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THESIS

**BUILDING PARTNER CAPACITY AND
STRENGTHENING SECURITY THROUGH MEDICAL
SECURITY FORCE ASSISTANCE**

by

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June 2013

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THROUGH MEDICAL SECURITY FORCE ASSISTANCE**

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ABSTRACT

This thesis examines the role of building partner medical capacity to strengthen foreign security forces as part of Stability Operations. It employs quantitative analysis and Game Theory. With the direct benefits of a strong and effective security force medical system established, the indirect benefits of a strong security force medical system to a nation-state, to a region, and to the United States are discussed. Joint doctrine that supports efforts to build partner medical capacity is also reviewed. Finally, a framework is proposed for strengthening partner security force medical systems through the use of advisors, exercises and training, and a rotational presence. Medical development for foreign security forces should be a priority of any effort to strengthen a foreign state partner.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFSOC	U.S. Air Force Special Operations Command
ALP	Afghan Local Police
ANA	Afghan National Army
ANP	Afghan National Police
ANSF	Afghan National Security Forces
BOV	Burden of Violence
BPC	Building Partner Capacity
COCOM	Combatant Command
CSIS	Center for Strategic and International Studies
DALY	Disability-Adjusted Life Year
DoD	Department of Defense
FAO	Foreign Area Officer
FID	Foreign Internal Defense
FM	Field Manual
GBD	Global Burden of Disease
HEUNI	European Institute for Crime Prevention and Control
IGO	International Governmental Organization
IHS	International Health Specialist
IO	International Organization
ISAF	International Security Forces – Afghanistan
ISCI	International Statistics on Crime and Justice
JP	Joint Publication
MAST	Military Assistance to Safety and Traffic
MHS	Military Health System
MMTT	Mobile Medical Training Team
NATO	North Atlantic Treaty Organization
NGO	Nongovernmental Organization
PHMS	Pre-hospital Medical System
PP	Police Productivity
PRIO	International Peace Research Institute

PRT	Provincial Reconstruction Team
SAM	Soldier Adaptation Model
SFA	Security Force Assistance
SSTR	Stability, Security, Transition, and Reconstruction
UCDP	Uppsala Conflict Data Program
UN	United Nations
U.S.	United States
USG	United States Government
WHO	World Health Organization

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I. INTRODUCTION

“Developing global partnerships” is the new strategic buzz phrase. In an era rife with disagreements about how best to conduct state-building and post-conflict reconstruction, all stakeholders appear to agree on the value of establishing or strengthening partner security forces to increase social stability and set the conditions for development. Over the past decade, Security Force Assistance (SFA) and Foreign Internal Defense (FID) have gained prominence as promising instruments of policy.¹ As either an exit strategy for large-footprint post-conflict scenarios or a small-footprint intervention to prevent future conflict in weak, failing, or partner states, SFA/FID supports the essential security pillar of development and nation-building, and advocates equipping others with capacity and capabilities to conduct security operations without significant outside assistance.

While previously the predominant domain of Special Operations forces, SFA/FID doctrine and institutions have experienced a rapid growth as Special Forces units could not meet the increasing needs demanded by recent conflicts. Granted stature as the cornerstone of U.S. exit strategies in Iraq and Afghanistan, security advisor and training teams were cultivated using conventional and augmentee forces. The scale of these requirements, though necessary for the current conflicts, challenged the future direction of military force structure. Was this going to be the new normal? The President’s new

1. Joint Publication 3-22, *Foreign Internal Defense*, defines FID as “...the participation by civilian and military agencies of a government in any of the action programs taken by another government or other designated organization, to free and protect its society from subversion, lawlessness, insurgency, terrorism, and other threats to their security.” In comparison, Stability Operations (FM 3-07) defines Security Force Assistance as “the unified action to generate, employ, and sustain local, host- nation, or regional security forces in support of a legitimate authority.” Significant overlap between these two missions exists. There is current debate on the extent of the differences between these two missions and the legal implications of considering them part of the same mission. Broadly speaking, FID dwells in the realm of Special Operations, while Security Force Assistance resides with the military’s General Purpose forces. The following clarifications attempt to clarify the differences between SFA and FID. “At operational and strategic levels, both SFA and FID focus on preparing [foreign security forces (FSF)] to combat lawlessness, subversion, insurgency, and terrorism from internal threats; however, SFA also prepares FSF to defend against external threats and to perform as part of an international coalition as well. FID and SFA are similar at the tactical level where advisory skills are applicable to both. Both FID and SFA are subsets of [Security Cooperation (SC)]. Neither FID nor SFA are subsets of each other.” For the purposes of my thesis, the two terms are interchangeable in regard to their focus on building partner capacity to perform security operations with minimal external support.

