promotion, injury prevention, and even health

emergency management (core programs such as vector control and response to pandemics), but did not factor the emergency response system as a part of these public health improvement programs. However, Aluttis et al. (2014) indicated that emergency response systems can be considered a part of this EPHF framework. They showed that research is poor on how to strengthen traumatic injury responses.

Improving Injury Responses Through the Use of EPHF

Aluttis et al. (2014) reviewed the EPHF model used in the Caribbean. They indicated that the PAHO/WHO EPHF conceptual framework model, in addition to its function as an assessment tool, was designed as a monitoring tool, and its results are often used as a redevelopment strategy for strengthening public health in a holistic approach. Aluttis et al.'s results indicate that this strengthening of public health services, like the emergency response system, must be achieved through policy framework. The strengthening of public health systems must include prehospital services and a policy framework guided by a bottom-up approach, starting with the worker, the health planners, and then a strategic policy tabled in the country's parliament (Aluttis et al., 2014; Williamson et al., 2011). Aluttis et al.'s results suggest that EPHF can be used to reform, redevelop, and redesign public health functions through a holistic approach. Aluttis et al. found that the Caribbean region used the PAHO/WHO EPHF similar to how the Europeans did their essential public health services to reform public health functions in their respective regions, including the ambulance services in Europe.

One key area of public health service strengthening that both the European and Caribbean models completed was the reform of the emergency response and prevention

targeting noncommunicable diseases. Williamson et al. (2011) identified a need for strong political will that prioritizes capacity building, infrastructure development and strengthening, and building leadership capacity as key to the strenghting of emergency response system in developed countries. Aluttis et al. alluded to a conceptual framework targeted toward specific public health areas such as emergency responses and/or prevention, and control of noncommunicable diseases. However, this aspect of emergency response did not give any consideration to the prehospital system. Both Williamson et al. and Aluttis et al. indicated that the policy development framework outlined in the EPHF only considered emergency response suitable to control and reduce the outbreak of pandemic emergencies and community responses to other communicable disease outbreaks. The authors stated that with traumatic injuries being the ninth leading cause of deaths and disabilities affecting mostly the working class of society, the EPHF must be used in designing traumatic injury response policies, programs, and strategies.

The Diffusion of Innovation Theory

Roger's (2003) diffusion of innovation theory is the theoretical framework that guides this study. This theory was used to understand the relevance of EPHF and how they can be used to improve prehospital traumatic injury responses. This theory was used to guide the research questions as they seek to incorporate missing and/or inadequate functions, to strengthen the St. Lucia Emergency Response Systems. Any EPHF that were found applicable to prehospital traumatic injury response improvements, that were flagged by the key informants, were subjected to ministerial policy stakeholder's assessment for their inclusion in the policy framework.

Zhang, Yu, Yan, and Spil (2015), illustrated that the process of using diffusion of innovation in policy development for any new idea would entail communicating that new idea or process, and in some instances a new technology that is perceived as unfamiliar, to a segment of a population. In this study, this new idea, process, or technology, that is considered important to stimulate change, is the reform in prehospital policy direction through the use of the EPHF. Cadarettea et al. (2017) uses a comparative case study analysis of the diffusion of innovation to communicate drug safety and effectiveness research (Pharmacoepidemiology). They explained the importance of post-marketing drug safety and effective research and recommended that in using the diffusion of innovation theory, four attributes namely (1) Innovation Attributes, (2) Communication Channels, (3) Time, and (4) Social System, should be considered. The authors stressed that these four attributes must be present for the theory to be effective. They further suggested that the new idea/innovation must have an uptake, a buy-in from stakeholders (sold to them using effective communication channels). Cadarettea et al. (2017) went on to explain that the stakeholders often called the adopters, accepted the innovations through stages (innovators, early adopters, early majority, late majority, and laggards), using effective social systems. In this research, the St. Lucia emergency system policymakers will have to be convinced that adopting the EPHFs will be beneficial to the prehospital trauma response policy. By in of these policy makers will be essential before adopting the EPHFs is possible. Cadarettea et al. (2017) literature review on the diffusion of innovation on drug safety and effective research analyzed over 5,000 pieces of literature that used diffusion of innovation. These authors concluded that for stakeholder

buy-in to this new idea and for changes to occur, there must be a clear description of the innovation (stakeholders must understand and recognize the innovation). Cadarettea et al. (2017) stated that the results perceived by the stakeholders must be comparable and produced different results from the status quo; the data must be available to show that the innovative strategy would not be burdensome or costlier to the stakeholders. Cadarettea et al. (2017) concluded that this innovation or idea must be articulated to the stakeholder early in the process and a methodology of the change process communicated clearly and understood by all parties. Zhang et al. (2015) indicated that Rogers (2003) theory suggested that for such changes to take place with any new intervention, a small group of key stakeholders, the innovators, has to first buy into this new idea or process. The innovators or key stakeholders then convince other important stakeholders.

Diffusion of innovation is widely used in healthcare to understand the adoption process of any innovation, as well as the pace of adoption by health practitioners, (Archibald & Clark, 2014). Five (5) important characteristics are essential to the rate or speed at which healthcare providers, (in this study the health policy advisors), adopt an innovation (Archibald & Clark, 2014). These five characteristics - "relative advantages, compatibility, complexity, trialability, and observability," are described by Rogers (2003) as essential to influencing the pace at which adoption of innovation will occur. According to Archibald and Clark (2014), Rogers (1962) and (2003), "relative advantage" is vital to how one views the importance of the proposed innovation. Sugarhood, Wherton, Procter, Hinder, and Greenhalgh (2014) indicated that relative advantage involves considering how such innovation or new process will improve the quality of life of the population of

study. They suggested that for diffusion of these new processes to take place the user must see cost savings linked to the process; the operability of the new process must give peace of mind and should avoid the current stresses. The proposed EPHF as new innovations to the healthcare policymakers of St. Lucia and how to incorporate those targeted EPHF for the improvement of prehospital traumatic responses, must be seen as relevant and important and will make a significant improvement to the emergency response system. The EPHF must be seen as more relevant than the current strategies being employed by the essential services. As a new process, EPHF must exhibit relative advantage as better, more applicable, and more relevant than that currently in place. Archibald and Clark (2014) suggested that if there is any indication that the existing status quo will persist, then the relative advantage will be lost and there will be a strong resistance to change.

Sugarhood et al. (2014) in looking at telecare for geriatric patients and the factors that influence adoption, implementation, and continued use of innovation, suggested that the characteristic "compatibility" often described how healthcare providers value consistency of innovation with existing values. There is always a resistance to change; however, Archibald and Clark (2014) outlined that innovation must be consistent with existing values as well as built on past experiences. Sugarhood et al. (2014) indicated that if new technology does not enhance and improve existing values, then healthcare providers will have strong resistance to change. Emergency response system operators must not see adoption of any of the proposed EPHF as an alteration or adjustment to daily response actions. Archibald and Clark indicated that Rogers (2003) diffusion of

innovation suggested that new ideas, new process, or innovation should not come with complexity or difficulty to understand or learn.

Doyle, Garrett, and Currie (2013) supported the views of Archibald and Clark (2014) that the diffusion of innovation theory is often used in the adoption of new clinical ideas, procedures, or clinical technology. Their study looked at integrating mobile devices into nursing curricula and their findings suggested that innovation or new ideas must be presented to meet the needs of all levels of the adopters. Doyle et al. (2013) in their meta-analysis study looked at fifty-two (52) research studies and indicated that challenges of having adopters accept the new innovation or new ideas can be overcome by ensuring a well laid out strategic plan using the four (4) attributes outlined by Cadarettea et al. (2017). Doyle et al. (2013) study outlined that the characteristics of the innovation must facilitate an adoption process. Doyle et al. (2013) proposed that influential promotion of the new idea or process can have significant implications for the progress of acceptance of the idea, and this new idea or process must be compatible with existing values.

Archibald and Clark (2014) recommended that for any healthcare provider to accept change the innovation should be accessible and easy to implement in incremental trial stages (trialability), and the results should be noticeable (observability). Sugarhood et al. (2014) indicated that for a small group of the population to accept change, that small group will first seek an opportunity to try the new process before committing to adopting any stage of it. Archibald and Clark, as well as Sugarhood et al. (2014), agreed

that the change process began after the trialability is observed and satisfying benefits acknowledged.

Prehospital Traumatic Injury Responses in Developing Countries

During the last decades prehospital traumatic responses in third world developing countries have been classified as a neglected public health epidemic. An estimated 90% of all trauma related deaths occurred in developing countries. Data have revealed that 80% of these deaths occurred within the prehospital setting, before arrival in hospital (Callese et al., 2015; Crooks et al., 2015; Elbashir et al., 2014). It is estimated that for many developing countries an estimated 45% of traumatic injury deaths and 35% of disability-adjusted life years, can be ameliorated with the development of effective and efficient emergency response systems (Mould-Millman et al., 2014). Mould-Millman et al. (2014) used a technical working group to define out-of-hospital emergency care for trauma and acute care in Africa. The consensus of the working group across the spectrum of African Countries discussed the roles, function of out-of-hospital care (emergency response systems), and defined the system as a holistic emergency care provided outside of healthcare facility. Mould-Millman et al. (2014) explained that the proposal to address many of these disability and mortality rates by the consortium of healthcare policymakers in their final draft document was for competent teams of healthcare providers capable of rendering public health services. The consortium of healthcare policymakers in their final draft document listed public health services such as addressing acute illnesses, traumatic injuries, rapid response to mass casualty incidences, as well as providing community public health care and promotion (Mould-Millman et al., 2014). Mould-

Millman et al. (2014) explained that these public health services must be provided at the lay rescuers and prehospital care level in order to reduce morbidity and mortality.

Not much credence is given to trauma care in the prehospital setting in developing countries, hence the mortality and morbidity of total deaths from traumatic injuries remain a significant challenge (Elbashir et al., 2014). The data has shown that prehospital responses to traumatic injuries in many developing countries are of sub-standard quality and lack appropriate treatment protocols (Crooks et al., 2015; Elbashir et al., 2014; Sriram et al., 2015). Elbashir et al. (2014), in a qualitative study in Sudan, indicated that Sudan is ranked thirteenth globally in the incidence of motor vehicle accidents with approximately 1,827 road traffic deaths and 13,000 injuries in 2008 alone. Elbashir et al. (2014) pointed out that with this injury pattern as well as deaths and disabilities from violence in Sudan prehospital care must be a priority. However, Elbashir et al. (2014) research group consisting of Sudanese and US researchers assessed the prehospital services between the periods 2008 -2014 and found that the service lacked appropriately trained response personnel, adequate policy directive, treatment protocols, as well as prehospital research services. Within rural Bangladesh, drowning is the leading cause of death between the ages of 1-17, and a similar lack of prehospital services was noted (Rahman, et al., 2015). In an action research looking at ways to improve prehospital emergency services to curtail the spiraling drowning public health crisis, Rahman, et al. (2015) found that the incidence of drowning was approximately 30 persons per 100,000 with more than 90% denied emergency care in the field. Their action research looked at improvement of prehospital care through community lay rescuers.

Sriram et al. (2015) concluded that many of the prehospital emergency responders lacked suitable training to respond effectively and efficiently to traumatic injuries. Sriram et al. (2015) used a cross-sectional comparative study, conducting three (3) case studies of emergency medical service models in the rural and urban areas of Pakistan and India. These studies analyzed emerging themes that focused on EMS health system building blocks (factors that influenced effective emergency responses), as well as crosscutting issues not directly related to any health service building block. One major EMS building block Sriram et al. (2015) discussed at length was the ambulance utilization pattern. The pattern was identified as inter-facilities transfers - emergency responses to traumatic injuries in the urban setting. Other building blocks that Sriram et al. (2015) discussed were financing of the EMS, leadership and management shortages, capacity building for staffing, and data collections such as informatics. One recommendation made by Sriram et al. (2015) was for governments of developing countries that professed the reduction of injury mortality and morbidity rates as their public health priority, to pay closer attention to policy development and implementation to manage traumatic injury responses and other emergency calls. Sriram et al. (2015) as well as Elbashir et al. (2014) found in both studies that policies were designed to reduce mortality and morbidity rates through primary and secondary preventions. The primary prevention strategies often worked, as with the imposition of helmet and seatbelt laws. Nonetheless, when an accident does occur, prehospital response must be effective and efficient (Sriram et al., 2015)

In reviewing emergency response systems (prehospital services) in South Asia, Pakistan and India, Sriram et al. (2015) stressed that there is an urgent need to strengthen

prehospital traumatic injury responses in many developing countries across the Asian region. The researchers call for an urgent need to strengthen prehospital traumatic injury responses in many developing countries was supported by Thind et al. (2015) findings. In an assessment of prehospital and emergency care responses in low- and middle-income countries, Thind et al. (2015) revealed that an estimated 24.3 million deaths (1,023 million DALYs, or 932 million years of life lost YLL), are attributed to premature mortality which might have be prevented with effective emergency response systems. Thind et al. (2015) as well as Sriram et al. (2015) described the trauma from motor vehicle accidents, gunshots, and stab wounds, as well as other blunt trauma, as senseless and avoidable. Sriram et al. (2015) stressed that despite the efforts and gains achieved through preventative measures and public health strategies, the death and disability rates continued to increase. Elbashir et al. (2014) and Sriram et al. (2015) lamented that prehospital traumatic injury responses are either inadequate or non-existent and in need of urgent strengthening in many developing countries. Both researches indicated that prehospital traumatic injury response must be given top priority, as, apart from its effects on mortality and mobility rates, it portends significant impact on countries GDP, depletes ministries of health budgets and impacted on population growth.

Stewart de Ramirez et al. (2014) in describing prehospital traumatic injury procedures carried out by a rural Uganda emergency response system, cited a protocol the government designed to prevent untimely and avoidable deaths. This Uganda system was developed after evidence revealed that growing mortality and morbidity rates from traumatic injuries in low- and middle-income countries (LMICs) had strong correlations

to sub-standard emergency response systems (Stewart de Ramirez et al., 2014). In this retrospective case review Stewart de Ramirez et al. (2014) described a system that required strengthening of the Emergency Medical Services scope of practice, a system lacking in both standards of training, treatment protocols, formal training curriculum and certification of responders. Similar descriptions of sub-standard emergency response systems and compounded prehospital traumatic injury responses were identified in many developing countries, according to Stewart de Ramirez et al. (2014); Sriram et al. (2015); and Elbashir et al. (2014).

Developing countries are slowly appreciating the knowledge and concept of EMS and the spectrum of care needed for the reduction of mortality and morbidity rates (Reynolds et al., 2017). Within the last two (2) decades developing countries started to understand that prehospital care (including law persons providing effective initial care) are integral to the successful discharge of patients without disabilities (Mulwafu et al., 2017). In a literature review Meta-analysis study of traumatic injuries in Malawi, Mulwafu et al. (2017) found that traumatic injuries are one of the a leading cause of deaths and disabilities in young adults. These disabilities were classified as preventable and singled-out the lack of an efficient response system as a contributing factor to the high disability rates. In a technical review of traumatic care in Africa, Mock, Quansa, Kobusingye, and Goosen (2014) did a technical review for the World Health Organization which looked at traumatic injuries across the continent. Mock et al. (2014) in this review elaborated on the views shared by many researchers (Mulwafu et al., 2017; Reynolds et al., 2017; WHO 2017) that for any patient with traumatic injuries to

successfully transfer from emergency room to definitive care, then discharge with holistic health free from short- and long-term disabilities, effective prehospital care has to be initiated early (Mock et al., 2014). Reynolds et al. (2017) stressed the need for a well-organized, researched, and strategically developed emergency care system. One with the right personnel (trained prehospital and hospital providers), adequate supplies and material for the services (including well-equipped ambulances), and supported by policies providing infrastructure support (political, ministrial and financial) for good sustainability.

There is a strong need for advanced trauma life support training, not just CPR and First Aid as is acquired in-service (Sriram et al., 2015). There is also the need for standardization of treatment protocols governed and enforced through policies, and with medical oversight given by emergency room doctors (Sriram et al., 2015). Studies have indicated a strong need for adequately equipped ambulances in developing countries with trained responders. The studies further suggested that the ambulance should be equipped with not just attendances and ward assistances, but that they should operate through a centralized dispatch service (Stewart de Ramirez et al., 2014; Sriram et al., 2015; Elbashir et al., 2014). Sriram et al. (2015) suggested that developing countries prioritize the improvement of prehospital services as an urgent policy agenda item if they desired a reduction in their morbidity and mortality rates. These improvements are necessary for developing countries as many of their healthcare systems lack adequate trauma treatment facilities, and appropriate diagnosis specialists and equipment to treat traumatic injuries (Elbashir et al. 2014).

Prehospital trauma responses in Latin America and Caribbean

Developing countries within Latin America and the Caribbean, including the island of St. Lucia, have noticed significant epidemiological transitions over the last two decades. Noncommunicable diseases and injuries in the 1990s accounted for 69% of total deaths, and 65% of total DALYs. During the 2000s, the trend continued with 73% of total deaths triggered by noncommunicable diseases and injuries, and 76% of DALYs. In disaggregating the 73% total deaths, injuries accounted for 13% (Crooks et al., 2015; Andreuccetti et al., 2012: Barreto et al., 2012). Andreuccetti et al. (2012) associated motor vehicle accidents, falls, and interpersonal violence as significant contributors of the regions' total death ratio.

In 2013, the WHO painted a very dismal picture that showed traumatic injuries among the leading cause of deaths and disabilities in the world, liable for 9% of total deaths. The Caribbean region patterns this trend of deaths and disabilities similar to other developing countries. During the period 2008 to 2014, St. Lucia displayed traumatic injury rates ranging from 21.02 to 36.34 per 100,000 (Crooks et al., 2015). Most importantly, the WHO (2013), and Sleet et al., (2015), linked these high death and disability rates in the Caribbean to the lack of an effective and efficient emergency response systems in developing countries. Sleet et al., (2015) recommended a reform of the emergency response system for the prevention of these untimely traumatic deaths. The World Health Organization (2013) described the epidemiological transition as worrisome and stated in their regional report that it is time for action. Sleet et al., (2015) as well as Barreto et al. (2012) endorsed strengthening of prehospital responses.

Haagsma et al. (2015) in reviewing global traumatic injury rates for 2013 showed a positive trend, a slight declined in DALYs. In estimating global morbidity and mortality rates using a Global Burden of Diseases (GBD), injury and risk factor index to measure DALY. Haagsma et al. (2015) linked the declining rates to improvements in public health performance, namely health promotion and prevention strategies, and enhancements in treatment qualities. However, the study had limitations as it pertained to early access to emergency response systems for traumatic injury victims. Noted in the discussion of the study, Haagsma et al. (2015) pointed out that access to health as a "proxy covariate that defines health system access" had to be used. This proxy covariate looked at maternal and child health indicators, which reflected access to primary care services. Injured victims that required trauma care services may not be captured under this form of access to health services (Haagsma et al., 2015).

