Medical Requirements in Support of Military Operations in a Megacity Environment

Parker Gahagen, Avery Littlejohn, Ryan Morgan, Thomas Stanford and John Farr

1Department of Systems Engineering, United States Military Academy, West Point, NY

Corresponding author's Email: Thomas.stanford@usma.edu

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Abstract: The focus of this research is to assess the interdependencies, requirements and resources in order to understand and plan the medical services needed to respond to the aftermath of a weapon of mass destruction (WMD) event in a megacity or dense urban environment. Historically, determining the planning factors to handle the medical requirements in the event of a WMD attack on a megacity has been difficult because of a lack of understanding and ability to quantify higher order effects. Megacities’ dense populations and interconnectedness make contingency planning more difficult than rural, open areas. Megacities also serve as major economic centers and make up the epicenters of most of the world’s gross domestic product. Systems diagramming, fuzzy cognitive mapping, and simulation and modeling are used to develop the medical need requirements of these megacities to support a WMD event. The simulation included two scenarios: a mature megacity and a rural dense urban environment. This research showed that the biggest capacity gaps are electricity, transportation, and food following the WMD event. These factors have the biggest effect on casualties in regard to the system.

Keywords: Megacity, Megacities, Systems Diagramming, Medical Resources, Weapon of Mass Destruction (WMD), Fuzzy Cognitive Mapping (FCM)

1. Introduction

First responders, local, state, federal agencies, and the international community are ill prepared for a substantial WMD event or a natural disaster in either a Continental United States (CONUS) or Outside Continental United States (OCONUS) megacity. The events surrounding a major destructive event would produce a cascading number of higher order consequences governed by complex interdependencies. Such an event would necessitate major resources to deal with medical needs, economic recovery, key and essential services, relief of human suffering, etc. In recent years, there have been numerous examples of collaboration between the military, non-governmental organizations, and host nations to establish a relief plan in the event of a disaster. These events range from hurricanes, such as Katrina and Ike, to a host of earthquakes, wildfires, oil spills, and other natural/man-made disasters, such as 9/11. Initially, medical services are the most important relief function that needs to occur. A major contributor in the relief of these events is the combination of Department of Defense (DoD) medical assets deployed to ease human suffering and help contain the disaster. When the first responders in a CONUS event are overwhelmed, the DoD can provide the resources needed to supplement the damaged infrastructure and supplement key and essential services in a megacity. For an OCONUS event, the DoD can project the assets and has the necessary equipment and personnel to make a difference even in a hostile environment.

For this research, a megacity is categorized as a city with a population of over 10,000,000 people. The different tiers of each megacity are then classified using their Gross Domestic Product (GDP) per capita. Tier 1 megacities are classified as “developing”. These are all countries that are currently classified as still developing and have a GDP per capita between $0 and $20,000. These are often unstable and at risk countries because of their high poverty levels and dense populations. Tier 2 megacities are classified as “transitioning”. These megacities have a GDP per capita ranging from $20,000 to $40,000. These megacities are more stable than the previous tier due to moderate GDP per capita. Tier 3 megacities are classified as “developed”. These are the megacities that have very high GDP per capita above $40,000. These cities have mature infrastructure and are the most complex of the megacities.

Every disaster is unique and requires different sets of people, assets, and coordination to effectively respond. A response would vary depending upon the type of event and the tier of the megacity. For example, a mature Tier III megacity (such as New York City) will be able to provide a greater amount and variety of resources and will have established greater