strategic guidance provided a definitive answer, “...*U.S. forces will no longer be sized to conduct large-scale, prolonged stability operations.*”²

The role and mission of SFA/FID, though, do not appear to be receding. Nor are they likely to belong to Special Operations alone. The potential for small advisor/training teams to strengthen foreign security forces and foster strategic partnerships has made the SFA/FID concept an attractive diplomatic/development tool to help preempt future conflicts. If a state can secure its own borders and deny access by terrorists and extremists to its under-governed areas, the state will be stabilized and set the conditions for economic growth and development.

At its root, SFA aims to build capacity in U.S. partner nation-states.³ While other benefits may be produced secondary to the capacity-building effort, such as increased access, influence or intelligence, any activity that fails to primarily focus on the development and cultivation of partner capacity falls outside of the SFA domain.⁴ Applying the “teach a man to fish” metaphor for security operations, SFA assumes that, in the long term, U.S. interests are best served if partner nation-states can protect and defend themselves without an overt or extensive U.S. military presence. The stated goal of SFA is “...to assist host countries to defend against internal and transnational threats to stability.”⁵

Maturing over the past decade in Afghanistan and Iraq under the auspices of Stability Operations, U.S. government policy has directed the use of SFA as a facet of Building Partner Capacity (BPC) and a U.S. Department of Defense priority equivalent to combat preparation. In 2005, DoD Directive 3000.05 “Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations,” defined a stability operation as the

2. Department of Defense, “Sustaining U.S. Global Leadership: Priorities for 21st Century Defense,” January 2012, 6, http://www.defense.gov/news/Defense_Strategic_Guidance.pdf.

3. This also includes aspects of FID relating to building partner capacity to strengthen internal defense forces and capabilities.

4. Joint Center for International Security Force Assistance, *Security Force Assistance: Candidate Joint Doctrine Publication*, June 2012.

5. Department of Defense, “Security Force Assistance (SFA),” DoD Directive 5000.68, October 27, 2010, 2.

...overarching term encompassing various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief.⁶

Medical contributions to Stability Operations and its new doctrine initially tended to focus on either the delivery of healthcare by U.S. forces (e.g., humanitarian assistance or disaster response missions that focused on direct care) or the provision of medical/health support for military organizations conducting Stability Operations missions. There was little focus on how the Military Health System (MHS) could directly contribute to Stability Operations, other than as a supporting effort.

In 2010, however, DoD Instruction 6000.16, “Military Health Support for Stability Operations,” expanded the role of the MHS in Stability Operations by directing it to “be prepared to perform any tasks assigned to establish, reconstitute, and maintain health sector capacity and capability for the indigenous population when indigenous, foreign, or U.S. civilian professionals cannot do so.”⁷

That same month in *Foreign Affairs*, Secretary Gates provided further guidance and focused DoD policy by advocating a strategy of building partner capabilities.

Where possible, U.S. strategy is to employ indirect approaches—primarily through building the capacity of partner governments and their security forces—to prevent festering problems from turning into crises that require costly and controversial direct military intervention.⁸

The MHS has been adjusting to this new mission by exploring how it can support the BPC mission. A recent RAND study for the U.S. Air Force Special Operations Command (AFSOC), “Building Partner Health Capacity with U.S. Military Forces,” explores the use of medical assets to support the BPC mission and reviews current efforts in medical BPC. The study builds upon AFSOC’s concept, unveiled in 2009,

6. Department of Defense, “Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations,” DoD Directive 3000.05, November 28, 2005.

7. Department of Defense, “Military Health Support for Stability Operations,” DoD Instruction 6000.16, May 17, 2010.

8. Robert M. Gates, “Helping Others Defend Themselves: The Future of U.S. Security Assistance,” *Foreign Affairs* 29, no. 3 (May 2010): 2–6.