EPHF Strategy to Strengthen Prehospital Traumatic Injury Responses

In recognizing traumatic injuries as a global epidemic in need of urgent remedial action researchers recommended strategies for improvement (Crooks et al., 2015; WHO 2013; Sleet et al., 2015; Sriram et al., 2015). Many studies focused on advanced traumatic injury training, prevention measures, and early access to care (Crooks et al., 2015; WHO 2013; Sleet et al., 2015). Sriram et al. (2015) review of prehospital services in Pakistan and India alluded to greater access to care starting at the prehospital level. They suggested that urgent improvements in the prehospital systems must incorporate policy development and implementation, improvements in training, research of treatment standards and development of treatment protocols (Sriram et al., 2015). These

recommendations coincided with similar strategies outlined by Aluttis et al. (2014) in a Meta-analysis literature review of over 100 primary and secondary studies. The main findings indicated a strengthening of public health services and health promotions. Still, articles that were discovered in this review strongly recommended the strengthening of prehospital services using the essential public health services (Aluttis et al., 2014; Sriram et al., 2015 and Reynolds et al., 2017). An interesting recommendation from Sriram et al. (2015) is to build prehospital services that can ameliorate injury responses using a health system building block framework. This health system building block framework proposed by Sriram et al. (2015) consist of:

- Building organizational structures, that is develop institutional capacity to offer public health services and response to disaster.
- Building partnership that can aid effective response,
- Knowledge development of human resources.
- Have the financing for project development
- Leadership and governance though policies.

Sriram et al. (2015) suggested that these improvements of strategies are needed in an effective response system, which is similar to the essential public health functions. Sriram et al. (2015) identified several problems for address improvement of prehospital services in developing countries. These included the pre-entry qualifications of persons in the emergency response systems. Sriram et al. (2015) and Aluttis et al. (2014) reviews found that persons received first aid and other basic training on the job in many emergency response systems in developing countries. Both authors identified problems

with supply distributions (lack of supplies on ambulances as well as in the emergency departments), poor information management systems, and a lack of data management such as medical informatics (Aluttis et al., 2014; Sriram et al., 2015). Poor communication from ambulances to receiving emergency rooms were also identified as a developing problem for the effective management of traumatic injuries (Reynolds et al., 2017). The care and management of ambulance fleets (maintenance issues) and the lack of quality training Aluttis et al. (2014) were suggested for the strengthening process. The recommendations to redress these problems—a need for strategic policy development, institutional capacity strengthened through resource and fleet management, improvements in management capacity, human resource development through training and continued medical education, evidence response system stemming from research, and training in public health—are all templates of EPHF 3, 4, 5, 8, 10 and 11 (PAHO/WHO 2008).

Hazeldine et al. (2017) in reviewing major complications that caused deaths from traumatic injuries in the first hour from impact to treatment (golden hour), suggested that a thorough understanding of deaths from septicemia is needed for emergency response system providers. To address this issue, Hazeldine et al. (2017) recommended consistency in prehospital research, as well as advanced training in traumatic injury management. However, these training must be streamlined through policies in prehospital courses and policy direction for research and continued medical education. Garner et al. (2015) indicated that deaths and disabilities from traumatic injuries could be attributed to the quality of care given. The reviewers suggested that data have shown that quite often

in the prehospital settings, traumatic injury patients are not properly diagnosed by prehospital care providers. Example, signs of brain injury were not recognized on scene; chest injury complications go unnoticed, and spinal injuries are further complicated by improper movement and non-administration of appropriate advanced medications (Garner et al., 2015; Hazeldine et al., 2017; Sriram et al., 2015). Garner et al. (2015) recommendations are for these shortcomings and complications to be addressed through research, training and employment of the right prehospital public health workforce. These recommendations coincide with EPHF 5 - "Development of policies and institutional capacity for public health planning and management," EPHF 8 - Human resources development and training in public health, and EPHF 10 - "Research in Public Health."

Injury Response Barriers in prehospital responses of Developing Countries

Injury response at the prehospital level is often hindered by the lack of centralized prehospital resources, inadequate advanced traumatic life support training, and in most countries, the absence of standardized treatment protocols (Callese et al., 2015). Studies have indicated that deaths and disabilities within developed first world countries have reduced with structured and organized emergency response systems, supported by adequately trained responders. Developing countries however, have inherent challenges such as geographical obstacles (vast terrains that hinder quick response times), resource constraints (lack of ambulances and equipment), and uncentralized medical control (doctors that oversee treatments). The need for formalized emergency response systems with appropriate traumatic resources were identified as primary barriers to adequate and effective response systems for low- and middle-income countries (Callese et al., 2015).

Mould-Millman et al. (2014) identified what is called the chain of survival as a critical link to the essential public health functions. According to them, for disabilities and deaths from traumatic injuries and other critical emergencies to be reduced, this chain of survival is vital. The components of the chain should consist of recognition of the emergency, bystander-initiated care, access to prehospital emergency care services, prehospital care delivery, emergency transportation, emergency centre care and definitive care. Barriers to this continuum of care were ascribed to a lack of political will to develop and implement policy and budgetary frameworks (cost implications), and agreement to an optimal system structure - a systematic gold standard for operation policies and procedures, Callese et al., 2015; Mould-Millman et al., (2014). An additional barrier identified by Mould-Millman et al. (2014) was poor advocacy from community leaders and lead stakeholders, such as the very emergency doctors that failed to lobby the political framework for support.

Summary

This chapter reviews the scholarly literature that identifies the need for continued research of Essential Public Health Functions, and aide prehospital traumatic injury responses within St. Lucia. The EPHF, as a regional conceptual framework to guide entities, and their roles within the regional public health structure, were reviewed. The Diffusion of Innovation was used as the theoretical framework. The EPHF, as a conceptual framework, was used as an evaluation tool to assess the functions, services, and operations provided by local and national public health organizations (Martin-Moreno el al., 2016). Within the Caribbean, EPHF are used not only as a conceptual

framework but as an assessment monitoring tool. The results of the monitoring process were often used as a redevelopment strategy for the strengtheningof public health in an holistic approach (Aluttis et al., 2014). In this regard, it is strongly felt that this process can be adopted and used to build on prehospital traumatic injury responses in St. Lucia.

The diffusion of innovation theory provided the groundwork for a clearer understanding of how the tenets of the EPHF, identified as essential for the strengthening of prehospital traumatic responses, can be communicated to policymakers and health planners for a rebuilding process. Additionally, a qualitative research design was identified as appropriate to gain the perspectives and attitudes of key players that have over-arching responsibilities for the reduction of morbidity and mortality rates. This methodology allowed for relaxed and frank in-depth interviews on EPHF as a rebuilding strategy.

The literature showed that pre-ospital traumatic response in third world developing countries is a neglected public health epidemic, requiring urgent action. Traumatic injuries are recognized as a contributing factor in an estimated 90% of total deaths in developing countries, with 80% of these deaths occurring in the prehospital arena (Callese et al., 2015; Crooks et al., 2015 Elbashir et al., 2014). The identified trends for developing countries globally mirrored the death and disability rates for the Latin America and the Caribbean when disaggregated. The literature revealed that noncommunicable diseases and injuries accounted for 69% of total deaths, and 65% of total DALYs during the 1990s. In the 2000s, these trends continued with 73% of total deaths and 76% of total DALYs linked to injuries and noncommunicable diseases, with

injuries accounting for 13% of total deaths (Andreuccetti et al., 2012: Barreto et al., 2012; Crooks et al., 2015). Although these figures are frightening, it is suggested that improvements in the prehospital traumatic injury response systems can aide in stemming the estimated 45% traumatic injury deaths and 35% disability-adjusted life years (Mould-Millman et al., 2014). The lack of political will to develop a budgetary framework, and fear of cost implications, as well as barriers to an agreed optimal system structure, were identified as the major factors conspiring against the development of an effective prehospital injury response system in developing countries (Callese et al., 2015; Mould-Millman et al., 2014). Chapter 3 discusses the methodologies that was used to capture the perspectives and views of the key informants on how the conceptual framework for EPHF can used to strengthen for prehospital traumatic injury responses St. Lucia.

Chapter 3: Research Method

Introduction

I conducted this study to address the problems with prehospital traumatic injury responses in the emergency response systems of St. Lucia. The attitudes and experiences of key stakeholders were evaluated to gain their perspectives on the use of EPHF that were previously used to assess, monitor, and develop public health strategies in the Caribbean region, and how they fit within St. Lucia emergency response systems. Assessing how these EPHF can be incorporated as strategies for improving the traumatic injury responses in St. Lucia emergency response systems. The preceding chapters were focused on the current literature on prehospital traumatic injury responses in developing countries, the strategies for improving the responses, and the need for continuous research on programs and procedures that can aid in the reduction of injury morbidities and mortalities. This chapter includes the methodology employed to examine the views, attitudes, and perspectives of key informants that are interrelated in the St. Lucia prehospital traumatic injury and emergency response systems. It also provides the context of the study, the type of research design found suitable for the evaluation, the process used to select the samples including the inclusion and exclusion criteria, the measures taken to protect the study participants, the data collection process, and how the data were managed, analyzed, and presented.

Research Methodology

A qualitative descriptive research design was found to be the most appropriate methodology to examine the strategies to improve prehospital traumatic injury responses

in the St. Lucia emergency response system. The design allowed for a wide-range of summarization of specific events (Neergaar, Olesen, Andersen, & Sondergaard, 2009). I did not seek to develop a theory or define any cultural sharing groups. I did not describe a phenomenological experience nor document life experience of individuals. Therefore, the grounded theory, ethnography, phenomenological, narrative, and case study designs were inapplicable. The systematic qualitative review and the qualitative meta-analysis were unsuitable, as peer-reviewed articles on the Caribbean and St. Lucia are limited.

I analyzed prehospital traumatic injuries in St. Lucia and how EPHF can ameliorate the weaknesses exposed. To achieve this aim, the peculiarities that are important to the event (prehospital traumatic injury responses) were best explored by a qualitative descriptive design as described by Neergaar, et al. (2009). The design, as expounded by Lambert and Lambert (2012), allows the researcher to present his findings based on the conventional categorical perspectives of an event as seen through the lenses of the persons who are fundamentally involved. Colorafi and Evans (2016) as well as Watkins (2012) suggested descriptive qualitative design became widely accepted and used by public health and health sciences researchers when mistakes in the use of the traditional qualitative designs were highlighted. In a meta-analysis assessment of qualitative researchers who used the five common qualitative designs—narrative, phenomenological, grounded theory, case study, and ethnography—Sandelowski (2000) found that health science and public health research sometimes lacks a true narrative format and does not display the true phenomenon of stand-alone case studies, therefore

giving more credence to the use of a qualitative descriptive design (Colorafi & Evans, 2016; Sandelowski, 2000).

As researchers in health sciences and public health encounter more complex public health problems, a more in-depth and comprehensive descriptive inquiry was required (Creswell, 2013). The recommendations for such a thorough assessment (Colorafi & Evans, 2016), and a more thoughtful exploration of qualitative descriptive research designs (Sandelowski, 2000), needs to be considered as an option by researchers. Neergaar et al. (2009) indicated that the qualitative descriptive design aided in answering the *why*, *how*, and *what* types of public health issues used an inductive approach. Most qualitative researchers employ an interpretive theory or conceptual framework that permits alteration as the study evolves, making the qualitative descriptive design most suitable (Colorafi & Evans, 2016; Sandelowski, 2000, 2010).

I applied the diffusion of innovation theory that limits alterations and endorses qualitative descriptive designs (Claudy, Garcia, & Driscoll, 2015). Sandelowski (2010) pointed out that the descriptive qualitative study lends itself to the straightforward description of an event or phenomenon that needed explanation. Colorafi and Evans (2016) added that as researchers modify the conceptual framework as the study progresses, the research tends to stay closer to the data and gave direct interpretation of perceptions gathered. The qualitative descriptive study is suitable for public health research that described how people felt about events and the use and hindrances to such events (Colorafi & Evans, 2016). The qualitative descriptive design was therefore found

to be most suitable to explore the use of EPHF to strengthen prehospital traumatic injury responses and in-depth understanding of EPHF implementation strategies and barriers.

Research Questions

This study was conducted in St. Lucia, an English-speaking Caribbean territory. EPHF are the foundation on which the public health system of St. Lucia is grounded. The following research questions were explored as to how the emergency response system can be strengthened for traumatic injury responses:

1. How can EPHF influence current emergency response policies and strategies to strengthen prehospital traumatic injury responses in St. Lucia?
2. How can the components of EPHF be used as a part of policy planning and program development for the improvement of traumatic injury responses within the prehospital phase?
3. How does the use of EPHF as a gold standard impact the opportunities to develop and strengthen the emergency response system workforce in St. Lucia to improve traumatic injury responses?

Qualitative Interview

The qualitative methodology allows for a thorough assessment using interpretive actions based on informed reflections, which provides an in-depth understanding rather than a scoring system (Gladstone, 2016). The research questions on the use of EPHF to strengthen the prehospital traumatic injury responses accomplished by the St. Lucia emergency response system guided the interview process for this qualitative descriptive study. Vaismoradi, Turunen, and Bondas (2013) outlined that qualitative inquiries are the

most appropriate design to "explore complex phenomena encountered by healthcare providers, policymakers, and patients" (p. 398). Hence, the increase in traumatic injuries in St. Lucia and other developing countries, and strategies for curtailing the phenomena of increasing death and disability rates, were best explored using the qualitative study design. Jamshed (2014) also indicated that qualitative research allows for examiners to gain in-depth and extensive understanding of the issues explored (EPHF and their applications for prehospital injury responses). Additionally, Starks and Trinidad (2007) suggested that qualitative interviews are a useful research instrument to gather in-depth information that researchers are not able to observe, such as perspectives, personal intentions, and health behaviors. Qualitative studies and using interviews as a data gathering strategy is a recommended way to produce textual interpretation (Creswell, 2013). A qualitative interview process allows the researcher the opportunity to record the interview upon receipt of consent (Creswell 2013), challenge and clarify viewpoints that may be unclear and unsubstantiated (Starks & Trinidad 2007), and also reinforce previous views shared (Jamshed, 2014).

Creswell (2013) suggested that by using qualitative interviews the researcher can use a semistructured, lightly structured, or in-depth interview format. I used a semistructured format, as it allows the respondents to express their perspectives and share their experiences openly, freely, and frankly (Corbin & Morse, 2003). Semistructured interviews (open-ended interviews with predetermined questions) were conducted with key informants (policymakers in government ministries of health and finance, emergency care providers, public health stakeholders, disaster management specialists, and health

and security advisors). The research questions were open-ended and designed by thematic areas. Semistructured, open-ended questions allowed me to probe issues that may be similar but expressed differently by varied respondents (Percy, Kostere, & Kostere, 2015). This research format also allowed me to address confrontational issues (Creswell, 2013). Percy et al. (2015) recommended that when interviewees are questioned with a subjective theory, it is best that the researcher design confrontational-style open questions. Using Creswell's guidelines for key informant interviews, I examined the weaknesses in the system and how they can be addressed using EPHF as an assessment tool.

Participant Selection

The sampling selection process is a methodological process that must follow strict guidelines (Creswell, 2013). The Walden University Institutional Review Board's (IRB) ethical approval for conducting this study was granted (approval number 01-22-18-0375663) after St. Lucia ethics approval was received. Approval from the St. Lucia Research Ethic Committee was gained after permission to conduct the study was received from St. Lucia Fire Services. This research did not involve using any human samples or collected specimens for clinical research or testing. Each participant for interview was asked to complete the informed consent documentation during the data collection stage. Efforts were made to ensure the study complied with the Walden IRB policies, which ensures that respondent's information is kept confidential and anonymous. Strict guidelines were followed to guarantee that respondents were protected from harm, and that the discussion process and results are not traceable.

During the sample selection process, key informants from government ministries in St. Lucia were solicited to participate in this study. These informants were selected from the hierarchy of the ministries of health and two government operated hospitals. The key informants selected were all subject area experts on prehospital traumatic injury data management, health policies, and health finances. These staff collate injury response data in the ministry of health and submit them to the PAHO's regional office for assessment, reporting and policy improvement (PAHO, 2014). The health staff of the ministry of health who track and monitor traumatic injury rates, patterns of injuries, and causes of disabilities (PAHO, 2017) are also subject area experts in the prevalence of prehospital trauma and were appropriate for interview. The staff is familiar with aspects of EPHF and their use in St. Lucia and how they can be strengthened (PAHO, 2014). These criteria make these informants suitable experts to speak on the prevalence, types of incidences and areas for improvements in prehospital traumatic injury responses.

The overall management and operation of the emergency response system in St. Lucia falls under the jurisdiction of the ministry of health (PAHO, 2017). That ministry has the over-arching responsibilities to designing strategic plans, policies, and programs for the emergency response system of the Island (PAHO, 2017), including the provision of medical oversight. Participants in these areas of the ministry that can relate to emergency response strategies and policy issues were interviewed. It is important to note that funding for all health initiatives programs are derived from the budget of the ministry of finance (PAHO, 2014). The issues of approval and funding of health initiatives are best ascertained by key informants in the St. Lucia Finance Ministry. Key Informants

were selected from the emergency department of the St. Lucia Ministry of Health. Emergency room consultants who receive traumatic injury patients from the St. Lucia emergency response systems and assist with the training of responders was interviewed. Essential parts of the strengthening process include the exposure of these emergency room informants to traumatic injury patients, prehospital treatment weaknesses identified when the patient is handed over to the emergency department, and how those deficiencies in the system can be addressed through policies and health strategic program.

I interviewed key professionals with responsibilities for the emergency response system, knowledge of the policies and programs for traumatic injury responses, training of responders, and knowledge of the challenges and issues of health funding in the St. Lucia health system. These key informants or subject area experts who were sampled are relevant to traumatic injury responses, emergency room healthcare providers, and health policy decision making and financing. The final group of participants interviewed was from the disaster management and national security services. The group often worked closely with the St. Lucia emergency response systems (Government of St. Lucia, 2015) in responding to trauma and mass casualty incidences. Relevant partners in these agencies were solicited for interviews.

Sampling Procedures

The criterion-based sampling procedure was employed for this study. Marshall (1996) indicated that the criterion-based sampling procedure is ideal for qualitative study, as the sample units are selected based on the characteristics relevant to the research questions. Palinkas et al. (2015) recommended criterion-based sampling in qualitative

study when the researcher chooses to use experts in the subject matter of exploration. In using the criterion-sampling technique for this study, key informants were selected based on their expertise in prehospital traumatic injury responses and the use of the EPHF to strengthen public health functions within St. Lucia. The majority of key informants' current expertise lies within the provision of guidance for prehospital policies and strategies, improvement of training modules and prehospital curriculum, and advice for system improvements (quality assurances). Criterion-based sampling was also recommended when subject area experts cut across extremes and may produce outliers; this type of sampling procedure is ideal when experts also fall outside the subject area but are interrelated (Palinkas et al., 2015).

Sample Size

Unlike quantitative studies, qualitative studies do not lend itself to sample size calculation instruments. Most researchers use the rule of thumb option to select the appropriate sample size (Creswell, 2013). In this dissertation, a similar rule of thumb option was used to select approximately 12 key informants. Camic, Rhodes, and Yardley (2003) indicated that when using key informant interviews, a sample of 5-25 persons is a good guide. A sample size of 8-15 key informants was targeted based on the key informant areas of interest. Three participants were selected from within the ministry of health injury response data policy development section, two participants from the finance ministry, and two from the ministry of security. I also canvassed two experts from the emergency department, two from the emergency response unit, and two from the disaster management division.