...that rather than using U.S. military medical presence in developing countries to directly treat indigenous communities and supplement or replace inadequate local care, U.S. advisors would engage and train local health workers in a systematic and sustained way through health-focused security cooperation.⁹

This excellent study provides a framework for conducting BPC-H (a term coined by RAND as Building Partner Capacity-Health) and proposes pragmatic and realistic metrics of effectiveness. The RAND study, however, fails to adequately consider focusing the MHS BPC efforts in the SFA domain. Instead, the use of military medicine to support BPC/Stability Operations has jumped from providing direct care to civilians (e.g., Humanitarian Assistance, Disaster Response, and large-scale Stability Operations) to teaching and training the civilian health sector. Consequently, the role of the MHS to build capacity in the partner security medical system goes unmentioned, presumably because the intent is to build security by directly strengthening a partner's *entire* health system. In contrast, my thesis advocates that the MHS should first focus on medical BPC as part of SFA, and only then use that strengthened institution to improve the civilian medical sector. Strengthening a partner state's security force medical system directly supports the security sector and has the potential to generate attractive secondary benefits.

A. PURPOSE AND SCOPE

My thesis explores the role of medical support development to strengthen partner nation-states' security forces. It also describes how medical capacity-building supports the goals and objectives of SFA under the paradigm of BPC. While U.S. military medical resources and technical skills support various missions throughout the world, my analysis concentrates on the role of military medical capacity-building to strengthen the security institutions of partner states and to develop partnerships for future contingencies.

9. David E. Thaler, Gary Cecchine, Anny Wong, and Timothy Jackson, "Building Partner Health Capacity with U.S. Military Forces: Enhancing AFSOC Health Engagement Missions," RAND Project Air Force Technical Report (2012), iii, http://www.rand.org/pubs/technical_reports/TR1201.html.

B. BACKGROUND

Strengthening the security sector of a country, whether via the military or police forces, focuses on the capacity, capabilities, and professionalism of the security institutions and security providers. At its heart, establishing and maintaining security requires the legitimate and legal application of force in the context of an equitable justice system.¹⁰ The skills learned and refined through SFA equip partner state security personnel to perform the security mission effectively. When challenged, however, the security officer is invariably exposed to risk of injury or death. Security personnel who aren't willing to accept some physical risk will either avoid it by marginally performing their duties or by over-responding to any threat of violence. Either outcome is undesirable and impacts the legitimacy of the security force and the state. Meanwhile, if members of the security forces accept the risk of injury and are wounded, they reasonably expect care from a competent and capable medical network to mitigate their injuries. Without that medical network, the willingness of security officers to perform their duties, e.g., to place themselves in mortal danger, may be compromised.

While the U.S. military medical system currently engages in numerous strengthening endeavors with foreign partners, especially in the areas of humanitarian/disaster assistance, bioterrorism, and infectious disease threats, there is little emphasis given to supporting SFA. To its credit, especially in Afghanistan, the coalition military medical system has provided essential care to wounded security forces injured in the conduct of their duties. This quality care girds the resolve of the security forces when they are conducting their missions. It is unclear how these security forces will perform once medical support is no longer provided by coalition medical units. While there have been some intermittent efforts to mentor and train indigenous medical providers, these efforts have been sporadic and tend to be at the whim of individual medical commanders.

At the tactical level, Building Partner Medical Capacity has been focused on first responders. While first responder training is critical, without concurrent capacity-building

10. Extensive debate exists on the interdependence between security and development in fragile and weak states. See Danielle Beswick and Paul Jackson, *Conflict, Security and Development: An Introduction* (New York: Routledge, 2011).

of the critical medical infrastructure needed beyond initial field care, care stops with the first responder. When U.S. medical units have conducted medical engagements, they have tended to provide direct care to civilians or have engaged in public health development, not training partner state medical personnel.

In Phase 4 operations, such as those underway in Afghanistan, compulsory missions to develop the indigenous health system through the lens of SFA should both focus medical engagement endeavors *and* create a lasting capability for security forces when U.S. forces depart. As a Phase 0 operation, medical training could provide a powerful incentive for the development of military/civilian medical partnerships. It would enable the military medical system to meet its requirements to support SFA and stability operations within its core competencies. And it could help prevent future conflict by strengthening the security in a partner state.

Strategic, operational, and tactical-level commanders have recently extended the use of their medical resources beyond the care of combatant troops to care for and interact with civilians on the battlefield. While initially done in accord with humanitarian principles (to meet the needs of those suffering), the positive effects of these missions led to a policy of using medical care to garner civilian political support, commonly known as “Winning Hearts and Minds.” Since the inception of this practice during the Vietnam era, the use of military medicine in support of political goals has steadily increased, especially in the context of fighting counterinsurgencies and with the rise of Stability Operations.