Saturation and Trustworthiness

Sample size saturation can be determined by the aim of the study (Mason, 2010), by which the researcher used adequate numbers of experts in qualitative interview to gain the appropriate answers suitable to address the research question. This method often ensures trustworthiness. Mason (2010) suggested that the study aim dictates saturation as this study evolves. According to Mason, many researchers use a large sample size in qualitative study, so their data collected can be defended. However, Mason advises against this strategy and recommend that researchers select only the appropriate participants that can answer the research questions appropriately and trustworthily thus fulfill the aim of the study. Researchers are encouraged to select the right sample applicable to the data (purposeful) and not just use large numbers to gain saturation and trustworthiness (Anney, 2014). Saturation of sample size would then be determined by the numbers of participants that would best able to answer the questions geared toward achieving the aim of the study.

Inclusion Criteria

The key informants interviewed fall within specific categories. All subject area experts worked in St. Lucia for more than 2 years and had close working relationships with or knowledge of the St. Lucia emergency response systems. These experts are familiar with the PAHO model of the EPHF (PAHO, 2008).

Exclusion Criteria

Experts working within the St. Lucia ministries and emergency department for less than 2 years, and participants who worked as experts in the various ministries

sampled for more than 2 years, but who did not work closely with the St. Lucia emergency response system were not eligible for selection.

The Role of the Researcher

During this dissertation process, I was considered an active human instrument (Simon, 2011) - the primary data collection person. The coordination and documentation of the interview processes were my primary roles. The researcher had no personal or professional relationship with any key informant. Therefore, as the human instrument, relevant personal aspects including any biases and assumptions, were explained and documented (bracketed) before data collection commenced. A research journal will be used for explicating personal reactions and reflections (Simon, 2011).

Data Collection

With qualitative descriptive designs, the researcher is the primary instrument who collects the data through interviews (Simon 2011). A key informant interview guide was used during the interview process (appendix B). Maxwell, (2013) suggested that at this stage it is best for the researcher to use a standardized guide that will ensure the consistency of questions on thematic areas. This interview guide was evaluated and cross-referenced with similar studies to ensure consistency. All participants for the study were selected voluntarily and asked to sign consent forms. They were also informed of their rights to discontinue the interview, should they feel they no longer wanted to participate in the study. Debriefing sessions were scheduled for participants who might chose to discontinue the study; these were designed to elucidate their choice to withdraw from the study, and to dispel any fear of harm or reprisal for so doing. The participants

were advised that the interviews would be recorded for accuracy of documentation. For those participants who were opposed to recorded interviews, accuracy of documentation was verified with the interviewee at the end of the session. Proper names were not used; hence a numbering system and/or pseudonym was assigned to each participant interviewed to protect their privacy and prevent de-identification. The interview sessions were conducted face-to-face or via Skype for Business. Each session lasted approximately 45 minutes to one hour. The face-to-face interview sessions were held away from the work environment to ensure privacy and confidentiality. Sensitive information that could be traced back to the interviewees were documented but not published in the results to ensure respondents anonymity and protection from harm.

Data Management and Analysis

The data management and analysis process of a qualitative descriptive research requires systematic and logical collection, storing, data coding and presentation (Gale et al., 2013). In this dissertation, the directions for qualitative research outlined by Gale et al. (2013) was followed, however, the analytical framework often used by multi researchers was not used. The interviews of the key informants were audio recorded and then transcribed verbatim. Several aspects of Gale et al. (2013) direction for multi-disciplinary health research were employed. I became very familiar with the interviews through replay of the audio recordings, and matched all transcribed notes to other notes, ensuring that the interviewee's points were captured accurately. The notes captured in the interview were compared with the transcribed themes. The transcribed notes were then coded under the thematic areas used in the interview guide. The final aspect, management

and presenting of the data, was completed through presentation of the interviewee's narrative as a story is being told. Sutton and Austin (2015) recommends presentation of the data to the audience in like manner. The Computer assisted qualitative data analysis software NVIVO were used to organize the data and to map the themes.

Validity and Reliability

Qualitative research is often subjective as the research tool is the researcher (Starks & Trinidad 2007). The researcher decides how to develop the thematic areas for interviews, codes and recodes, and contextualize/recontextualize the findings (Starks & Trinidad 2007). Such actions by the researcher, as pointed-out by Noble and Smith (2015), exposes the study to a high possibility for bias and raises issues of validity and reliability. Noble and Smith (2015) indicated that because the researcher is the primary research tool, paying specific attention to reliability and validity will increase the integrity of the study and give credibility to the. One recommendation from Noble and Smith (2015) is for the researcher to account for all personal biases in the sampling process, at the methodology stage as well as the interpretation of findings.

Therefore, for this research, the bracketing procedures were followed, and all personal biases were journal by the researcher before data was collected. The bracketing procedures were used throughout the study. Sorsa, Kiikkala, and Astedt-Kurki (2015) suggested that bracketing allows for increase awareness regarding the researcher's personal interests, allow the readers to put the researcher assumptions aside and explore the phenomena of interest with an open mind. Throughout this study the researcher ensured validity and reliability by following Noble and Smith (2015) recommendation for

the researcher to embark on a meticulous record-keeping process, and involved the dissertation committee chair and other research members to provide guidance in interpreting the data in a consistent and transparent manner and to reduce bias. Where applicable a comparison of findings was done with any existing gold standards (compare for similarities from previous EPHF studies). Finally, a clarity of research terms was provided throughout data analysis and interpretation and where possible, the respondents were asked to validate transcripts and themes to reflect their description of the phenomena expressed.

Summary

This study seeks to find ways to strengthen prehospital traumatic injury responses in St. Lucia by capturing views of key informants on how EPHF can be used to strengthen the emergency response system. The EPHF have previously been used to assess, monitor and develop public health strategies in other public health services (PAHO, 2008) hence its usefulness to strengthen prehospital traumatic injury responses were explored. The methodology used was a Qualitative descriptive research design. This design was expressed by many researchers as more appropriate if the traditional qualitative design (Sandelowski, 2000) is not applicable.

Ethical consideration clearance for conducting the study was sought from the Walden University Ethic Review Board (IRB) as well as St. Lucia research ethic committee. Upon approval, a Criterion-based sampling procedure was used to select research participants to share their views on the three (3) research questions will for exploration. Data was collected from these informants using a semi structured interview

process. To ensure credibility of the study, biases were controlled using bracketing. Other validity and reliability issues was enforced through a meticulous record keeping process, involved dissertation committee chair and other research members to provide guidance as the data is interpreted.

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Chapter 4: Results

Introduction

In this chapter, I report the findings obtained from semistructured interviews that addressed the factors affecting prehospital traumatic injury response policies in St. Lucia. Face-to-face and telephone interviews were conducted to obtained the views and experiences of prehospital experts, directorates in the ministry of health (policy advisors) and emergency room specialists. Their perspectives on the extent to which the emergency response systems in St. Lucia incorporated pertinent EPHF (EPHF 3, 4, 5, 8, 10, & 11) in their prehospital trauma response policy were examined. Through these in-depth interviews, the question of how the EPHF used in the Caribbean Region can be purposed as change strategies to strengthen prehospital traumatic injury responses within St Lucia was explored. I also explored a comprehensive analysis of the experiences and perceptions of these experts as to which EPHF are inherent in the existing emergency response prehospital trauma policies, which tenets are missings, and how those missing tenets can be fused into the development of future prehospital trauma response policies and strategies.

Chapter 1 addressed the need for strengthening of the prehospital traumatic injury response strategies in St. Lucia and how EPHF can be integrated into a response policy framework. The chapter highlights the lack of research in prehospital trauma responses as traumatic injuries become a neglected epidemic, and traumatic injury mortalities and morbidities increase in developing countries. Chapter 1 showed the relevance for this study as prehospital response strategies for developing countries became a priority for the

WHO as they mandated the developing health ministries to improve response capacity (WHO, 2016). In Chapter 2, I reviewed the current literature on prehospital traumatic injury response strategies. The peer-reviewed literature on EPHF as response strategies, were also examined. In Chapter 3, I clarified the research methodology used throughout the study.

The potential influences affecting the implementation of EPHF or their complete absence from the countries emergency response systems expressed in informant interviews are discussed in this chapter. Additionally, this chapter includes the study settings, the data collection process, and the thematic analysis strategy that were employed. Interpretation of the data, limitations of the study, and recommendations are discussed in Chapter 5.

Previous studies were conducted on traumatic injury and how to cauterize the spiraling mortality and morbidity rates using health promotion intervention strategies (Mock et al., 2014; Stewart et al., 2015), as well as secondary and tertiary care response strategies (Vansell et al., 2015; Vos et al., 2012). Prehospital trauma care has not been studied as a part of the strategies needed to aid in the reduction of morbidity and mortality rates in the Caribbean. This study, therefore, was focused on the means to entrench EPHF into policies applicable for out-of-hospital traumatic injury responses.

Pilot Study

There were no known standardized data collection instruments to collect the required data; a new key informant guide was therefore created (see Appendix B). This key informant data collection instrument was first pilot tested on two comparable

candidates who were interviewed: a Senior EMT and an ER Nurse. Their answers to the interview questions were succinct and relevant to the research question being explored and helped to refine the final version of the instrument. However, the instrument did not require any change. I used the pilot test interview sessions to note key areas that required more probing analysis. Data obtained through the pilot test were not used as part of the results, and their transcripts were kept separate and secure as per Walden research guidelines.

Study Settings

The study was conducted in St. Lucia, one of the larger English-speaking islands in the Windward Region of the Caribbean (Figure 2). The Island's 2010 census data showed a population of 165,595 (Population and Vital Statistics, 2016). The Island maintains a steady population growth of 1.3% per annum with 17% of the population residing in the urban areas (Population and Vital Statistics, 2016). The largest contributor to the population mortality rate across all age groups, 33% of total mortalities, are noncommunicable diseases and traumatic injuries (Commonwealth Health Online, 2018). In the fiscal year 2010 the Government of St. Lucia spent 3.5% of its Gross Domestic Product (GDP) on health, which equated to approximately US$503 per capita (Commonwealth Health Online, 2018). A significant proportion of this spending went toward traumatic injury rehabilitation (WHO, 2017).

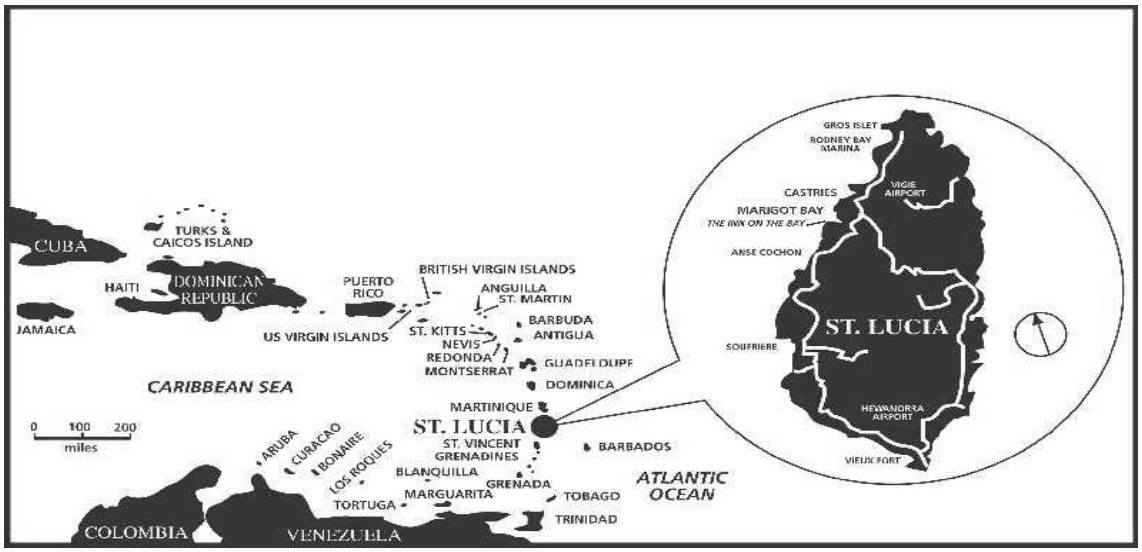


Figure 2. Map of the Caribbean Islands highlighting St. Lucia. This figure shows the map of the Caribbean, highlighting the Island of St. Lucia (Still Fab and Travel, 2014).

In a survey conducted using 1997 to 2010 data, results showed that the Island operates with 47 doctors and 206 nurses per 100,000 people (Commonwealth Health Online, 2018). These healthcare practitioners provide public health services through two major secondary care facilities: Victoria and Vieaux Fort Hospitals, operated by the Government of St Lucia, and St. Jude's Hospital, a third private secondary care facility (Commonwealth Health Online, 2018). The primary care system also operates approximately 30 health centers, whereas the fire department respond to emergencies from six different ambulance locations across St. Lucia. These ambulances are operated by firefighters that are trained first responders, EMTs, and emergency medical technicians advanced (WHO, 2017).

St. Lucia was selected for this study, as it is one of the few English-Speaking Caribbean Islands with an active EMS system, which makes it feasible to recruit

participants. I had previous working relationship with the services as a trainer of the Island's multisectoral mass casualty management system, but I had no personal or organizational relationship with participants or their experiences before or during the study that may affect the interpretation of the study results.

For this study I used the descriptive qualitative research design to elicit the perspectives of experts in prehospital trauma responses, analyzing how the EPHF can complement response strategies and emergency response legislation in St. Lucia. Lambert and Lambert (2012) suggested that the semistructured interview format of a qualitative descriptive research design is a very useful tool when researchers are searching for answers regarding a phenomenon. Lambert and Lambert stated that this research design is ideal to paint a picture of what is happening, who is involved, and the location of occurrence of a given phenomenon. McIntosh and Morse (2015) also discussed the usefulness of semistructured interviews to gain in-depth insights from key experts when a straightforward description is needed, hence the use of this methodology.

Research Tool

I developed a key interview guide (see Appendix B) with eight open-ended questions and several probing questions. The first section of the guide contained questions pertaining to the level of satisfaction or dissatisfaction with the country's emergency response policies, response strategies and procedures. Section 2 was focused on questions pertaining to prehospital traumatic injury responses in St. Lucia and the weaknesses and improvements noted in the Island's prehospital trauma response procedures. The final section was focused on which EPHF were in the current response

policies, response strategies and/or procedures, and sought answers on how to implement and maintain EPHF in the St. Lucian prehospital traumatic injury response procedures and policies.

Data Collection

The fire department and the two government-operated hospitals were contacted and a detailed description of the study was e-mailed to them (see Appendix C). After ethical approval was obtained from both St. Lucia and Walden IRB, a criterion-based sampling procedure was employed to identify participants that had knowledge of the EPHF, and how they can be used or should be used in prehospital trauma responses in St. Lucia. Eighteen participants were solicited for this study; however, only 15 agreed and partook (see Table 2). Eligible participants were senior St. Lucian EMS experts working in the EMS for more than 2 years, and the St. Lucian Ministry of Health and ER caregivers working in close relationship with the St. Lucia EMS for more than 2 years.

Table 2.

The Study Participants

Participants Contacted	*Numbers*	*Respondents that Participated*	*Numbers*
EMS Managers	3	EMS Managers	3
EMS Senior Staff	5	EMS Senior Staff	5
ER Doctors	3	ER Doctor	2
ER Nurses	5	ER Nurse	3
Ministry of Health Officers	2	Ministry of Health Officers	2
Total	18	Total	15

Note: Numbers of participants contacted and number of respondents who partook.

A total of two ER doctors, three ER nurses, two ministry of health policy advisors, three senior firefighters/EMS managers, and five EMS senior staff were the total respondents. These participants were contacted via telephone and details of the study, as well as a one-pager flyer giving description of the EPHF (see Appendix D), were e-mailed to each respondent separately. They were all given 3 days to read the documents. Once they agreed to participate, they were asked to communicate with me for an interview date. Having volunteered to share in the study I provided each participant with an informed consent form to read and sign.

Participants who were interviewed via Skype or telephone received their e-mailed consent form before the interviews were conducted. I also e-mailed the research information regarding the study (Appendix C) and the one pager EPHF Flyer (Appendix D) to them 3 days before interviews were conducted. This allowed the participants to

become familiar with the type of study and reminded them of the EPHF. Each study participant was informed that no identifying information pertaining to their names or location was kept. I explained that I would use a pseudonym or numbers to identify them in my study. All respondents who participated (n = 13) as well those used for the pilot study (n = 2) were provided with my contact information on each consent form. This information was provided should a respondent become uncomfortable after the interview and felt the need to withdraw from the study. I included my research committee chair's contact information should any respondents require additional support or confirmation of the study from Walden.

The majority of the interviews (n = 8) were conducted face-to-face. These sessions were held at a hotel restaurant away from the participants' work setting. The others (n = 7) were done via telephone or Skype interviews. These sessions were done after 7 p.m. on weekdays after participants arrived had left work. Each interview session was directed by the key informant guide to maintain consistency between study participants.

In order to have a large enough sample size to understand how the EPHF have been used and can aid to strengthened prehospital trauma responses, a sample of 10-15 participants were proposed. This provided the sample size to answer the proposed research questions. Saturation was achieved with 13 respondents as no new information was obtained.

Some participants did not want to be audio recorded; therefore, sessions were not recorded for these participants. Each interview session lasted between 45 minutes to 1

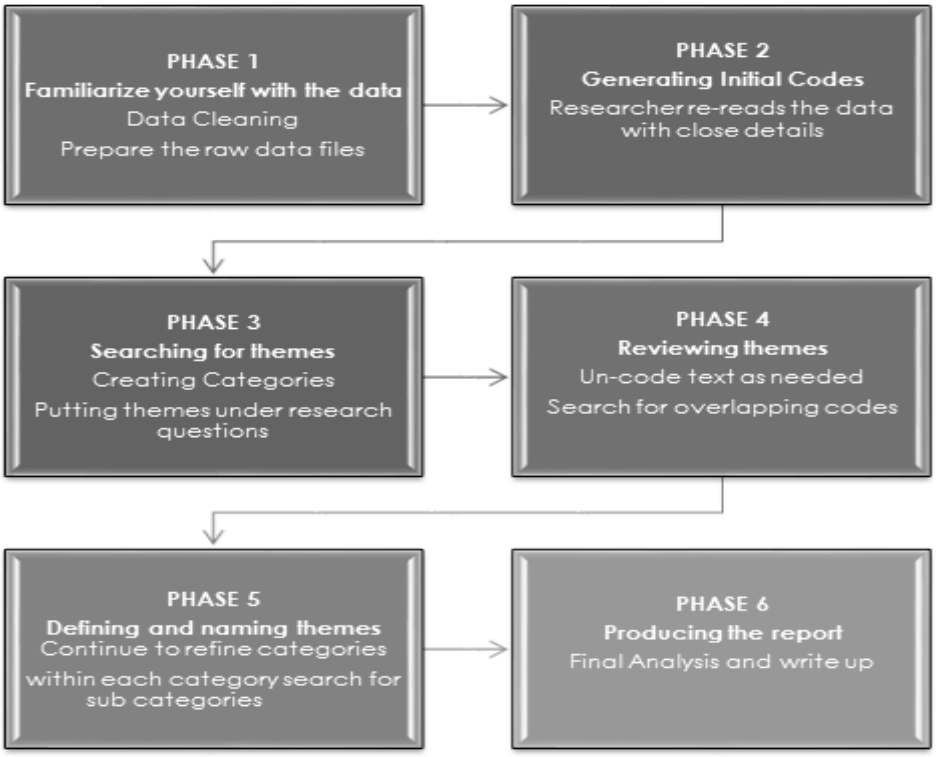
hour. Detailed notes were collected during the sessions as probes and follow-up questions were used to stimulate richer detailed explanations. Each note and audio recording were then transcribed verbatim and saved as Microsoft Word documents. Reflective notes were taken as I transcribed the interviews and each transcribed session was uploaded to NVIVO 10 for Mac to analyze derived themes.

The study did not require the collection of respondents' demographic data such as age, sex, and response location. St. Lucia is classified as a Small Island Developing State (SIDS). It is customary within SIDS for community members to be close knit, and the collection of demographic data could lead to the identification of respondents.

Data Analysis

In this qualitative descriptive study, the analysis of the data is vital to find the answers to the research questions being explored. I therefore familiarized myself with the data by reading and re-reading the transcribed documents to identify common emerging themes that matched each research question. I then employed Braun and Clarke's (2006) inductive thematic analysis format (see Figure 3) described by Nowell, Norris, White, and Moules (2017) as well as Galvin et al. (2017) for ensuring a systematic approach to the analysis of the results. I have chosen to follow these authors' directions for reporting qualitative results, as their depiction of a systematic approach gives guidance to ensuring a trustworthy thematic analysis as appropriate to this study. The respondents' results, when place under the applicable thematic headings, matched the appropriate subheadings and gave logical answers to the research questions being explored.

The subcategories were then organized under each of the three main research questions. The qualitative results presented common emerging themes (see Appendix E) gleaned from the perspectives and experiences such as no policy, lack of policy and protocols, use of training as response guide, weaknesses in prehospital traumatic injury responses, useful EPHFs, willingness to change perceived barriers, and the need for quality assurances. These emerging themes matched the major subheadings and research questions as the participants' answers were transcribes verbatim.



Error! Reference source not found. Example of thematic analysis used. The following examples showed schematic modification of the thematic analysis used. Adopted from "Using thematic analysis in psychology," by V. Braun and V. Clarke, 2006, *Qualitative Research in Psychology, 3*, pp. 77–101.

Evidence of Quality and Trustworthiness

In order to ensure that this qualitative descriptive research is credible and contributes to the existing body of literature in the field of prehospital traumatic injury responses, reliance was placed on the quality of data collection, data analysis, and verification of the research findings. It is recommended that researchers use credibility, transferability, dependability, conformability, and intracoder reliability strategies to ensure evidence of quality and trustworthiness in the data collected and used (Cope, 2014).

Process for Ensuring Credibility

The credibility of the study was verified through a triangulation data collection method. Data Triangulation involves validation of the data sources through cross verifications from two or more sources (Carter et al., 2014). For this study, it was not feasible to use standard triangulation to collect data by questionnaires, focused groups and interviews. The researcher therefore ensured that data triangulation was done through the collection of data from different organizations such as EMS personnel, emergency room departments, and the ministry of health personnel.

Credibility was then reinforced using the member check method (Birt et al., 2016) where each interviewee is shown the transcribed notes that were collected from them during the face-to-face interview sessions. The Skype and telephone participants were e-mailed their transcribed notes, which were then read and validated for accuracy.

Transferability

Transferability or external validity refers to the degree in which the findings of the study can be applied to similar situations (Leung, 2015). In analyzing the data, the researcher was mindful of external validity, and assessed ways in which the findings would be applicable for other English-speaking islands. The researcher identified avenues where prehospital injury response procedures, policies, quality assurance and health education to the public can be strengthened in other Caribbean Islands.

Process for Dependability

Dependability in qualitative study helps to ensure the reliability of the study. Moon et al. (2016) described this process as an audit trial process, consisting of thorough documentation of the findings so that future researchers can repeat similar work. In ensuring dependability for this study, interview sessions were audio recorded with an external microphone to capture verbatim what each interviewee shared. The use of the audio recorder produced a more reliable account of the data collected and created a permanent recording of the interviews for future reference. Permission to audio record each interview was granted by the participants when they signed the informed consent prior to the start of the interviews. For those participants who refused to be audio recorded, a thorough collection of documentation on all aspects of the research interview was conducted and the notes transcribed verbatim. These transcribed notes were then validated by the interviewees as an accurate reflection of their views, perspectives and experiences shared. This allows for authentication by comparing the two forms of data (raw notes and transcribe data).

Process for Ensuring Confirmability

Researcher has indicated that confirmability of any qualitative research is best achieved through an audit trial, reflective journal and triangulation (Anney, 2014). Several strategies were employed for confirmability of this study. First, the researcher ensured the data was collected using a triangulation method (collecting same data from three sources): notes from all three sources were compared for similarities of derived themes. The researcher then used a simplified version of an audit trial during coding of the data. Detail rich notes (raw data) were gathered on the interview guides: they were transcribed verbatim to word documents to provide detail rich data. Emerging themes were then summarized and documented, then organized according to sub-headings and research questions. Finally, I used rich description from the study participants and reflectivity. The final strategy to ensure credibility and trustworthiness was to do intracoder reliability checks. The NVIVO 10 software for mac was used to ensure all data were coded a consistent manner.

The Use of Bracketing for Controlling Researcher's Biases

Being aware of my own biases and how they might influence the data interpretation, I documented each bias and continually assessed my beliefs on how prehospital response systems should operate. I then read and re-read each transcript, revisited each raw data derived from the interviews, and carefully analyzed in accordance with only the research questions to identify common themes and their consistencies between respondents. The interpretation of the data based on the research questions and the emerging themes are provided in Chapter 5.

Research Findings

The following section presents the research findings. The responses are arranged in four (4) sections. I first presented the participants answers on how they viewed the country's prehospital trauma response policies, and how satisfied they were with the EMS policy. This information provided clarity on which policies, treatment protocols and legislations are used to govern the prehospital response systems, and the state of the emergency response governance monitoring within the policy framework. These thematic areas were further examined with the responses gained from the other three (3) research questions being explored. The first research question was pertained to the influence of EPHF on the current emergency response policies in St. Lucia. The respondent's answers on EPHF and how they fit into the Island's prehospital traumatic injury response policies were then presented in the second research question. The third question focused on the potential/intended use of EPHF as a gold standard to improve traumatic injury responses in St Lucia.

Themes

St. Lucia Prehospital Trauma Response System and Response Policy

To elicit these experts' views on the current state of the St Lucian emergency response system (EMS), I asked four (4) open-ended questions (see Appendix B, Interview questions [IQ] 1-4). To determine the existence of a standardized response policy for the emergency response system, I asked these Senior EMS personnel, ER nurses and doctors, as well as MOH directorates (policy advisors) their opinions on the current use of any standardized traumatic injury response policy at the prehospital phase.

Satisfaction with Current Response Policy

The first set of perspectives shared by the thirteen (13) respondents spoke to their degree of satisfaction or dissatisfaction with the current policy and procedures to respond to traumatic incidents. The responses varied from a vague "… somewhat dissatisfied," to ". . . not pleased at all", and "… there is no policy" (See figure 4). The main views, per interview cohort, are noted below: -

ER Nurses: "I am not aware of any policy."

ER Doctors: "I am not sure if I can say satisfied or dissastisfied, as I have never seen or discussed with the EMTs any policy they used for trauma."

MOH Directorate: "There is no known trauma policy in place for St. Lucia Prehospital Services."

EMS Senior Staff: "We don't formally have a policy."

EMS Managers: "Very dissatisfied. There is no EMS Legislation, no policy."

Response Strategies Used

In recognizing that all respondents were of the view that there was no policy in place and that they were equally dissatisfied, I then asked what the current strategies and or procedures were that governed traumatic injury responses. Sixty nine percent 69% (*n*=9) of the respondents stated that the EMTs responded to traumatic injury incidents using the knowledge gained from their training (completing their EMS Courses) or in-service training (training on the job): -

EMS Managers: "We use our training as response Policy."

EMS Senior Staff: "We use previous knowledge gained in training as treatment

Protocols."

Emergency Room Nurses: "They use the training as treatment guide."

The following Word Cloud Image shows common words used in reference to the query of participant's satisfaction with the Island's prehospital trauma response policy.

Figure 4. Participants satisfaction with the Island's EMS Policy.

The other cohort respondents provided answers to support the opinion that there was no policy, and hence effectiveness could not be measured: -

EMS Managers: "There was no established emergency response procedure put in place with that training."

ER Doctors: "They have always complained of a lack of treatment procedures to follow."

MOH Directorate: "There is no organized system and or policies in place for them to utilize."

ER Nurses: "I am not aware of the EMS Policy but clearly if there is one, it is not followed or needs to be reviewed."

Effectiveness of the Training Strategies Used

The majority of respondents indicated that the strategies used to respond to traumatic injuries in St. Lucia were solely the skills and knowledge gained by EMTs and AEMTs personnel during training. Varying levels of concern were expressed that there were no formal edicts governing EMS. Perspectives included: -

EMS Senior Staff: "Yes. I am satisfied with the training guidelines used as trauma response strategies, even though a policy to guide the use of those would be more effective".

EMS Managers: "Relying on skills only can be dangerous. Chance of mistake is high if relying only on training. There is a need for good policy to guide response procedure, as well as to ensure standard of care is maintained".

ER Doctors: "As with any other profession, I would say that some EMTs don't follow what was taught in their training".

MOH Directorate: "Once the EMS personnel carry out the practice they were trained to do then prehospital trauma response is effective."

ER Nurses: "The strategies, that I know they use, whether written or unwritten is working to some extent and has some great effectiveness."

Traumatic Injury Response Weaknesses

The responses of the experts indicated that the Island has no legislative framework, response policy, and treatment protocol established by the Ministry of Health

and tabled in the legislative parliament to guide traumatic injury responses. The researcher then sought to learn if the lack of these endorsements contributed to deficiencies in the emergency response system. The question of the types of weaknesses noted in traumatic injury responses (IQ 4b) and how those identified in the prehospital traumatic injury response system, during the last five years were rectified (IQ 4), were then posed to the interviewees.

The respondent's descriptions of weaknesses were mostly criticisms of ". . . staff not doing proper patient assessment," ". . . not doing proper spinal immobilation procedures and treatment," and ". . . lack of communication between the ambulance and the ER" (See table 3). The majority of respondent (*n*=8) suggested that these weaknesses were rectified by training of responders/firefighters to become EMTs, continued medical education for current EMTs, and preparatory writing of treatment protocols. However, a few respondents *n*=5 had different views of the weaknesses and how they were addressed:-

EMS Senior Staff: "These weaknesses are not addressed through continued education or medical oversights."

EMS Managers: "Conflicts between the ambulance responders and ER staff are usually handled in a piecemeal manner without any overarching policy put in place to address the issue from a strategic standpoint."

ER Doctors: "The weaknesses I have seen is normally documented and competency in practice that is not correct are usually addressed."

ER Nurses: "It is not addressed, unfortunately. I still see these mistakes"

Lack of Policy and its Association to Response Weaknesses

The question of weaknesses was further probed to determine if they ensued from a lack of policy. Equally, a probing question regarding the reasons for improvements was asked to the interviewees as well. All respondents felt the weaknesses were due to a lack of policy and medical oversights.

EMS Senior Staff: "These weaknesses are a policy problem."

ER Nurses: "They are linked to a lack of policy and of Treatment Guidelines."

EMS Managers: "The weaknesses are all linked to several issues but mainly lack of policy and treatment guidelines."

Table 3.

Types of Weaknesses Identified in the Response System

Respondents	*Weaknesses Identified as per Interviewee*
ER Doctors:	"The lack of advanced care when it is really needed."
	"Suspected spinal injury patient not properly stabilized."
	"Lack of communication between ambulance and the ER."
ER Nurses:	" EMTs don't do a proper patient assessmen.t"
	"Lack of communication between ambulance and the ER."
EMS Managers:	" Not able to apply the theory they learnt to trauma calls."
EMS Senior Staff:	"Staff not doing proper patient assessment."."
	"EMTs assume that the spinal procedures are not needed"

Note. The common weaknesses described by respondents

Improvements Noted with Trauma Injury Responses

Weaknesses in the Islands prehospital traumatic injury responses were captured for a five-year period. It was therefore felt that the improvements noted in responses and within the system should compared over a similar timeframe. The interview question "Can you discuss any improvement noted in prehospital traumatic injury responses during the last five years (IQ 5)?" was then posed to the interviewees. Table 4 gives the list of improvements that the majority of respondents *n*=11 noted. Answers like "… training of firefighters to becoming EMTs," … improvements in continued medical education sessions," … initiating advance trauma care," and "… starting of writing treatment protocols". However two (2) responses suggested that there was either limited or no improvements noted over that five-year period.

EMS Senior Staff "Since being in EMS I have not noticed any improvement in trauma response."

EMS Managers: "Whatever improvements in the prehospital traumatic injury response during the last five years have been minor."

System Improvement to Enhance Response Procedures

Likewise, the majority of respondents felt that the training of EMTs and the replenishment of current traumatic injury supplies that were added to the response services during the last five (5) years, were geared toward a system improvement to strengthen the Island's trauma response procedure.

EMS Managers: **"**Improvements help with improving response time."

ER Nurses: "I can't say these improvements have anything to do with policy that

is non-existence."

ER Doctors: "It is not associated with any policy but geared towards improving the system."

EMS senior Staff: "These continuous medical education sessions were not done through Policy."

Table 4.

Improvement Recognized in St. Lucia Response System

Respondents	*Improvements Identified as per Interviewee*
ER Doctors:	"The equipment they are using now are more current to trauma."
ER Nurses:	"More firefighters trained EMTs."
EMS	"More firefighters trained EMTs."
Managers:	"Training was provided by certified/accredited college."
	"The improvement I have noted in the last 5 years are with selected EMTs providing advanced care."
MOH	"Recently there has been training of fire fighters and private EMTs in
Directorate:	trauma care."
EMS Senior	"More training, lots more EMTs training within the last 5 years. "Types
Staff:	of ambulances improved."
	"Improvements in more continued medical education sessions."

Notes: The Improvements described by respondents

Research Question 1

The respondents' views were similar as to which policies existed within the emergency response system in the Island. Their observations as to the weaknesses and improvements within the prehospital trauma response procedures during the last five (5) years were also shared. The researcher then set out to answer the three (3) research questions for the study. The first research question, "How can EPHF influence current emergency response policies and strategies to strengthen prehospital traumatic injury responses in St. Lucia?"

To answer this question, three (3) open-ended interview questions (see appendix B, IQ 6, 6b, and 6c) were used to extract respondents' perspectives. It was established that there was no response policy. The researcher therefore tried to determine if the EPHF were used in the EMTs training programs, or any other strategies used for their prehospital trauma responses. I asked them to explain how the EPHF have been used in the development of the current emergency response strategies.

The EPHF Usage in the Development of EMS Strategies

There were varied responses as to the use of the EPHF in the current training programs. Views given *n*=3 were:

> **EMS Senior Staff:** "Yes, the EPHF has been used in developing some aspects of our training but remember, we don't have a policy to say the EPHF are in it."
>
> **ER Doctors:** "Because there is no policy, skills and procedures observed carried out by the EMTs cannot be link the EPHF".

ER Nurses: "The EPHF have been used in the training guidelines. There are a few aspects of EPHF that were used in developing current training program used to train EMTs."

The EMS' use of the EPHF in health education was another perspective shared by some respondents *n*=2:

EMS Senior Staff: "EPHF 3 - Health Promotion has been used in community education programs carried out by the EMS."

ER Nurses: "EPHF10 - I cannot see the EMS department do much research. However, EPHF 3 - They have done a lot of health promotions."

Respondents *n*=2 also selected relevant EPHF that have either been used and or can be used:

EMS Senior Staff: "EMS department would flag certain injuries coming from certain communities; the EMTs would then report these cases and their frequencies to the MOH. The MOH would then address it. This is an example of EPHF1."

MOH Directorate: "The EPHF should have been an eye opener in recognizing the amount of grounds that must be covered to get the EMS to the standard where it should be."

A selected few respondents *n*=2, could not say if the EPHF were used.

MOH Directorate: "I can't explain due to not knowing if EPHF have been used as of yet."

> **ER Doctors: "**I am not knowledgeable about any current policy, neither am I aware if the EPHF was used in the recent emergency response policy in its infancy was drafted."

Two (2) respondents indicated that the draft treatment protocol in its infancy did not contain the EPHF:

> **EMS Managers: "**These EPHF are not used to develop the needed EMS protocols now in draft. The ambulance service in St. Lucia has not formally adopted the EPHF."
>
> **EMS Managers: "**I am not aware of any such a policy (EPHF) in St. Lucia and as a result I am unable to respond to his question."

Perceived Usefulness of the EPHF to Traumatic Injury Response Procedures

To draw further clarity on the use of EPHF in previous traumatic injury responses, the question, "Can you say how the EPHF aided in the improvement of traumatic injury response procedures?" was then asked. The respondents again shared mixed views. The EMS staff were able to identify that EPHF 3, 4, and 8 were used to some extent:

> **EMS Senior Staff:** "So far, only aspects of EPHF 3 and 8 have been used to improve our trauma responses." Another senior staff stated "EPHF 3 - We have a component of health promotion as a big one. The third senior staff stated "EPHF 4 - We have social participations where the public is called in and issues of illnesses, not necessarily injuries, are discussed."

One (1) EMS Manager and one (1) MOH Directorate insisted that because there were no policies or protocols, that the EPHF are not used.

EMS Managers: "The EPHF have not been used in any trauma policy in the St. Lucia Response Procedures."

MOH Directorate: **"**The EPHF were once used as a set of guiding principles to evaluate, monitor and improve the public health services offered to the public. However, I am not aware that they were ever used in the ambulance services."

Other views shared *n*=4, proposed ways that the EPHF can be used to strengthen trauma responses.

EMS Senior Staff: "Each function could be used in aid of a better trauma response. Example, they can be included in policy that would help to educate the population on how to better handle trauma. The EMTs can also use these EPHF as a part of their training policy and treatment protocols – EPHF 1, 3, 5 and 8."

ER Nurses: "It can also provide continued monitoring to see how effective the trauma strategies are."

ER Doctors: "The EPHF can be used as proactive planning and training strategies. These EPHF, if used, can be monitoring, evaluating and alignment tools for trauma cases, according to the patterns of trauma."