While the amount of military medical research focused on improving the delivery of healthcare to our soldiers on the battlefield continues to expand, the body of research questioning the “Hearts and Minds” mission is growing, as well.¹¹ At the root of this criticism is the reality that the provision of good medical care occurs in a networked system over time. Unfortunately, most “Hearts and Minds” medical engagements have consisted of high-quantity, low-quality medical care without any access to further

11. Robert F. Malsby, III, “Into Which End Does the Thermometer Go? Application of Military Medicine in Counterinsurgency: Does Direct Patient Care by American Service Members Work?” (Master’s thesis, Army Command and General Staff College, 2008).

diagnostic testing or evaluations for definitive diagnoses or care. Metrics and success have been centered on the “number of patients treated,” leading one to wonder about the quality of that treatment if several hundred patients are seen in one day. When balancing the questionable medical benefits of these operations against the risk of injury to our soldiers and physicians when conducting them, their relative benefits become questionable.

Confusion about balancing the risks against the value of these missions grows from their nebulous purpose. Although they offer an excellent venue and tactic for collecting information, engaging with the population, and creating public relations stories, the use of medical events for these purposes has likewise been criticized by the international health community and has led to charges that they “militarize the humanitarian space.”¹² In response, missions are cast as fulfilling humanitarian principles. When these events, however, fail to use techniques that would lead to long-term improvements and when they expose our forces to risks with questionable gains, many of the participants involved grow disillusioned. After all, soldiers do not sign up to be injured while handing out aspirin. This is especially true for medical personnel who see little medical value in many of these missions and instead perceive them as “dog and pony” shows planned to either demonstrate that the command is doing something, or to make the participants feel good about themselves for helping others. In some instances, such as in Afghanistan, policy now strictly prohibits the use of medical engagements for what were some of their most useful tactical and operational purposes, to collect intelligence and biometrics.¹³

The challenges of strengthening a foreign state’s medical system, as opposed to providing direct care, are well documented from Vietnam to the present. In his book *Military Medicine to Win Hearts and Minds*, Dr. Robert Wilensky catalogs his research and experience as a military physician in Vietnam during the 1960s-1970s. Even with

12. Pierre Krahenbuhl, “The Militarization of Aid and its Perils,” *Intercross*, September 26, 2011, <http://intercrossblog.icrc.org/blog/militarization-aid-and-its-perils>.

13. International Security Assistance Force, “ISAF Guidance on Military Medical Engagement in Health Sector Reconstruction and Development and COMISAF Directive: ISAF Medical Involvement in Civilian Health Care,” ISAF Standing Operating Procedure 01154, November 9, 2010.

medical programs designed to build partner medical capacity, the “...tendency of the Vietnamese to allow U.S. military and civilian advisors to carry out tasks rather than to learn to do them would persist throughout much of the war, both within the medical setting and elsewhere.”¹⁴ This tendency invariably leads to a shift to direct care and inhibits indigenous medical growth. Local medical systems are often left worse off in the long run, especially when a U.S. unit moves to another location or is forced to stop providing care to local patients, whether these are members of the security forces or civilians. As Wilensky relates one battalion surgeon’s view, “It appeared to [Dr.] Allred that as long as services were provided by U.S. forces, there was no effort by the [Government of Vietnam] to establish a permanent system to provide such services.”¹⁵ This phenomenon persists in today’s conflicts.

So, what might be better? How might medical engagements and partnerships better contribute to our nation’s strategy? A recent assessment by the Center for Strategic and International Studies (CSIS) by Bonventre, Hicks, and Okutani attempts “to frame health and security in terms of the ‘opportunities’ they present to advance both the United States’ objectives and the quality of global health care.”¹⁶ In evaluating the U.S. policy of using global health development as a tool of “soft power,” the paper addresses the role of the Department of Defense as part of this initiative.

More controversial, however, is DoD’s growing peacetime civil-military health activity—which DoD calls humanitarian assistance, but which more closely resembles what civilian agencies call development. Such activities include well drilling, constructing or repairing clinics, and hospital ship visits. DoD refers to these peacetime activities as “shaping” or “phase 0” activities because they prepare its personnel for their combat and postcombat roles, which follow as phases 1 to 6. Stewart Patrick laments, however, that “what DoD calls phase 0 is what we used to call foreign policy.” A clear benefit would be gained by more precisely defining which of these peacetime activities truly contribute to fulfilling the principles of

14. Robert J. Wilensky, *Military Medicine to Win Hearts and Minds: Aid to Civilians in the Vietnam War* (Lubbock: Texas Tech University Press, 2004).