The Use of EPHF to Improve the Prehospital Response Policy

One of the central questions to the research study was, "How can the tenets of EPHF be used to strengthen prehospital trauma responses in St. Lucia. The interviewees were all asked to explain how EPHF 3, 4, 5, 8, 10 and 11, could improve the prehospital response policy. The majority of views shared were grouped as per the listed EPHF

numbers. There was a consistency and similarity of answers amongst all respondents. The major views expressed for each EPHF were: -

- EPHF 3. Health Promotion
    - **EMS Senior Staff:** "EPHF 3 – Health promotion can be used to help the public be more sensitized as to what they should do and not do at a trauma scene."
    - **ER Doctors:** "The EMS system can use EPHF 3 to facilitate more public awareness of the consequences and risk factors of improperly moving trauma victims. Moving patients inappropriately before the ambulance arrived."
    - **MOH Directorate**: "EPHF 3- Health promotion is one of the key elements in public health function, it is very important to trauma responses."
- EPHF 4. Social Participation in Health
    - **EMS Senior Staff:** "EPHF 4. Collaboration with other stakeholders to host workshops so response teams can better work together during trauma responses."
    - **MOH Directorate:** "Social participation of each organization should be put on the front burner so that we all can be aware of each other responsibilities."
    - **MOH Directorate:** "EPHF 4. Social Participation in Health indicates that when the community is trained as first responders, because they are

always first on the scene of trauma and disaster, the public skills can help to prolong life of a person that is injured."

- EPHF 5. Development of policies and institutional capacity for public health planning and management
    - **ER Doctors:** "EPHF 5. The development of Policy and intuitional capacity may change their outlook on the care that is given to patients. Policy formation will help to boost compliances with standards of care."
    - **EMS Manager**s: "An allied health practitioner's act was passed in 2006, EPHF 5."
    - **MOH Directorate:** "EPHF 5. The development of new policy and revision of any existing policy will help with health promotion and effective traumatic injury response."
    - **MOH Directorate:** "EPHF 5. There is a need for these functions to be incorporated in policy framework."
- EPHF 8. Human resources development and training in public health
    - **ER Doctors:** "EPHF 8 is also very important. Ensuring competent healthcare workers will reduce the deaths and disability rate of St. Lucia."
    - **MOH Directorate:** "EPHF 8 indicates that the human resource development and training should be a priority."
    - **MOH Directorates:** "EPHF 8. Human resources development and training in public health: Once people know how to react to some

incidents and the best way to treat them, then treatment from when EMS come to the scene would be greater."

- EPHF 10. Research in public health
    - **ER Doctors:** "The key to improving trauma care at the prehospital level is to conduct research EPHF 10, on types of trauma calls, weaknesses on care and how they are linked to disabilities and mortalities."
    - **MOH directorate:** "EPHF 10. Research in public health is always needed to maintain good health practice and response procedures for effectively responding to traumatic injury."
- EPHF 11. Reduction of the impact of emergencies and disasters on health
    - **MOH Directorate:** "EPHF11. Reduction of the impact of emergencies and disasters on health. If prehospital response is given priority, it will surely help to reduce health impacts. Can I say more? Many studies have linked the weaknesses of a prehospital service to a high death toll in disaster situations. Our neighbor Haiti was a clear example."
    - **EMS Senior Staff:** "EPHF 11 would be useful as training to deal with disaster and help in mass casualty trauma response as well."

Although EPHF 1, 2 and 9 were not a part of the given EPHF, several respondents made reference to their urgent need in the Island's response system. The respondents viewed EPHF as crucial for effective response procedures. Views shared in reference to these EPHF were: -

- EPHF 1. Monitoring, evaluation, and analysis of health status

- **ER Doctors:** "The EMS department can enforce a monitoring, evaluation and surveillance system - EPHF1, to monitor types of trauma, impact from trauma, mechanism of injuries and lack of care in the prehospital system. In doing these monitoring, it would guide the ministry for planning as well as the EMT where certain types of treatments are needed."

- EPHF 2. Surveillance, research, and control of the risks and threats to public
  - **ER Doctors:** "These listed EPHF are very vital to EMS policy, not just trauma policy. However, specific to trauma, EPHF 10 should be the starting point. The department should use EPHF 10 to work in collaboration with EPHF 1 and 2."
- EPHF 9. Quality assurance in personal and population-based health services
  - **MOH Directorate:** "EPHF 9 is essential to the prehospital phase because a guideline for proper procedure would be created."
  - **EMS Senior Staff:** "Medical oversight would help in quality assurance- EPHF 9."
  - **EMS Manager**s: "EPHF1, 3, 5, 8, and 10, will be great assets to enforce EPHF 9. This will improve the monitoring, quality assurance, and legal framework for the EMS services."

Research Question 2.

The second research question explored how the components of the EPHF can be assimilated into policy planning and program development for the improvement of prehospital traumatic injury responses. In this section, the interviewees were asked two

questions (IQ 6d and 6f) and the results were compared in table format. The interviewees were asked, “Which EPHF were missing from the prehospital traumatic injury response policy?” and “Which of those missing EPHF would be useful to strengthen response policy and or procedures?” The respondents were further probed with a third question (IQ 6e), to gain insights as to why there were missing EPHF

Missing EPHF from Prehospital Traumatic Injury Response Programs

Because the responses previously received asserted that there was no policy, the questions were modified slightly. The interviewees were asked “Which EPHF are missing from the prehospital traumatic injury response strategy and or procedures used?” as well as, “Which EPHF would be indispensable to strengthen those response strategies and procedures?” Consistency of responses from the varied groups interviewed showed that the majority of respondents singled out EPHF 1, 2, 3, 4, 6, 10, 11 and sections of 9 as missing, and that EPHF 1, 2, 3, 5, 8 and 10” would be useful for improvement of prehospital response procedures and policies. *Table 5* displayed the interviewee perceptions of missing EPHF and those that are essential for strengthening of those response strategies.

Reasons Why These EPHF are Missing

The respondents were further probed with the question, “Can you give reasons why these EPHF are missing from the response policies, strategies and response procedures?” The majority of respondents *n*=11, provided similar answers - “There is no policy or treatment procedures, therefore they are all missing.”

However, two respondents stated: -

ER Nurse: "I am not sure why the EPHF are not used."

EMS Manager: "I cannot say why the policy or the EPHF which should be included are missing."

Table 5.

Comparison of Missing EPHF to the Propose Useful EPHF

Respondents	Missing EPHF	Useful EPHF for improvement
ER doctors:	"1, 3, 5, 8 and 10"	"1, 5, 6, 8 and 10"
ER Nurses:	"1, 2, 5, 8 and 10"	"1, 2, 3, 5, 8 and 10"
EMS Managers:	**"**1, 2, 3, 4, 6, 10, 11" section 9".	"1, 3, 5, 8. and 10"
MOH directorates:	"1, 2, 3, 4, 5, 6, 8, 9, and 10".	"All except 7".
EMS senior staff:	"6, 10 and 11, aspect 1-5, 6, 8 & 9"	**"**1, 2, 3, 4, 5, 8, and10"

Note. A comparison of the missing EPHF to the proposed useful EPHF

Reasons Why These EPHF are Essential to the Strengthening of Procedures

The respondents did not just state which EPHF were useful to strengthen the response procedures. They all gave reasons why they were essential. These responses were thoroughly assessed, by re-reading transcripts and reviewing notes. The major recurring responses were ". . . EPHF needed for health education of the public", ". . . EPHF should be used for research, assessment, monitoring of calls and policy planning" and, ". . . EPHF are essential to quality assurance and oversight for procedures carried out by the EMS personnel." The views, as they were expressed, are presented below: -

ER Doctors: "EPHF 6. Many regulations are on paper but not enforced. Many of the traumatic injuries seen could have been better managed in the prehospital

stage had regulations been in place and penalties given when standards of care are breached."

ER Doctors: "My perspective as a healthcare provider would be to combine EPHF 1 and 10, then incorporate EPHF 5 and 8. What do I mean by that? I would use the research methodology in public health to monitor the calls received in the system for the past 5 years. I would look backwards. Based and what the data shows me, I would develop policy to fit the pattern of calls. Then I would give additional training to the EMS according to the findings of the data. This would be a revolving cycle for every 5 years."

ER Nurse: **"**EPHF 8 would be very helpful to improve trauma. If we get our workers trained, we would get better results with our patients. I also believe EPHF 2 and10 would help to see the types of trauma and provide training based on the types of trauma."

ER Nurse: "To build a good traumatic injury policy in the EMS we would have to start with EPHF 1. Constant monitoring of the types of trauma will give the EMS and the health department an idea of what types of trauma to prepare for. EPHF 2 is important, it intertwines with EPHF 1. Having EPHF 2 in the EMS forces a closer working relationship with the MOH through a reporting and monitoring system. They would evaluate calls received by EMS, the prevalence of the trauma, as well as types of trauma."

"EPHF 3 is a must, this helps the public to become aware of how to treat the trauma victims while they wait on the ambulance."

"EPHF 5, 6 and 8 addresses policy and human resource development using research in public health, EPHF10 and other best practices."

EMS Managers: "EPHF 1, 3, 5, 8. and 10 will be great assets to improve the monitoring, quality assurance, and legal framework for the services".

MOH Directorate: "EPHF 3, because it will help community members to know when and how to assist a trauma victim. EPHF 8 will help to ensure the EMS workforce is competent. EPHF 9 will aid in matching the service EMS provides to the population we serve. EPHF 10, trauma cannot be improved without current research."

Proposed Ways to Incorporate EPHF into Policies

The next question asked of the respondents (IQ 7) was, "How would you recommend that the EPHF identified as essential to prehospital trauma are executed into the St. Lucia prehospital traumatic injury response policies and procedure?" This question was followed by IQ 7a which focuses on "… any perceived barriers or challenges to the implementation of EPHF into the policy of the St. Lucia emergency response system?"

Implementation Strategies

The respondents proposed that these overall EPHF strategies be implemented through direct consultation with the St. Lucia Ministry of Health (See Figure 5). They proposed that the Ministry of Health be stimulated to action through public and private sector lobbying. Responses were: - "implementation through consultation with the

ministry of health and getting the political buy-in," "public and private sector lobbying and through research and continued medical education."

EMS Senior Staff: "As to EPHF 6 legislation that is missing, this can be implemented if government have political will to pass the legislation. For EPHF 10, EMTs should be trained in research skills, how to look at ambulance calls and mistakes made by the EMS staff then conduct research on how to improve responses." Other senior staff suggested, "Use the St. Lucia EMS association to lobby for the missing EPHF through the Ministry of Health and ensure legislation is enacted. There is need for public lobby as well as the political buy-in, and all relevant EPHF should be placed in a handbook as part of the EMS Continued Education."

ER Doctors: "We would first need to have evidence that these EPHF can be useful. Next, we would have to get the Fire Department to see the need for their legislation, protocols and policy as an part of their system and the day to day operation policy." One doctor suggested, "The EPHF can be implemented through designing standards of care guidelines for services and holding EMTs to better quality of care (Quality assurance)."

MOH Directorate: "By doing survey or research of the different traumatic injuries EPHF 1 and 2. Discuss the different response and their effectiveness with the Ministry of Health and Parliamentarians, do comparative analysis of countries that used the EPHF."

EMS Managers: "Such a policy has to first be developed in consultation with the Ministry of Health officials and experts." Another EMS manager commented," "…have a quality assurance team that can steer recommendation to the training department and MOH."

The following Word Cloud Image shows common responses for the implementation of the EPHF into the St. Lucia prehospital response policy.

Figure 5. Implemetation strategy of the EPHF into Policy

Perceived Barriers and Challenges

In assessing the opinions of perceived barriers and challenges to implementation of the EPHF that were considered important, the common responses gained (*n*=13) were

described as willingness to change, lack of expertise in EPHF and lack of funding (See figure 6). Tabulated results were expressed as: -

EMS Senior Staff: "Barriers will be lack of political will. Meaning, getting the Ministry of Health to put before parliament that draft policy that are important." Another cohort stated, "There is a need for the Ministry to see Prehospital system as priority."

ER Doctors: "… not having knowledgeable trainers and training entitity to do EMS research is a barrier. People's reluctance to change."

MOH Directorate: " Implementing these EPHF will be deemed time consuming."

ER Nurses: "Skilled personnel or experts in EPHF are needed as well as the usual challenge of finance (Budget)."

EMS Managers: "Lack of consultation between the fire services and the Ministry of health, as well as ignorance of the EPHF and Politics." Other views shared by EMS Managers was: "Lack of Interest from the Ministry. Lack of Interest from the EMS leader. Slow process of the political will."

The Word Cloud Image shows words frequently used in reference to the perceived barriers and challenges that would prevent implementation of EPHF to prehospital trauma response policy, protocols and procedures.

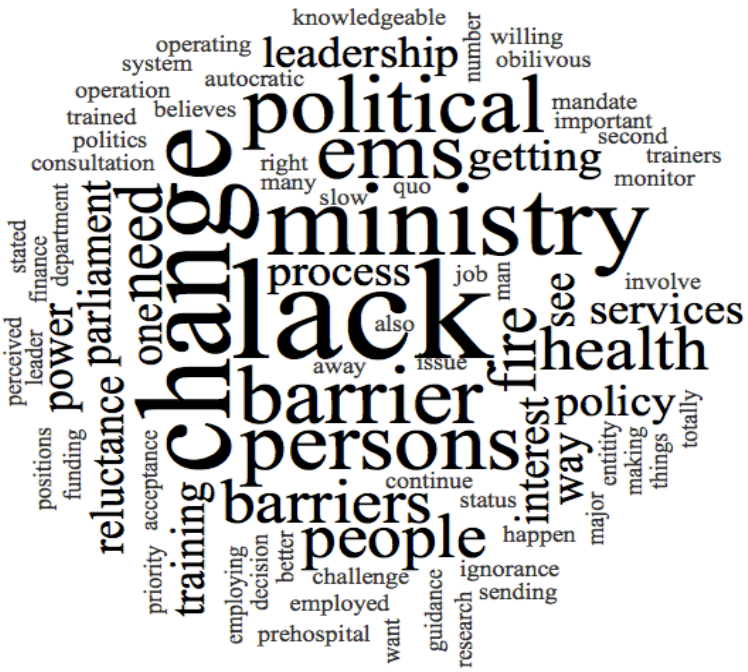


Figure 6. Perceived Barriers and challenges to implementation of EPHF to Policy.

Research Question 3

The final research question explored the use of EPHF as a gold standard to improve traumatic injury responses and how they impact the opportunities to develop and strengthen the emergency response system workforce in St. Lucia. Interview questions (IQ 8a and 8b) were used to tease out, "How can EPHF be used to assist in the assessment, monitoring and evaluation of prehospital traumatic injury responses?" as

well as to assessed sustainability strategies. The interview question explored "… after implementation, how can EPHF be maintained in the emergency response policy?"

Using the EPHF as Assessment, Monitoring and Evaluation Tools

Following the discussions on how these EPHF can be used in the prehospital trauma response policies and assessing the barriers and challenges to implementing them in the emergency response system, the EPHF usage as a gold standard for assessing, monitoring and evaluating prehospital traumatic injuries were then examined. Themes derived from the interviews regarding assessment, monitoring and evaluation were linked to quality assurance. The theme recurring the most was "… assessment, monitoring and evaluation of the EPHF as gold standards would be enforced through Quality assurance program?"

The main perspectives shared were organized as follows: -

> **EMS Managers:** "Assessment, monitoring and evaluation of the EPHF as a gold standard would be enforced through Quality assurance program. This is needed in St. Lucia EMS. This quality assurance would provide feedback on the usefulness of EPHF in policy."
>
> **ER Doctors:** "Use the EPHF as policies not just for response but for quality assurance. When these policies are made public, EMS staff would realize that they will be held accountable for their actions and work to the best of their abilities." Another view expressed was, **"**The EPHF were originally designed in the region to be used as a guideline to assess what needs to be done in any public health services. Therefore, they can be used to implement standard of care and

procedure, then evaluate the effectiveness of the protocols to international gold standard and look for ways to adjust or make changes where necessary."

ER Nurses: "Create a designated person within the Ministry of Health that the Fire department can report to." Another view was, "Use the EPHF as a response guideline. This would give the step-by-step procedures of how to do assessment of the day-to-day calls."

Senior EMS Staff: "One way to ensure that EPHF are assessed, monitored and evaluated is to do monitoring of health status. An example would be to report the frequencies, types and places where trauma occurs to the Ministry of Health. This should be mandated as a primary duty for EMS and enforced by the Ministry itself. This will ensure that constant reporting is done through the Ministry of health."

After Implementation, how can EPHF be Maintained in Policy

Should these EPHF become implemented in the St. Lucia prehospital trauma response policy and treatment protocols, they would need to be sustained as part of the response strategy. The Interviewees were all questioned as to how they could be maintained as a part of the system.

ER Nurses: "Facilitate regular re-evaluation/research to determine, identify and facilitate changes where needed." Other views expressed, "Continuous evaluation and amendments of EPHF through research and evaluation as we see areas for change, and continuous research for areas that no longer work."

MOH Directorate: "It can be maintained with semiannual assessment programs or by appointment of a Quality Assurance Officer for quarterly assessments. A Quality Assurance Officer would monitor daily procedures and assess efficacy during research or data gathering and analysis from the hospital."

EMS Senior Staff: "These EPHF can be maintained by constant analysis and evaluation of the practice and implementation of the policy so that it can continually be tailored to suit the country."

Summary

The purpose of the study was to analyze the perspectives and experiences of key experts in the emergency response network, by identifying factors that could potentially influence the implementation of EPHF in the St. Lucia traumatic injury response system. An evaluation of how the Islands response system incorporates EPHF in the development of emergency response policies and strategies was gained from these perspectives. The study also explores the views and experiences of these experts on how the emergency response systems in St. Lucia incorporated EPHF 3, 4, 5, 8, 10 and 11 for prehospital traumatic injury responses. An assessment of the EPHF that were in place to support effective and efficient emergency response to traumatic injuries was extracted from the views.

Participants were selected using a criterion-based sampling procedure. They were informed of their rights to withdraw from the study before they signed the informed consent form at the beginning.

The researcher used the credibility, transferability, dependability, conformability, and intracoder reliability strategies to ensure evidence of quality in the data used and trustworthiness of the data collected. The credibility of the study was verified through use of the triangulation data collection method. Credibility was further strengthened by the members check method. Secondly, the researcher used transferability or external validity to evaluate the degree to which the findings of the study can be applied to similar situations. The researcher identified avenues where prehospital injury response procedures and policies, and quality assurances and health education to the public can be strengthened in other Caribbean Islands. Next, in ensuring dependability for this study, interview sessions were audio recorded with an external microphone to capture verbatim the information shared by interviewees. The transcribed notes for participants who refused to be audio recorded were validated by them for accuracy. Finally, confirmability of the data was achieved through an audit trial, reflective journal (use of bracketing for bias) and triangulation data collection method.

Responses from in-depth interviews examined how these ER, EMS and Ministry of Health experts viewed the country's prehospital trauma response policies, and their levels of satisfaction with EPHF replicated in the EMS policy. Their perspectives provided clarity on policies, treatment protocols and legislations that were used to govern the prehospital response systems, and the state of the emergency response governance monitoring within the policy framework. Their observations as to the weaknesses and improvements within the prehospital trauma response procedures during the last five (5) years were shared.

The first research question explored was “How can EPHF influence current emergency response policies and strategies to strengthen prehospital traumatic injury responses in St. Lucia?” Through their answers, it was established that there was no response policy in place. The researcher therefore tried to determine if the EPHF were used in the EMTs training programs, or if there were any other strategies used for prehospital trauma responses. There were varied responses as to the use of the EPHF in the current training programs.

The second research question explored how the components of the EPHF can be assimilated into policy planning and program development for the improvement of prehospital traumatic injury responses. Three interview questions were used to garner respondents’ views. The questions, “Which EPHF were missing from the prehospital traumatic injury response policy?” and, “Which of those missing EPHF would be useful to strengthen response policies and or procedures?” The majority of respondents singling out EPHF 1, 2, 3, 4, 6, 10, 11, and sections of 9 as missing, and EPHF 1, 2, 3, 5, 8 and 10” useful for improvement of prehospital response procedures and policy. The respondents were further probed with the question “Can you give reasons why these EPHF are missing from the response policy and strategies of response procedures? The majority of respondents n=11 indicated that there is no policy or treatment procedures therefore they are all missing.

The third research question explored whether the use of EPHF as a gold standard to improve traumatic injury responses impact opportunities to develop and strengthen the emergency response system workforce in the St. Lucia. Discussions on the barriers and

challenges to implementation of these EPHF were then explored. The theme that reoccurred the most regarding the sustainability of these EPHF as gold standards were their enforcement through quality assurance, assessment, monitoring and evaluation and would be enforced through quality assurance program.

Chapter 4 provides an overview of the process used to collect, tabulate, and analyze data collected from these ER and EMS experts as well as the Ministry of Health policy experts in St. Lucia regarding the emergency response system use of EPHF in their response procedures and policy. In Chapter 5 I offer an interpretation of the study findings, the limitations of this study, recommendations and social change implications.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of the study was to analyze the St. Lucia emergency response systems and identify the factors that could influence the implementation of the EPHF in the Island prehospital trauma responses. An evaluation of how the St. Lucia response system incorporates EPHF in the development of emergency response policies and strategies were gained from these perspectives. I sought to address the strengthening of traumatic injury responses at the prehospital level, as injuries and deaths in the English-speaking Caribbean, such as St. Lucia, account for approximately 11.5% of total deaths (Crooks et al., 2014).

Using 2007-2013 data, Crooks et al. (2014) showed that 4 times as many men in the productive and reproductive age group died from injuries than females in the same age cohort. Additionally, one in four males between the ages 15-44 in the English- and Dutch-speaking Islands of the Caribbean (which includes St. Lucia), die from violence more than from any other cause of death. These reasons justify this study's assessment of the use of EPHF to strengthened prehospital traumatic injury responses. The following research questions were the basis of this study: -

1. How can the EPHF influence current emergency response policies and strategies to strengthen prehospital traumatic injury responses in St. Lucia?
2. How can the components of the EPHF be used for policy planning and program development to improve traumatic injury responses within the prehospital phase?

3. How does the use of the EPHF as the gold standard impact opportunities to strengthen and develop the St. Lucia emergency response system workforce to improve traumatic injury responses?

To answer these questions, I used the qualitative descriptive approach with in-depth, face-to-face, as well as Skype and telephone interviews with 13 ER, EMS, and ministry of health policy experts in St. Lucia. The qualitative descriptive approach allows for a comprehensive summarization of specific events, using the lived experiences of individuals or groups of individuals (Lambert & Lambert, 2012) via in-depth interviews. A qualitative descriptive study also provides a more holistic and rich collection of data from various sources to gain a thorough understanding of individuals' opinions, perspectives, and attitudes (Nassaji, 2015).

Most of the interviews for this study were audio recorded and detailed notes collected on the thematic interview guide to ensure accuracy and precise transcriptions. Reflective notes were taken that were transcribed and uploaded to NVIVO 10 for Mac for data management. To analyze the data, I used inductive thematic coding format (Braun & Clarke, 2006; Galvin et al., 2017; Nowell et al., 2017), which allowed me to analyze frequent and important emerging thematic areas (Galvin et al., 2017).

The main findings from the respondents were the lack of prehospital traumatic injury response policy, treatment protocols, or response guidelines. Response procedures are done using knowledge gained from EMS training. The results indicated that the EPHF would be a useful compliment to response policy; however, these EPHF and treatment protocols must be guided through quality assurance from the medical fraternity.

Chapter 5 includes an interpretation of the data derived through those emerging thematic areas expressed in Chapter 4. A discussion on the interpretation of the data using the conceptual and theoretical frameworks as guide are also displayed in this chapter. Lastly, the limitations of the study, recommendations, and social change implications are presented.

Interpretation of the Findings

St. Lucia Prehospital Trauma Response System and Response Policy

My study included 13 respondents from the St. Lucia fire department, the ministry of health, and the two government-operated secondary hospitals. No demographic data were collected on these respondents as this information was not applicable. Data collection stopped at 13 respondents as no new information was garnered after the eleventh interviewee. This indicated that data saturation was reached.

Response Policy

The first main thematic area explored were views, perspective, and attitudes toward the St. Lucia prehospital trauma response policy and response procedures. All respondents shared the view that there was no response policy. The majority expressed dissatisfaction that there was no treatment protocol or documented standard operating procedures for traumatic injury responses. These views were similar to the findings documented in two PAHO technical studies done by Segree (2003) and Moss (2010).

A review of listed policy documents such as the Motor Ambulance Regulations, Statutory Instrument 10/1962 and the Public Hospitals (Management) Act made no provision for prehospital care response procedures or prehospital trauma care performed

by EMTs, advanced emergency medical technicians (AEMTs) or paramedics (Moss, 2010, p. 20). Other documents included the Disaster Management Act (Act No. 30 of 2006) and the country's National Emergency Management Plan that comprises several policy documents, such as the Comprehensive Disaster Management Strategy and the National Mass Casualty Management Plan (Moss, 2010, p. 20). These policies insinuated that the St. Lucia fire service ambulance was the national emergency response team. However, according to Moss (2010), no reference to prehospital care guidelines were documented in any of these documents. A thorough search of the literature conducted by myself did not find any other current policy.

Response Strategies and their Effectiveness

Sixty-nine percent of respondents (n = 9), stated that the EMTs responded to traumatic injury incidents with the knowledge they gained in training. The other 31% (n = 4) suggested that there is no policy or response procedure that guides EMS trauma responses. Based on the data collected, views were varied on the effective use of knowledge and skills gained in training versus unwritten policies for response procedures. Few respondents indicated partial satisfaction (n = 3), whereas others stated that complete reliance on skills can be dangerous (n = 2). Some respondents felt that use of training skills was helpful but required policy and procedural support (n = 8).

The WHO (2005) recognizes that injury is a major cause of death and disabilities worldwide, and that many developing countries like St. Lucia do not have a systematic approach to their prehospital response systems or standardized guides to effect response procedures. The WHO linked these deficiencies to a lack of policy, financing, and experts

to direct prehospital care responses. As part of the strategies that the WHO recommended to curtail these disabilities and deaths, a reference guide was designed to develop a simple, sustainable, and practical prehospital trauma care system. Key points in this guideline where that prehospital trauma care system must be infused into the existing public healthcare system, having the appropriate transport infrastructures (ambulances) with appropriate policy guidelines, and treatment protocols to guide caregiver responses (WHO, 2005).

Weaknesses of Traumatic Injury Responses

The weaknesses described by the respondents were mostly criticisms of EMS staff not doing proper patient assessments, conducting improper spinal immobilation procedures, and the lack of advanced treatment when needed. The ER respondents decribed lack of communication between the ambulance and the ER department as a major weakness for trauma responses linking these weaknesses to both a lack of treatment protocols as well as lack response policy. Although some respondents felt these weaknesses were addressed through continued medical education and training of fire fighters and EMTs, others felt they were only documented and required continued medical education, with medical oversights, to properly address the deficiencies.

The weaknesses described by the interviewees in St. Lucia were similar to those observed by Williamson et al. (2011) in their study conducted in developed countries. Garner et al. (2015) indicated that deaths and disabilities from traumatic injuries could be attributed to the quality of care given. Data have shown similar prehospital weaknesses such as the misdiagnosis of traumatic injury patients by prehospital care providers. For

example, signs of brain injury were not recognized at scene, chest injury complications go unnoticed, and spinal injuries are further complicated by improper movement, and the non-administration of appropriate advanced medications (Garner et al., 2015; Hazeldine et al., 2017; Sriram et al., 2015). In studying the advances in prehospital trauma care in developing countries Williamson et al. indicated that documentation of treatment breaches and continued medical education were useful strategies to address these weaknesses but not sufficient. In addition to continued medical education, these authors recommend review and standardized treatment procedures and protocols to include a trauma scoring system that would then be used in future research projects, allowing for the comparison of different treatment modalities and the differences in prehospital care (Williamson et al., 2011).

Additional recommendations have been made for the use of current technology (telemetry and other modalities) by ambulance personnel to communicate patient injuries and care with emergency departments were recommendations (Bahrami et al., 2011), as strategies to address EMS communication weaknesses. Borgohain and Khonglah (2013) endorsed the use of telemedicine, e-medicine, and e-information to transmit patient injury pictures, cardiac arrhythmias, and other useful information to the ER staff to prepare for the incoming traumatic injury patients. Borgohain and Khonglah concluded, however, that this data communication must have strict medical policies to guide their usage.

The lack of treatment protocols was identified as the major cause for the lack of advanced trauma care. Both ER doctors and nurses mentioned cases where patients needed advanced care but AEMTs did not provide that care because of lack of medical

oversight. Studies conducted on trauma injuries of war victims and mass casualty incidents in the Middle East have linked success in care to effective trauma policy, medical oversight, guidance to caregivers at scene, rapid and safe transportation of stabilized victims, ongoing trauma care during transport and direct communication with ER doctors (Borgohain & Khonglah, 2013).

Improvements in Traumatic Injury Responses

The improvements noted within the St. Lucia Fire Department EMS Service during the last 5 years were mostly the upgrade of staff competences in the training of fire officers to becoming EMTs, and EMTs to AEMTs. Respondents also gave feedback on improvements of response procedures stemming from frequent continued medical education sessions. Few EMTs (n = 3) shared perspectives indicating an improvement of ambulance fleet and development of treatment protocols. Two respondents stated that there were no improvements. Of the respondents that discussed improvements (n = 11), all associated those improvements with strengthening of the services' infrastructure. In resource-challenged countries like St. Lucia, entities with responsibility for emergency care often endeavored to ensure that the infrastructure was available to respond and carry out its roles and responsibilities with its limited resources (Burke et al., 2014). Improvements in infrastructure (more ambulances) and training of new staff to better respond are noted across developing countries (Aekka et al., 2015; Burke et al., 2014).

Research Question 1

Policy and Procedure for Effective Prehospital Trauma Responses

Based on the analysis of the in-depth interviews, EMS staff, EMS Managers, ER staff, and the ministry of health personnel have a basic understanding of the EPHF and their relevance to evaluate, monitor, and strengthen public health services like those offered by the EMS Department. The participants' answers to the use of the EPHF in the prehospital response strategies ranged from "because there is no policy, skills and procedures performed by the EMTs cannot be linked the EPHF," and, "Yes, the EPHF have been used in developing some aspects of our training, but remember, we don't have a policy to say the EPHF are in it." The issues of absent response policies, treatment protocols, or legislative frameworks were recognized by Moss (2010). However, the EMS managers (n = 2) indicated that treatment protocols are in the infant stage of development but that EPHF were not components of their development. EMS managers indicated that, "These EPHF are not used to develop the needed EMS protocols now in draft," and "I am not knowledgeable about any current policy, neither am I aware if the EPHF was used in the recent emergency response policy."

The respondents shared their perceptions of how an emergency response system should be managed and operated to effectively and efficiently respond to trauma injury calls. Opinions such as, "There is no organized system and or policies in place for them to utilize" were expressed, showing that the response system must be governed through policy, response procedures and legislation. According to Hoy et al. (2014), to prevent the spiraling rate of disabilities stemming from trauma in developing countries,

healthcare systems must invest in the creation of response policies and treatment protocols and match their response procedures to the types of injuries the country's response system faced. Wolf et al. (2013), Vos et al. (2012), and Vansell et al. (2015) all supported the views of Hoy et al., indicating a robust policy with medical protocol are all part of the legislative framework needed for any effective prehospital system. Hoy et al. also called for drastic reform in developing countries response policies to suit the type of trauma the responders received. Hoy et al. suggested that no response system would be able to function effectively without policy guidance.

Elements of EPHF in the Current Prehospital Response Strategies

Because no trauma response policy was identified, the respondents were able to share how they felt the EPHF were used in the response programs for trauma responses. Eight respondents identified sections of the EPHF tenets currently used informally. Views expressed (n = 6) as to how the EPHF have been used in the development of health education, social participation, and public health research were, "So far, only aspects of EPHF 3 and 8 have been used to improve our trauma responses." Another respondent stated, "EPHF 4 - We have social participations where the public is called in and issues of illnesses, not necessarily injuries, are discussed." However, few respondents (n=3) felt they were not used. They responded with, "I am not knowledgeable about any current policy, neither am I aware if the EPHF was used in the recent emergency response policy in its infancy was drafted." Anderson et al. (2012), as well as Gonzalez Block et al., (2013), recommended that the EPHF be considered as instruments for policy reform. Indicating that the health ministries should see these EPHF as more than mere

monitoring and assessment tools. Holder (2007) reminded health ministries of the stated purpose of the EPHF when conceptualized, indicating that they were formulated by the health ministry's themselves to evaluate, monitor, and restructure health services for the public. This restructuring process must start at a policy and political level (Holder, 2007).

The views shared suggested that none of the listed EPHF were used in their entirety in the Island's response system. EMS staff indicated that EPHF 3, 4, and 8 were used to some extent. They expressed views like "So far, only aspects of EPHF 3 and 8 have been used to improve our trauma responses." Another EMS staff stated, "EPHF 4 - We have social participations where the public is called in and issues of illnesses, not necessarily injuries, are discussed." However, the ER staff and the MOH interviewees did not feel that the EPHF were a part of any of the EMS response strategies. They stated, "The EPHF were once used as a set of guiding principles to evaluate, monitor and improve the health services offered to the public. However, I am not aware that they were ever used in the ambulance services." Both Martin-Moreno el al. (2016) and Gonzalez Block et al., (2013) confirmed the latter view that the EPHF were not used in their entirety in any prehospital services in the Caribbean. Martin-Moreno el al. confirmed that many countries only used the EPHF to assess and monitor their public health services. The development and strengthening of the services, based on the assessment results, Martin-Moreno el al. indicated, are rarely used. The literature review search for this study did not reveal any prehospital usage in any peer-reviewed documents.

How can the EPHF be used to Improve the Prehospital Response Policy

Varied views were shared as to how EPHF 3, 4, 5, 8, 10 and 11, can improve the prehospital response policy. All respondents *n*=13 suggested that EPHF 3 can be used to facilitate more public awareness of the risks and consequences of improper movement of trauma victims at incident scenes. There were four (4) consistent views regarding EPHF 4. These respondents felt that collaboration with other stakeholders was essential to good prehospital trauma responses. Most responders combined their answers for EPHF 5, 8, and 10. Their views suggested that prehospital trauma research - EPHF 10, can start with the examination of the ambulance call logs to note the types of trauma the ambulance responded to - EPHF 1 and 2, and then design effective training - EPHF 8, and response policies - EPHF 5. In looking at the EPHF conceptual framework, the strategies as suggested by the responders, were replicas of those conceptualized for the health ministry (Aluttis et al., 2014).

The respondents expressed views as to the usefulness of EPHF 1, 2, 9 and 11. Several respondents *n*=9, suggested that a monitoring system - EPHF 1, surveillance and research to control public health risks, and EPHF 2, can be implemented by assessing the types of trauma, mechanisms of injury and response locations. EPHF 1 and 2 can be used to design appropriate training and response policies that are useful information for the ministry of health. They summarized that EPHF 1, 2, and 11 can complement EPHF 9, which is quality assurance in personnel and population. Many views shared *n*=8 were to the effect that "EPHF 9 is essential to the prehospital phase because a guideline for proper procedure would be created." In looking the EPHF as a conceptual framework

designed in 1999 to modernize and streamline public health functions, Gonzalez Block et al., (2013) supported the respondents' views that the EPHF can be used in research evidence, then design policy applicable for public health services, including prehospital services that can combat non-infectious diseases such as traumatic injuries.

Research Question 2

EPHF that are Missing from Response Procedures

The respondent's views on which EPHF are missing from the Island's response procedures were compared against those they expressed as the essential EPHF tenets needed to build an efficient and effective response program (see table 5). The majority of respondents singled-out EPHF 1, 2, 3, 4, 6, 10, 11, and sections of 9 as missing, and expressed that EPHF 1, 2, 3, 5, 8 and 10 were useful for the improvement of prehospital response procedures and policy. Sriram et al., (2015) in reviewing the prehospital services in Pakistan and India suggested that urgent improvement in the prehospital system must incorporate policy development and implementation, improvements in training, research of treatment standards and development of treatment protocols. The recommendations of Sriram et al., (2015) are in line with the EPHF that the respondents flagged.

Essential EPHF to Strengthen Traumatic Injury Response Procedures

The major recurring responses shared as to why EPHF 1, 2, 3, 5, 8 and 10 were indispensable for the strengthening of traumatic injury response procedures were ". . . EPHF needed for health education of the public…", "…EPHF should be used for research, assessment, monitoring of calls and policy planning. . ." and "…EPHF are

essential to quality assurance and oversight for procedures carried out by the EMS personnel. Aluttis et al., (2014) in a meta-analysis literature review of over 100 primary and secondary studies recommended the development of prehospital trauma response procedures through the use of research evidence, which are in line with EPHF 1 and 2, policy framework to guide human resource development using best practice response standards, a combination of EPHF 5, 8 9 and 10. Both Aluttis et al., (2014) and Sriram et al., (2015) endorsed quality health education EPHF 3 which enhances support from the public through community participation. Several respondents *n*=3, referred to EPHF 9 as essential for the strengthening of advanced procedures needed in traumatic injury responses. The respondents linked the lack of advanced care delivery to the absence of medical oversight. Responses to the effect "… if there was MOH oversight it would help in quality assurance - EPHF 9," as well as "… EPHF1, 3, 5, 8, and 10 will be great assets to enforce EPHF 9. This will improve the monitoring, quality assurance, and legal framework for the EMS services." Poor communication between ambulances and the receiving emergency rooms was identified as a developing problem for the effective management of traumatic injuries (Reynolds et al., 2017). These authors suggested that there is need for medical guidance for the ambulance crews at the scenes of trauma. This communication is not only needed by the ER teams to prepare for the incoming trauma, but also to provide procedural guidance for the ambulance crews (Reynolds et al., 2017).