15. *Ibid.*, 93.

16. Eugene V. Bonventre, Kathleen H. Hicks and Stacy M. Okutani, “U.S. National Security and Global Health: An Analysis of Global Health Engagement by the U.S. Department of Defense,” A Report of the CSIS Global Health Policy Center – Working Draft. April 2009, 2, <http://csis.org/publication/us-national-security-and-global-health>.

security and stability, and by ensuring that these often short-term efforts set the stage for the long-term development and conflict-mitigation efforts of civilian agencies, rather than competing or interfering with long-range goals or threatening the impartiality of nongovernmental organizations (NGOs) that claim to abide by these principles.¹⁷

In keeping with the sentiment expressed in the CSIS paper, my thesis will focus on strengthening partner security forces “by, with, and through” *their* medical system. Strengthening a medical system requires engagement at all levels of the medical network and requires addressing tactical level capability at each node and connection of the network, with the aim of delivering healthcare. Medical resources for these missions exist in both the Special Operations and General Purpose Forces. More importantly, the bulk of the technical expertise and ability to teach the delivery of healthcare above the first responder level exists in the medical departments of the U.S. military services.

Again, unfortunately until recently, little attention has been paid to strengthening the medical systems supporting security forces as an important aspect of BPC above the first responder level. Recent updates to Joint and Service Doctrine have begun to include programs that support medical development for security forces as part of an indirect approach and in support of development goals.¹⁸ Concurrently, the development community is reconsidering the role of security in development. “Engagement with security forces, though not traditionally a focus of development, is now regarded as crucial for enhancing human security and creating an environment in which development can take place.”¹⁹

C. APPROACH

My thesis seeks to answer the primary research question: “To what extent should medical SFA play a more significant role in strengthening partner security forces and BPC?” To fully address this question, the thesis addresses five supporting questions:

17. Ibid., 5.

18. Foreign Internal Defense (JP 3-22), JP 3-57, Civil-Military Operations (JP 3-57), Health Service Support (JP 4-02), Foreign Humanitarian Assistance (JP 3-29), Civil Affairs Operations (FM 3-57), and Force Health Protection in a Global Environment (FM 4-02).

19. Beswick and Jackson, *Conflict, Security and Development: An Introduction*, 22.

1. How does health care impact the disposition of security forces?
2. Does casualty/trauma care impact the effectiveness of security forces?
3. Why does casualty/trauma care impact the effectiveness of security forces?
4. What are the benefits of a strong medical system to support security forces?
5. How can military medical partnerships build capacity to strengthen partner nation-states?

My thesis sequentially tackles these questions in the following sections.

Chapter II reviews previous research that investigates the factors influencing security force performance. The Soldier Adaptation Model (SAM) is introduced and is used to frame the various factors influencing soldier behavior and performance, such as casualty/trauma care's ability to mitigate the risk of injury.

Chapter III uses a large-*n* analysis to investigate the impact of varying levels of risk and casualty/trauma care on the performance of security forces. Using deductive hypothesis testing, the analysis suggests a strong relationship between the provision of casualty/trauma care and security force performance.

Chapter IV focuses the lens of game theory on the availability of casualty/trauma care to influence security force performance and the willingness of a state to invest in casualty/trauma care. Utility theory assists in exploring the role of risk on security force behavior and the mitigating effects of casualty/trauma care. Available strategies to influence the Other's behavior are reviewed and applied to contemporary Afghanistan to explore their implications.

With the importance of medical support to security forces established, Chapter 5 explores the additional benefits of ensuring that partner states possess a strong medical system to support security forces. The strengthening aspects of a strong security medical system permeate all levels of the security domain, from the individual security officer to its international partners.

Chapter VI considers how U.S. military medical organizations can build partner capacity through medical SFA. It will make the case that initially focusing health BPC

efforts on medical SFA strengthens security and develops critical medical partnerships within the security forces. In addition, prioritizing medical SFA creates a cohort of trained security force medical personnel who could be leveraged to assist their own civilian sector without U.S. assistance, thereby increasing state legitimacy by providing essential services using internal resources and supporting civic action programs.

Chapter VII concludes the thesis and provides recommendations for future research.