Implementation Strategies to Incorporate EPHF into Policy

The majority of participants interviewed *n*= 9 proposed implementation through consultation with the St. Lucia Ministry of Health. Respondents felt that to have these

EPHF implemented into policy response procedures form a part of the legislative framework to support prehospital care, a political buy-in was needed. The majority of respondents recommended public and private sector lobbying to convince politicians, using research findings as convincing evidence. Crooks et al., (2015) as well as Sleet et al. (2015), suggested a starting point would be for the ministry of health hierarchy to recognize that traumatic injuries is now a global epidemic in need of urgent remedial action. The WHO (2013) indicated that political directorates and health planners needed to start using best practice evidence from continuous public health research. Finally, Sriram et al., (2015) proposed that the improvements gained from research be used in public and community stakeholder lobbying and public consultation with community politicians and health educators.

Perceived Barriers and Challenges to Implementation of EPHF into Policy

The respondents *n*=6 listed several barriers and challenges they perceived to hinder implementation of the EPHF into policy. Foremost, was the lack of political will, "… getting the Ministry of Health to put before parliament that draft policy that is important." These six respondents supported the view that the Ministry of Health needed to see prehospital services as important. One respondent *n*=1, suggested that: "… there is a need for the Ministry to see Prehospital system as priority." Other challenges listed, "Having knowledgeable trainers and training entitity to do EMS research,", "Peoples reluctance to change.", "Skilled personnel or experts in EPHF are needed.", "… challenge of finance (Budget) …,", and, "… lack of consultation between the fire services and the Ministry of health." Callese et al., (2015) identified barriers and

challenges stemming from a want of centralized prehospital resources, inadequate advanced traumatic life support training, and in most countries, the absence of standardized treatment protocols. However, Williamson et al. (2011) identified a need for strong political will that prioritized capacity building, infrastructure development and reinforcement, and building leadership capacity as key to the strenghting of emergency response system in those developed countries.

Research Question 3

EPHF as an Assessment, Monitoring and Evaluation Gold Standard Tool

The theme recurring the most, to address how to maintain the EPHF as an assessment, monitoring and evaluation gold standard tool, was that it would be enforced through a quality assurance program. Four (4) respondents indicated that quality assurance programs would provide useful feedback through policy. One respondent suggested that the EPHF were originally designed in the region to be used as a guideline for assessing public health services. These functions were used to assess standards of care and procedures, evaluate the effectiveness of the protocols to international goal standard, and then make adjustments or changes as applicable. Aluttis et al. (2014) in reviewing the conceptual framework models used globally looked at the model used in the Caribbean. Aluttis et al. (2014) indicated that the PAHO/WHO EPHF conceptual framework model, in addition to its function as an assessment tool, was designed as a monitoring tool and its results are often used as a Gold Standard for redevelopment strategy to strengthen public health in a holistic approach. Aluttis et al. (2014) results indicated that this strengthening of public health services like the emergency response system must be achieved through

prehospital service policy framework, guided by a bottom-up approach and supported by the EMS worker lobby for best practice protocols from the health planners. A strategic policy is then tabled in the Country's parliament (Aluttis et al., 2014; Williamson et al., 2011).

Maintaining EPHF after Implementation

The majority of respondents believed that sustainable strategies for the EPHF when implemented in the St. Lucia prehospital trauma response policy and treatment protocol can be maintained through a semiannual assessments program, or by using a quality assurance officer that will design quarterly assessment. Some respondents suggested a regular re-evaluation or research program that will determine weaknesses and identify areas for change. Studies conducted in 2006-2007 have found that many English-speaking Caribbean countries use the EPHF as an assessment tool only, but failed to move to the second stage of implementation (Gonzalez Block et al. (2013); Holder, 2007). Both Gonzalez Block et al. (2013) and Holder, (2007) studies recommend that the Ministries of Health in the Caribbean can do reprioritizing of the EPHF for sustainable reforms. Their findings also recommend integration of the EPHF into the planning for health priorities and their use as a part of strategic development and reform of the health sector, including prehospital services according to utilization profile.

Theoretical Framework

Roger's (2003) diffusion of innovation theory provides the framework that guides the development of my research questions and the basis for data analysis and discussion on the findings. Research findings in other health studies have used the diffusion of

innovation theory to examine how new research findings can be communicated to health planners, advisors and ministry of health officials for the amendments and creation of public policies, Gonzalez Block et al. (2013). It is well documented that not all persons within a social system accept new ideas (research findings) at the same pace (Gonzalez Block et al., 2013; Rogers, 2003). Change agents to drive policy shifts - acceptance of the EPHF as tools to rebuild and restructure the prehospital trauma response policy and response procedures and development of a legislative framework - will first need the support of the group Rogers (2003) classified as visionaries or opinion leaders. This group was identified in the research findings as the St. Lucia EMS Association Members, Senior Staff in the Fire Service (those with vested interest in EMS), and the ER Doctors who have continued to work closely with the Island's prehospital trauma care system. The research findings will be communicated to the group who will be the vehicle of change to stimulate public and private sector lobbying of this and other research findings, to the St Lucia Ministry of Health and the Political Directorate to inspire policy development.

The study identified other groups, those that Rogers (2003) described as the pragmatists, accepting change at a slower pace by avoiding risk. Rogers (2003) identified a third group called the late majorities or laggards who accepted new policy only by reacting to peer pressure. The results of the study identified these groups as those persons who are reluctant to change "people's reluctance to change." Respondents in the study recognized that in order for these late majorities or laggards to be a part of the change process, they will have to find ways to communicate the research findings to them to

stimulate their acceptance of the EPHF as a useful assessment and monitoring tool for the prehospital trauma response policy.

Limitations of the Study

There were several limitations to this study, namely - the small sample size, the sampling design, the geographical location and the potential for bias. The sample size n =13, proved a true reflection of the perceptions, attitudes, and experiences of the ER, EMS and Ministry of Health personnel within a larger population. The study methodology did not lend itself to the use of random sampling design and restricted the researcher's ability to generalize the findings. The research was conducted on the island of St. Lucia where there is limited private emergency service, and the fire service was the principal emergency system. The results might differ if a similar study was conducted on an island with a more robust public/private emergency response system. Finally, the answers to the interview questions were self-reported by the study participants and therefore increased the possibility of recall bias or misrepresentation of facts.

Recommendations for Future Research

The study is a preliminary look at the extent to which the English-speaking Caribbean Islands, like St. Lucia, can improve their prehospital traumatic injury response systems. There is need for further research to implement appropriate policy, treatment protocols and legislative frameworks that can guide efficient prehospital trauma responses. It is recommended that the St. Lucia Fire Service, through its EMS Department, explore public and private sector lobbying to target the design and

implementation of response procedures and treatment protocols, customized by the utilization pattern of prehospital needs.

EPHF 11 addresses the need to reduce impact from disasters. This area is wide and requires research as traumatic injuries are portrayed as a global pandemic (WHO, 2016). Lobbying for EPHF to be included in disaster management and health disaster research, which is often conducted by private and public international organizations like the Pan American Health Organization, CARICOM (Caribbean Communities) Cooperation in Health, and the Caribbean Disaster Emergency Management Agencies, is a recommended avenue. These entities conduct continuous research on other public health issues and are good vehicles to lobby on behalf of the emergency response system to the St. Lucia Ministry of Health using scientific evidence and research best practices.

Making EPHF a Public Health Agenda Item

A major recurring theme from the majority of the respondents is for governments and their Ministries of Health to make prehospital services a priority agenda item. Public Health Agencies such as the Pan American Health Organization (PAHO) can include the emergency response system as one of their agenda items for public health research, planning and development. Precedence must be given to the reduction of morbidity arising from the improper movement and transportation of trauma victims through the use of effective prehospital response services. Research is lagging in prehospital discipline. The St. Lucia Ministry of Health must be reminded that curtailment and reduction of the Island's total morbidity and mortality rates cannot be attained without regard to the impact of EMS prehospital responses (Aekka et al., 2015; Aluttis et al., 2014). Were

prehospital services made a public health agenda item, assistance would be provided for the right experts to streamline policy and legislative development. Making prehospital response a priority service in the MOH would also address the need for competent experts to facilitate training and develop prehospital research capacity, as well as provide able personnel to use the ambulance call logs to conduct research, evaluation, surveillance monitoring and quality assurance, using the EPHF as its gold standard tenets.

Communication and Medical Oversight

Another recommendation is to improve prehospital care communication. There should be consistent communication standards for rural and urban trauma care (Borgohain, & Khonglah, 2013). Both communities can share access to consistent trauma care by improving online medical communication between ambulance and emergency room (VHF radio communication and telemetry with ER doctors). There is need for research on the use of e-medicine or telemedicine in rural communities and e-information such as online medical communication, for the AEMTS to relay information to the ER on the types of injuries and cardiac rhythms observed in patients, and to confirm prehospital trauma care protocols. Communication strategies would include community health education, which is essential to prevent increases in morbidity (paralysis from improper patient movement). This health education could involve community visits and health fairs (education for geriatric caregivers and family members) on the prehospital care of the victims of falls.

Quality Assurance and Medical Oversight

The final recommendation would address a major theme derived from the results - the need for quality assurance of the emergency responses and provision of medical oversight. It is recommended that the department explore best practices for the ER doctors and nurses to guide the AEMTs to improve their delivery of advanced trauma life support care. This oversight would address the issue of lapses in the standards of care provided by EMS responders. The oversight would aid in the assessment, evaluation, and monitoring of EMS call logs and 911 data, that are currently not used as a part of the public health surveillance and diseases tracking and tracing.

Implication for Social Change

The research findings have the potential to develop social change programs for trauma victims that are often improperly moved and transported to ER Departments. An injury response protocol could be developed to reduce paralysis in these traumatic injury patients, and health promotion and/or health education campaigns created to sensitize citizens to the perils of unnecessary and improper movement and transportation of the injured. These strategies could aid in the reduction of injury morbidities and deaths.

Country-specific profile data suggest that the under-developed and/or missing EPHF in the emergency response systems in most Caribbean countries stem from financial resource constraints (PAHO/WHO, 2008). The research results also have the potential for social change through tailored emergency response systems that fit the needs of the target population, based on utilization patterns. The initial system could be built with existing resources as most countries have utility vehicles available, that could be

repurposed and equipped with personnel (nurses) trained in injury response protocols developed around the EPHF.

Conclusion

Based on the data analyzed, I was able to determine that the emergency response system in St. Lucia can be strengthened with the development of a prehospital response policy, treatment protocols and a legislative framework to guide ambulance operation on the Island. The results showed that these documents are currently missing, and EMTs respond to traumatic injury incidents with only the knowledge gained from their structured training (completion of EMS Courses) or in-service training (training on the job). I was able to conclude that the emergency response personnel, ER staff, and MOH policy advisors, have a fair understanding of how the EPHF can address the areas lacking in prehospital traumatic injury responses. The responders were able to link the following weaknesses to an absence of protocols and policy - improper patient assessment by EMS staff, inconsistent spinal immobilation procedures, and trepidation to initiate advanced trauma life support care. The weaknesses identified - a lack of medical oversight, and the absence of online medical communication between the ambulance and the ER.

The data addressing Research Question 1 showed that the EPHF were not officially used in the current prehospital response procedures. However, several of them were informally used in programs that aided the emergency service mandate, such as health education to the public. The respondents all felt that EPHF 1 to 6 and 8 to 11 were extremely useful for the strengthening of the Island’s response system. The results suggest a need for continuous assessments, evaluation and monitoring of public health

threats, such as trends in trauma, and the use of research best practices to develop policy to guide response procedures and customized training pertinent to the Island's pattern of usage. The results indicate that the EPHF are useful for quality assurance and medical oversight for the responders.

Results for Research Question 2 compared the EPHF that the respondents felt were missing from their prehospital traumatic injury response procedures - EPHF 1, 2, 3, 4, 6, 10, 11 and sections of 9, with those highlighted as useful for improvement of the prehospital response procedures and policy - EPHF 1, 2, 3, 5, 8 and 10 (Table 5). The data showed that these functions were classified as useful as they are always needed for the health education of the public, and can be used for research, assessment, call log monitoring and policy planning, as well as for quality assurance and oversight for procedures conducted by EMS personnel. The data showed that these EPHF could be implemented through consultation with the Ministry of Health and with political by-in that could be realized with public and private sector lobbying, as well as through research and continued medical education.

Research Question 3 explored how the EPHF can be used to assist in the assessment, monitoring and evaluation of prehospital traumatic injury responses. The main results suggested that use of the EPHF as a gold standard would be enforced through quality assurance programs that could be maintained with semiannual assessments or by designation of a medical quality assurance officer or quality assurance team.

Finally, Chapter 5 discussed recommendations for future research and several implications for social change. The findings from this study will contribute to the knowledge base of prehospital traumatic injury responses, and open avenues for future research on the EPHF and its use in prehospital services.

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Appendix A: Literature Review Matrix

Theme: The EPHF as a Conceptual Framework

Author/ Date	Theoretical/ Conceptual Framework	Study Objectives	Study Population	Methodology/Type of Study	Results & Major Findings	Strengths/ Limitations	Conclusions Recommendations
Martin-Moreno, Harris, Jakubowski, & Kluge (2016)	The EPHF as an assessment tool looking at performance of essential public health functions, services, and operations.	To analyze how public health functions and practices have been defined and operationalized in different countries and regions around the world.	Nearly 100 countries that have carried out assessments, using diverse analytical and methodological approaches.	An exploratory literature review of both peer-reviewed journals indexed in PubMed and the gray literature published in English and Spanish by national and international bodies	Key contextual factors that emerged that seem to favor policy-oriented follow-up were local ownership of the assessment process, policymakers' commitment to reform, and expert technical advice for implementation.	A variety of approaches were used. Two major factors that have to be considered are that the assessment tool used by the WHO for Europe has expanded to become the most functionally comprehensive EPHF assessment tool, whereas the U.S. tool has been streamlined.	The concept of EPHF has been used widely in the world to indicate the services and operations included under the public health remit. Shared ownership among local and national stakeholders, including institutions, integration into the health policy cycle from the outset
Gonzalez Block, Gonzalez Robledo, & Cuadra Hernandez (2013).	The EPHF as an assessment tool looking at performance of essential public health functions, services, and operations.	To characterize the capacity of public and private institutions in Mesoamerica, the Mexican States of Chiapas and Quintana Roo and the Dominican Republic to perform essential public health functions	Ministries from Belize, Costa Rica, El Salvador, Guatemala,Honduras, Nicaragua, Panama, the Dominican Republic and the Mexican states of Chiapas and Quintana Roo.	An online survey of 83 organizations from Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, the Dominican Republic and the Mexican States of Chiapas and Quintana Roo was conducted on their ability to meet each of the 11 EPHF.	High levels of performance were found most often for EPHF 1, EPHF 2, and EPHF 5	The results were validated in a workshop with representatives of the ministries of health from the seven countries and the two participating Mexican States. Views expressed may not be a full reflection of the countries.	In the countries and territories analyzed, there is a need to improve strategic performance in most of the EPHF, as well as to strengthen infrastructure, upgrade equipment, and further develop human resources at both the strategic and tactical levels.

(table continues)

Author/ Date	Theoretical/ Conceptual Framework	Study Objectives	Study Population	Methodology/Type of Study	Results & Major Findings	Strengths/ Limitations	Conclusions Recommendations
Aluttis, den Broucke, Chiotan, Costongs, Michelsen, & Brand (2014).	The concept of public health capacities used across countries and national/ international levels.	To highlight commonalities among these frameworks, and propose a country-level framework which integrates all reoccurring dimensions.	No specified sample	A comprehensive meta-analysis which involved a search of the electronic journal databases Pubmed and Science Direct. Both Pubmed and Science of wide-ranging sources of scientific information for public health and health system related research.	The meta-analysis literature search identified 11 publications which proposes conceptual models for public health capacities. These frameworks developed in research institutions and public health agencies like the WHO. Key areas in health promotion, identified *organizational development, workforce development*, and *resource allocation*, as further key elements.	The author's decision to drop some study areas that did not relate to the Regional or National Systems Levels Items were also omitted if they recurred across frameworks.	Developing strategies to strengthen public health capacity is no different from capacity building strategies in any other sector. The first step is to perform a mapping of the existing situation, upon which a plan or strategy can be build. The present review brought these different theoretical approaches to public health capacity together and provided insights into their commonalities.

Theme: Prehospital Traumatic Injury Responses in Developing Countries

Author/ Date	Theoretical/ Conceptual Framework	Study Objectives	Study Population	Methodology/ Type of Study	Results & Major Findings	Strengths/ Limitations	Conclusions Recommendations
Callese, Richards, Shaw, Schuetz, Paladino, Issa, & Swaroop (2015)	Qualitative thematic analysis with a 5-stage iterative process	Examining initiatives to develop EMS in low- and middle-income countries to inform the development of comprehensive prehospital care systems in poor resource settings.	Identified emergency medical services in low- and middle-income countries.	Databases were queried to identify relevant peer-reviewed literature on efforts to improve or implement EMS in low- and middle-income countries from 1965 to January 2014.	Expanding prehospital training and certification through the establishment of a dedicated degree program in prehospital emergency care within medical schools, was important to the reorganizing of existing fragmented EMS system. Lack of funding was identified as a significant barrier to successful implementation.	The themes are applicable across most LMIC stratum. Four core concepts and strategies were identified through this review that are potentially applicable across all LMICs.	EMS design of the High-Income Countries which focused on cardiac arrest from ventricular fibrillation and ventricular tachycardia, may not have been adaptable to LMIC with epidemiology profile which has a higher mortality from trauma. Initiatives to improve EMS systems in LMICs should be developed within the context of the resource limitations.
Peltzer & Pengpid (2014).	They explored the theoretical framework of Global School-based Health Survey to compare prevalence.	To assess estimates of the prevalence and social correlates of unintentional injury among adolescents in the Caribbean.	11,571 In-School Adolescents Students, in the grades, 6-10 from seven Caribbean countries.	Cross-sectional national data. Chosen by a two-stage cluster sample design.	Percentage of adolescents reporting one or more serious injuries within the past 12 months was 54.3% for all countries, ranging from 43.1% in Dominica to 59.5% in Jamaica.	School-going adolescents may not be representative of all adolescents in a country as the prevalence of injury, and associated risk behavior may differ between students not going to school.	High annual injury prevalence was found among adolescents in the seven Caribbean countries.

(table continues)

Author/ Date	Theoretical/ Conceptual Framework	Study Objectives	Study Population	Methodology/Type of Study	Results & Major Findings	Strengths/ Limitations	Conclusions Recommendations
Uthman (2016)	No specified framework. However, the study was done using the concepts of country-specific and cause-specific to measure QALYs (Quality-Adjusted Life Year) and DALYs (Disability-Adjusted Life Year).	To estimate incidence and prevalence by age, sex, cause, year, and geography.	Data from 21 regions with 195 countries and territories.	Population-based prospective study recorded activity focusing on trends for main and national results over the past decade from 2005 to 2015.	Eight causes of chronic disease and injury each affected more than 10% of the world's population in 2015. Lower back and neck pain mostly attributed to injuries was the leading global cause of disability in 2015 in most countries.	Many sources of uncertainty exist in the estimation used. Data available to estimate excess mortality by age and sex, and to capture how excess mortality changes with development status are very limited. Standardized and comprehensive approach of the GBD studies study provides useful insights.	Regular quantification of health is particularly important as the new health-related targets of the Sustainable Development Goals have broadened the health agenda throughout the world.