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II. SECURITY FORCE BEHAVIOR AND MEDICAL SUPPORT

There is negligible research investigating the impact of various levels of casualty/trauma care on the performance of security forces. Most studies of combat medical care focus on clinical treatment and improving the military medical system, thereby decreasing the morbidity and mortality of injuries sustained on the battlefield. These advances lead modern security institutions to invest significant sums in developing, equipping, maintaining, and deploying medical support for their forces. Because they understand the dangers associated with providing security in areas of increased violence, most modern countries increase their investment in medical support as the risk of injury increases. Why do they do so? One might argue that a state has a responsibility to provide healthcare to security forces when the forces it sends to do the state's business face an increased risk of injury. One might also suggest that members of a security force will be more aggressive and accept greater risk of injury if they know there is a competent medical support system in place to care for them should they be injured. It seems reasonable to predict that members of security forces will modify their behavior to minimize their risk of injury when the state fails to provide medical support to their operations.

While no one has specifically looked at the effects of health support on the performance of security forces, research in the area of work motivation theories assists in understanding the factors that affect organizational behavior and provides a framework to understand organizational performance. The military's culture and organization have proven quite different from those found in the civilian world. While most of the work motivation research has been conducted on U.S. military forces, the resulting framework can be used to analyze motivational behavior in various contexts, though application of this research to foreign security forces must include appropriate cultural and historical considerations in order to draw correct conclusions.

Maria Grazia Galantino summarizes traditional discussions about soldier motivation as an "attempt to answer some old and uneasy questions: why do men fight? why are they willing to kill and—especially—why are they ready to sacrifice their

lives?”²⁰ She continues by arguing that empiric research and efforts to operationalize answers to these questions developed alongside social psychology and behavior theory. Since World War II, this research has culminated in three main theories about work motivation in the military: social, rational economic, and self-actualization needs of individuals.²¹

The social approach developed from research conducted by Samuel Stouffer. Published in 1949, *American Soldier* evaluates the motivation of soldiers fighting in World War II and emphasizes the importance of the workplace to meet an individual’s social needs for communication, affiliation, and social interaction. Stouffer’s research concludes that soldiers fight for those in their immediate cohort and attach little importance to patriotism or idealistic concerns. Since then, the axiom that soldiers “fight for each other” has become a common part of the military lexicon.²² Following the U.S. invasion of Iraq in 2003, Leonard Wong re-examined Stouffer’s conclusions. Dr. Wong’s report, *Why They Fight: Combat Motivation in the Iraq War*, echoes Stouffer’s findings, highlighting social pressure as a motivation for fighting.²³

The rational-economic approach to understanding soldier motivation is based on rational decision-making and the assumption that reward systems create a self-motivated workforce.²⁴ With the transition away from compulsory military service in the U.S. and the establishment of an all-volunteer army in the 1970s, this approach flourished as the military began competing with the civilian workforce for recruits.²⁵ Managing an

20. Maria G. Galantino, “Work Motivation and the Peacekeeper,” in *The Psychology of the Peacekeeper: Lessons from the Field*, ed. Thomas W. Britt and Amy B. Adler, 111–125 (Westport, CT: Praeger, 2003), 111–112.

21. Ibid.

22. David A. Petraeus, “CIA Director’s Remarks at Furman University’s Wilkins Legislative and Civic Awards Ceremony,” Central Intelligence Agency, January 27, 2012, <https://www.cia.gov/news-information/speeches-testimony/2012-speeches-testimony/directors-remarks-at-furman-universitys-wilkins-legislative-and-civic-awards-ceremony.html>.

23. Leonard Wong, Thomas A. Kolditz, Raymond A. Millen, and Terrence M. Potter, *Why They Fight: Combat Motivation in the Iraq War* (Carlisle, PA: Strategic Studies Institute, 2003), <http://www.strategicstudiesinstitute.army.mil/pdffiles/pub179.pdf>.

24. Edward E. Lawler, *Motivations in Work Organizations* (Monterrey, CA: Brooks, 1973).

25. James Burke, “Patriotism and the all-volunteer force,” *Journal of Political and Military Sociology* 12 (1984): 229–241.

effective, business-like organization and financial rewards were seen as the best way to attract and retain qualified recruits.²⁶ This ultra-rational approach faced challenges, however, as society became less calculating and adopted post-materialist values.²⁷ Factors affecting quality of life and the contribution of one's work to one's potential for self-fulfillment began to influence soldiers' motivations to serve, thus resulting in the self-actualization approach to service.

All three of these approaches minimized or undervalued the role of patriotism and a soldier's political values in his/her decision to fight. As early as 1976, Bowers argued against the absence of these factors. He stated "the traditional American values of independence and material success still are important and are likely to remain so for the immediate future."²⁸

Based on the research described, and given the need to develop a better framework to understand work motivation, the Soldier Adaptation Model (SAM), was devised by Bliese and Castro to provide a "broad conceptual scheme that can be used to organize constructs of phenomena within the domain of military stress research."²⁹ Viewed as a meta-theory on which to build a theoretical framework to guide research and generate hypotheses, the SAM yields a superstructure for a unified understanding of military work motivation.

In the SAM, all theoretical constructs are categorized into one of three components: stressors, moderators, or strains/outcomes (See Figure 1). Careful delineation of the components points to the expected relationship among variables and

26. John H. Faris, "The Social Psychology of the Military Service and the Influence of Bureaucratic Rationalism," in *The Military. More than just a Job?* eds. C.C. Moskos & R.R. Wood, 57–65 (New York: Pergamon-Brassey's, 1988).

27. Ronald Inglehart, *Modernization and Postmodernization: Cultural, Economic and Political change in 43 Societies* (Princeton, NJ: Princeton University Press, 1997).

28. David G. Bowers, "Work-related attitudes of military personnel," in *The Social Psychology of Military Service*, eds. N.L. Goldman & D.R. Segal, 89–115 (Beverly Hills, London: Sage, 1976), 95.

29. Paul D. Bliese and Carl Andrew Castro, "The Soldier Adaptation Model (SAM): Applications to Peacekeeping Research" in *The Psychology of the Peacekeeper: Lessons from the Field*, ed. Thomas W. Britt and Amy B. Adler, 185–203 (Westport, CT: Praeger, 2003), 186.

creates a shared terminology for the advancement of theory development and investigation.³⁰

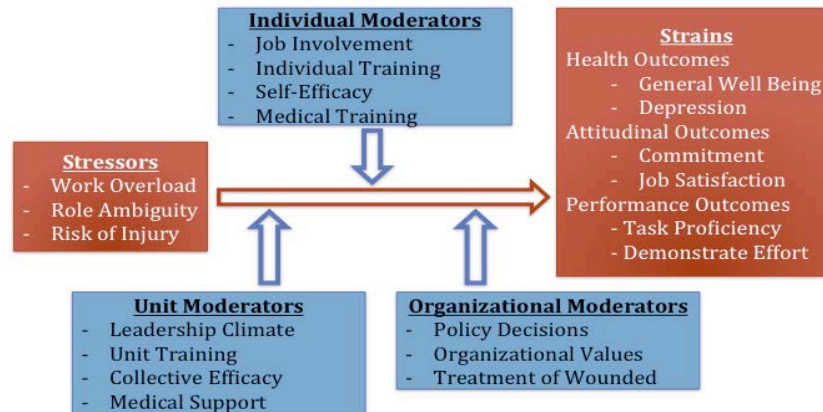


Figure 1. Soldier Adaptation Model.³¹

The first component, stressors, refers to all aspects of the environment that “place a load or demand on the soldier.”³² This includes inputs experienced by the soldier, e.g., weather, duty responsibilities, role ambiguity, workload, family separation, and danger. Many of these stressors will vary by location and time, while some are intrinsic to working in a security institution.

The second component of the SAM, moderators, represents actions taken to buffer or mitigate the effects of stressors on the third component of the model, strains. While some moderators are cultivated prior to exposure to prepare soldiers for anticipated stressors, they also include behaviors and psychological defense mechanisms taken by soldiers to protect themselves against unforecasted stressors. The position of moderators between the stressors and strains/outcomes in the SAM highlights their importance in shaping the effectiveness of both units and the individuals who comprise those units. Moderators can be further subdivided into: individual moderators, such as individual preparedness, efficacy, job involvement, and resiliency; unit moderators, such as

30. Ibid., 187.

31. Ibid., 188.

32. Ibid.

leadership, group efficacy, and collective training; and organizational moderators, such as policy decisions, funding, and strategic vision. Similar to the different levels of military operations (tactical, operational, and strategic), moderators must work in concert across all three levels. Bliese and Castro argue that “soldier well-being and performance is at its peak when moderation at each of the three levels, the individual, the group, and the organization, is maximal.”³³

The last component of the SAM, strains, represents the output of stressors mitigated by moderators. “Strains represent outcomes.”³⁴ Bliese and Castro divide strains into three categories—health, attitudes, and performance. This tripartite categorization enables evaluation across three different measurable domains using various tools, such as surveys, performance metrics, disease incidence rates, etc.