Theme: Prehospital Traumatic Injury Responses in Latin America and the Caribbean

Author/ Date	Theoretical/ Conceptual Framework	Study Objectives	Study Population	Methodology/Type of Study	Results & Major Findings	Strengths/ Limitations	Conclusions Recommendations
Barreto, Miranda, Figueroa, Schmidt, Munoz, Kuri-Morales, & Silva (2012)	Injuries are one of the leading cause of deaths and disabilities in the Caribbean Region, including St. Lucia.	Internet and literature searches and data provided by key informants were used to describe perspectives on the Epidemiological profile of the region.	Secondary data of health records of the Caribbean and Latin American were used.	Health situations of the region were analyzed based on published data on selected mortality, morbidity and risk factor. Epidemiological publication output by country was estimated by Medline bibliometrics.	Despite important advances in recent decades, LAC remains the world's most unequal region. In 2010, 10% of LAC's population still lived in conditions of multi-dimensional poverty, with huge variations amongst countries.	Epidemiological and public health research panorama presented shows clear insufficiencies, enormous regional discrepancies, but great prospects.	Noncommunicable diseases such as injuries are still a major health concern in the region.
Crooks, Hinds, Bissesarsingh, & Ivey (2015)	The conceptual framework classified the underlying cause of injuries and deaths coded using the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10).	To partially determine the magnitude of the burden of injuries and violence in the Caribbean through a review of cause-of-death data for the region.	This study at evaluate the cause of death in 5-year band in the Caribbean Region , and the top ten leading cause of deaths among persons aged 1-44 years old.	Descriptive analyses were used to summarize cause of deaths in the region.	In the English- and Dutch-speaking Caribbean, annual deaths from injuries accounted for 11.5% of all deaths and four times as many men as women died from injury. Among persons aged 15-44 years old, 116,931 person-years of life were lost due to injuries.	The injury death rate and the related causes varied substantially across countries within the region. Completion of the certificates by physician and the provision of information on accidents, violence and other external causes of death are some of the limitations.	Males aged 1-44 years old are more likely to die from violence and injuries than any other cause. The profile of injury deaths varies from country to country, with road traffic accidents, drownings, violence, and suicide contributing to deaths in almost every country.

(table continues)

Author/ Date	Theoretical/ Conceptual Framework	Study Objectives	Study Population	Methodology/Type of Study	Results & Major Findings	Strengths/ Limitations	Conclusions Recommendations
Andreuccetti, G., Carvalho, H., Korcha, R., Ye, Y., Bond, J., & Cherpitel, C. (2012)	The authors did not specify any framework, however they used social-contextual factors and their influence on alcohol consumption and their relationship to traumatic injuries.	The study identify the most up-to-date information on alcohol and injuries derived from ER studies conducted in Latin America and the Caribbean.	The study looked at the Latin American and Caribbean Emergency room studies (59 primary studies).	Meta-analysis literature on Emergency Room studies in which injured patients were investigated during ER visits for alcohol use prior to injury.	The study corroborates that alcohol has a high prevalence amongst traumatic injuries in Latin America and the Caribbean.	The authors stated it was not possible to make inferences regarding the differences in prevalence estimated for alcohol use and related disorders across the different LAC countries.	There is a lack of ER studies to support strategies to reduce alcohol-related injuries in a region where effective alcohol policies are scant. Future research should focus on understanding how drinking influenced by local contexts and drinking behaviors may affect the risk of injury within each LAC Country.

Theme: EPHF as Strategies to Strengthening Prehospital Traumatic Injury Responses

Author/ Date	Theoretical/ Conceptual Framework	Study Objectives	Study Population	Methodology/Type of Study	Results & Major Findings	Strengths/ Limitations	Conclusions Recommendations
Sriram, Gururaj, Razzak, Naseer, & Hyder (2015)	The Framework for Action for Strengthening Health Systems proposed by the World Health Organization.	The study objective was to conduct a cross-case comparative analysis of three EMS organizations in India and Pakistan, GVK EMRI, Aman Foundation and Rescue 1,122 in order to draw out similarities and differences in their models.	EMS providers from different sectors in India and Pakistan rescued 1,122 in Punjab Province, Pakistan; GVK Emergency Management and Research Institute in Karnataka, India; and Aman Foundation in Karachi, Pakistan.	Three case studies were conducted. The case study methodology was used to explore each model.	Emergent themes under each health system 'building block' of service delivery, health workforce, medical products and technology, health information systems, leadership and governance, and financing were described.	Cross-cutting issues not applicable to any single building block were further identified. The limitation was that the studies were carried out as individual case studies, and not with the primary objective to conduct a multiple-case study.	The study highlights key innovations and lessons, and areas of further research across EMS organizations in India, Pakistan and other resource-poor settings. Legislation instituting public services, or public support of services through public-private partnerships, enables longer-term financial and institutional support for EMS organizations.

Theme: Barriers to the Implementation of Effective Prehospital Injury Response Systems in Developing Countries

Author/ Date	Theoretical/ Conceptual Framework	Study Objectives,	Study Population	Methodology/ Type of Study	Analysis, Results & Major Findings	Strengths/ Limitations	Conclusions Recommendations
Mould-Millman, Naidoo, de Vries, Stein, & Wallis (2014)	Emergency Care Continuum.	The objective of this study was for the working group to reach a consensus on a few position statements to facilitate advocacy and to guide the development of the emergency care system in Africa.	135 persons representing experts in African acute and emergency care, public health, medical education, and research attended the one day 2013 African Federation of Emergency Medicine (AFEM) Consensus Conference representing 18 African and 14 non-African countries.	The objective of the working group was to discuss the scope of emergency care as was defined in a previous AFEM Consensus Conference as the provision of initial resuscitation, stabilization, and treatment of acutely ill and injured patients.	Critical components of this system were defined, including first responder care (tier-one) systems, prehospital care and emergency medical services (tier-two) systems.	The urgent need for the development of African OHEC Systems, such as poor resources, lack of technical expertise, underdevelopment of in-hospital emergency care, compelled the OHEC Workgroup to adopt a practical approach to reach a consensus around the development of a system.	The large burden of acute diseases in Africa can be substantially addressed by effective, integrated emergency care systems, of which non-hospital emergency care plays a critical role. The concept of the workgroup provided a practical, adaptable and flexible set of guidelines and expert recommendations to facilitate advocacy and development of out-of-hospital emergency care.

Appendix B**:** Key Informant Interview Guide

Research Questions, Thematic Areas and Interview Questions

Research Questions

1. How can the EPHF influence current emergency response strategies and policy and to strengthen prehospital traumatic injury responses in St. Lucia?
2. How can components of the EPHF be assimilated into policy planning and program development for the improvement of traumatic injury responses within the prehospital phase?
3. Does the use of EPHF as a gold standard to improve traumatic injury responses impact opportunities to develop and strengthen the emergency response system workforce in St. Lucia?

Interview Questions

1. How satisfied or dissatisfied are you with the current Emergency Response System (EMS) Policy in St. Lucia?
    a. Please explain and provide examples of what you mean.
    b. Do you think things will change?
    c. Will you say more about that?
2. How does your Emergency Response Policy address prehospital traumatic injury responses?
    a. Can you provide details of how the process works?
    b. Will you tell me more about the strategies?

3. How effective are those prehospital traumatic injury response strategies, programs and plans?
    a. Will you provide examples?
    b. Will you say more about that?
4. How have the weaknesses that have been identified in the prehospital traumatic injury response system been addressed during the last five years?
    a. Could you say more about those remedial strategies?
    b. Can you provide examples of those weaknesses?
    c. Will you say more about how these weaknesses are linked to or associated with the prehospital traumatic injury response system or policy?
5. Can you discuss any improvement noted in prehospital traumatic injury responses during the last five years?
        a. How are these improvements associated with the current EMS Response Policy?
        b. Will you say more about that?
        c. How are these improvements linked to the System Approach (training, ambulance delay, etc.)?
        d. Can you explain?
6. Please explain how the Essential Public Health Functions (EPHF) have been used in the development of the current Emergency Response Policy?
    a. Will you provide examples?

b. Can you say how the EPHF have aided in the improvement of traumatic injury response procedures?

c. Please explain how EPHF #3, #4, #5, #8, #10 and #11, can improve the prehospital response policy?

d. Can you explain which EPHF are missing from the prehospital traumatic injury response policy?

e. Can you provide a reason why they are missing?

f. Which of these missing EPHF would be useful for the prehospital traumatic injury response policy in St. Lucia?

g. How would these missing EPHF aid in the reduction of traumatic injury mortalities and morbidities at the prehospital phase (before the patient reaches the emergency room)?

7. How would you recommend that the identified EPHF be incorporated into the St. Lucia prehospital traumatic injury response policy and procedures?

    a. Can you articulate any perceived barriers or challenges to the implementation of the EPHF into the policy of the St. Lucia Emergency Response System?

    b. Will you say more about that?

8. How can the EPHF be used to assist in the assessment, monitoring and evaluation of prehospital traumatic injury responses?

    a. Will you provide examples?

b. After implementation, how can the EPHF be maintained in the emergency response policy?

c. Will you say more about that?

Appendix C: Participants Information and Summary of Research Project

Study Title

"Essential Public Health Functions (EPHF): Public Health Strategies for Strengthening Prehospital Injury Responses in St. Lucia."

What is the purpose of the study?

The study endeavors to assess the emergency response system in St. Lucia and determine the extent to which pertinent Essential Public Health Functions (EPHF 3, 4, 5, 8, 10 & 11) are incorporated in the Island's health policies and procedures. The study will evaluate how they have been assimilated in the development of EMS procedures and strategies. It will also assess which EPHF are currently in place to support effective and efficient emergency response to traumatic injuries.

NOTE: *This study will evaluate how the EPHF can be used to strengthen prehospital response to trauma. Where these functions are not in place, it will explore how the can be included and used to strengthen traumatic injury responses at the prehospital stage. Kindly note, the study is not intended to unearth the weaknesses and deficiencies in the EMS system. Its main aim is to identify the means by which the EPHF can be incorporated into the EMS policy framework or response strategies to improve trauma responses undertaken by EMS in the English-speaking Caribbean and St. Lucia specifically.*

Justification for the Study

Traumatic injuries have steadily increased during the past two decades, becoming a leading global public health issue (Butchart, & Mikton, 2014; Lee et al., 2013). To date,

traumatic injuries are the ninth (9^{th}) leading cause of deaths and disabilities globally, responsible for the approximately 5.8 million persons injured each year (Altoijry, 2013; Health Organization, 2014). These increases are also noticed in the English-speaking Caribbean, including St. Lucia. The World Health Organization (2017) indicated that traumatic injuries is a neglected pandemic in Latin America and the Caribbean. Data have suggested that the Region is attributed with the highest morbidity rate for road traffic accidents. The WHO (2017) also suggested that EMS Departments must strenghten their trauma prehospital response mechanisms.

NOTE: *The Essential Public Health Functions have been used to strenghtened other Public Health Services such as primary care (clinics) and secondary and teritairy care (hospitals) in the Caribbean (PAHO 2008). This study will seek to explore the usefullness of the EPHF as instruments for the improvement of prehospital trauma responses in St. Lucia.*

Type of Research

The research will be a qualitative study. It will interview key persons - Senior EMTs and EMT Trainers. Their views and perspectives of past traumatic injury responses and how the EPHF could have been useful will be the key data collected. The research design will be a descriptive qualitative method. Approximately 8-10 persons will be interviewed. These persons will be selected based on their expertise with EMS.

Sampling Process

Key experts (because of their work and interactions with EMS and prehospital trauma responses) will be identified for selection. They will be contacted by the

researcher and asked to volunteer for a 30-minute interview session. Selection will also be based on their levels of expertise with the research variables - Prehospital Traumatic Injury Response, EMS Policy, and Knowledge of the PAHO Essential Public Health Functions.

Participants will be selected from the EMS, the main Emergency Department in St. Lucia. Their participation will be entirely voluntary. They will be asked to sign a consent form, and their personal information will not be exposed in the study.

NOTE: *No sensitive information about the St. Lucia EMS or the Emergency Department will be captured or published. The only interest is in statistics on the improvement of prehospital traumatic injury responses using the EPHF.*

Participants' responses must be voluntarily, respondents will be kept confidentially, and they are free to withdraw at any time

Participants are expected to spend 30-45 minutes in one interview session, sharing their views, perspectives, attitudes, and experiences with prehospital traumatic injury responses in St. Lucia, and explain how they believe the Essential Public Health Functions can aid in improvements.

What are the possible disadvantages and risks of taking part?

There is no perceived risk to participants. No human sample or clinical procedure is a part of this study, nor is sensitive departmental information collected**.**

Steps taken to ensure and maintain confidentiality

The names and other personal information of respondents will not be collected. Data will be protected to ensure that responses cannot be traced to participants, stored for

audit without personal identifiers and accessible only to the researcher. All Ethical Guidelines of St. Lucia and Walden University will be adhered to.

What are the possible benefits of taking part?

The results of this study will be promoted through the regional governing bodies - PAHO, CDEMA and CARICOM, as a gold standard for other Caribbean Countries to improve their prehospital trauma responses.

NOTE: *The PAHO Essential Public Health Functions (EPHF) have been used in the past to strengthen the region's Primary Care Sector, Public Health Departments, and Secondary & Tertiary Healthcare Systems. This study would be revolutionary for St. Lucia as it would be the first ever study to look at EPHF in any EMS Division.*

It is also our intention (my research committee, supervisor and myself), that should the findings of this study engender social changes in St Lucia, we would lobby for use of the EPHF as a gold standard for the Caribbean Region. In addition, as the EPHF are up for review, we propose to complete the study ahead of the appraisal and lobby the World Health Organization to have EMS Review in the Region as an agenda item. (Note, one of my research committee members is from this region and is also a staff member of the WHO.)

We cannot promise that this study will aid specific individuals, but the information derived from it, will help to improve health education and policies for the treatment of victims with spinal cord and traumatic injuries.

If you have any concerns on any aspect of this study, please contact the researchers. (See Page 4 for contact information.)

Will my participation in the study be kept confidential?

Participants' confidentiality will be safeguarded during and after the study using the Cadicott Principles and the US Data Protection Act 1998, for handling, processing, storage and destruction of their data match.

Participants should be aware of the following guidelines that apply: -

- **Data Collection Process:** Interviews will be conducted via Skye for Business. Where face-to-face interviews are conducted, they will be done away from the workplace and in confidence.
- **Data storage Process:** Interview transcripts will not contain names. Data will be safely stored in password-protected Word Documents.
    - Each participant's research data (questionnaires/interviews) will be anonymous and uniquely coded by the researcher.
    - A master list, mapping participants to the research codes, will be password-protected and stored on a computer accessible to the researcher only.
    - Data hard copies will be stored in a locked cabinet, within a locked office, accessible to the researcher only.
    - Electronic data will be stored on a password-protected computer accessible to the researcher only.
- **Use of Data:** The data will be used for the purposes of this study ONLY and will not available as secondary data for future studies.

- **Access to Data:** The researcher will be the only person with access to the data collected. The data will be retained for a maximum of five (5) years, for Audit purposes, and then destroyed.

A Mandatory Statement will be issued to the research participants, as below: -

All information collected during the course of this research will be kept strictly confidential. Any information shared will exclude personal data that could identify participants.

What will happen to the results of the research?

All findings will be made public to the St. Lucia Government Ministry of Health, Emergency Medical Services and Emergency Department.

- The following Research Ethics Principles will be adhered to: -
    - ***Confidentiality:*** The identity of respondents will not be disclosed.
        - Sensitive information will not be made public except to the research committee.
    - ***Anonymity*****:** Respondents' identities will be protected in the published results.
        - No information will be published that can be traced to respondents.
    - ***Consent:*** Participation in the study is voluntary. All respondents are required to sign a consent form agreeing to their participation in the research.

Research Interview Questions

The following research questions will explore how the emergency response system in St. Lucia can be strengthened for traumatic injury responses: -

1. How can EPHF influence current emergency response policies and strategies to strengthen prehospital traumatic injury responses in St. Lucia?
2. How can the components of EPHF be used as a part of policy planning and program development to improve traumatic injury responses within the prehospital phase?
3. How does the use of EPHF as the gold standard impact opportunities to develop and strengthen the St. Lucia emergency response system workforce to improve traumatic injury responses?

Who is organizing or sponsoring the research?

- This Research is my Dissertation for the Ph.D. in Public Health Epidemiology.
- There is no affiliation or sponsorship from any company.

Further information and contact details:

Should participants require additional information, please feel free to contact me at:

Delwin Ferguson BSc. MPH
Nova Scotia Canada

Frazier Benjamin Beatty, Ph.D., MPH, CHES
Walden University Research Supervisor
University Research Reviewer
Ph.D. in Public Health Programs

College of Health Sciences
Walden University

Appendix D: Essential Public Health Function Flyer

Essential Public Health Functions Flyer

STRATEGY FOR IMPROVING OVERALL HEALTH SYSTEMS PERFORMANCE

Through the Public Health in the Americas Initiative 1999, the Pan American Health Organization/World Health Organization defined 11 Essential Public Health Functions (EPHF) and developed a methodology that allows countries to evaluate their public health systems in a comprehensive manner.

- Forty-one countries and territories of the Americas successfully applied the assessment tool during the period 2001-2002.
- The goal of the Initiative was to establish the basis for achieving a regional commitment to strengthen public health in the Americas.

EPHF PERFORMANCE ASSESSMENT

Through the EPHF Performance Assessment, Health Ministries and/or Secretariats were able to identify the strengths and weaknesses in their public health systems, and, based on the results, develop interventions designed to sustain good Public Health practices and bridge gaps.

Worldwide, as countries are experiencing demographic and epidemiological changes that will have a direct impact on the capacity of their health systems to respond to current and emerging public health needs, they are looking for strategies to:

- assess performance of health systems.
- be more efficient with scarce resources.
- better respond to the health needs of the population and achieve improved health outcomes.

The EPHF provide an opportunity for the use of public health and public health performance assessments as mechanisms for the strengthening of health systems on a whole.

List of Essential Public Health Functions

EPHF 1. Monitoring, evaluation, and analysis of health status	**EPHF 2. Surveillance, research, and control of the risks and threats to public health**
EPHF 3. Health promotion	**EPHF 4. Social participation in health**
EPHF 5. Development of policies and institutional capacity for public health planning and management	**EPHF 6. Strengthening of public health regulation and enforcement capacity**
EPHF 7. Evaluation and promotion of equitable access to necessary health	**EPHF 8. Human resources development and training in public health**
EPHF 9. Quality assurance in personal and population-based health services	**EPHF 10. Research in public health**
EPHF 11. Reduction of the impact of emergencies and disasters on health	

Retrieved from: Reference: Pan American Health Organization. 2008

Appendix E: Example of Coding Strategy and Derived Themes