Using the meta-theory of SAM as a framework, my thesis explores the relationship among: risk of injury (the stressor), health care (the moderator), and security force performance (the strain). If security forces can be strengthened in the performance of their duties by the provision of medical support, then efforts to strengthen and build partner capacity in the security sector medical system has the potential to directly strengthen security and provide an institution that can serve the broader state.

33. Ibid., 189.

34. Ibid., 190.

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III. THE IMPACT OF CASUALTY/TRAUMA CARE ON SECURITY FORCE EFFECTIVENESS: A LARGE-*N* ANALYSIS

A. INTRODUCTION

Many factors influence the effectiveness of security forces. While there has been significant inquiry and research on the impact of obvious factors (e.g., training, leadership, logistics, equipment, oversight, policies, and legal institutions), the influence of casualty/trauma care on security force effectiveness has received little attention.³⁵ In fact, there is no evidence of any published quantitative or qualitative analysis on how casualty/trauma care availability affects the performance of security forces! If the availability of casualty/trauma care to security forces shapes the quality and quantity of security, efforts to evaluate and assist the strengthening of medical support must be included in any U.S. effort to strengthen the security of other nation-states.

It is undisputed that the delivery of security, especially in areas with active or latent instability, carries an inherent risk of injury for those tasked to provide it. For effective and enduring security, security forces must enter and control contested areas to establish order, apprehend criminals, and enforce peace. Establishing and maintaining security, however, exposes security forces to violence and the risk of injury. For the individual soldier or police officer, the risks are personal. For the state, the legitimacy of its governance often rests on establishing and maintaining order through the use of legitimate coercion and violence. Indeed, security, one of the pillars of development, remains a necessary condition for state development and economic progress.

This chapter explores the relationship between the effectiveness of police forces with access to varying levels of casualty/trauma care using a large-*n* quantitative approach, and considers the role of medical support for security forces when building,

35. As defined in the Introduction, “casualty/trauma care” consists of the trauma and rehabilitative care provided to security forces in the event of their injury while performing security operations. In this thesis, I treat casualty/trauma care as a subset of medical support, which also includes medical care for the diagnosis and treatment of non-battle injuries and diseases. Both casualty/trauma care and medical support are subsets of health support, which also includes preventive medicine and sanitation services.

strengthening, or advising security forces.³⁶ While the data prevents making causal claims or quantifying the degree to which casualty/trauma care emboldens a security force, a strong association between medical support and improved security force effectiveness argues for developing the medical support capacity during any security strengthening effort. Furthermore, if the level of violence influences security effectiveness (i.e., the role of casualty/trauma care is greater when security forces face higher risks), then strengthening the medical support for security forces emerges as a critical task during post-conflict stabilization missions.

What the large-*n* analysis conducted in this chapter reveals is that security forces performed more effectively when there was a reasonable expectation of medical care in the event they were injured. The ability of casualty/trauma care to mitigate the risks faced by security personnel, however, diminished once it reached a specific level; above this level, the risk of injury overwhelmed the benefits from medical care. Additionally, my analysis finds that higher quality medical systems were more likely to extend their care to security forces using pre-hospital capabilities.³⁷ These findings suggest that casualty/trauma care fills a key role in contributing to security force effectiveness and that strengthening local medical systems provides an opportunity to improve the medical support for security forces, thereby strengthening security. When violence levels are particularly high, however, casualty/trauma care cannot mitigate the risks of injury alone, but must be provided in concert with other interventions to strengthen security forces.

B. SOLDIER ADAPTATION MODEL FRAMEWORK

As introduced in Chapter II, the Soldier Adaptation Model (SAM) described by Bliese and Castro provides a framework to understand the factors influencing security

36. By using a large number of cases to test the hypothesis, my thesis takes advantage of an extensive dataset to randomize and reduce the impact of omitted variables. While large-*n* statistical methods provide evidence to either accept or reject a hypothesis concerning the relationship between independent and dependent variables, they lack the power to explain how the variables are related. Large-*n* analyses are discussed further in Stephen Van Evera, *Guide to Methods for Students of Political Science* (Ithaca: Cornell University Press, 1997).

37. Pre-hospital medical capabilities consist of the evaluation, stabilization, and evacuation of patients from the place of injury to a medical facility. While it can include care provided by physicians, pre-hospital medical care is usually provided by trained individuals, such as medics or paramedics, using specially equipped vehicles, such as ambulances.

personnel's work motivation.³⁸ The SAM uses a systems-based approach to describe performance outputs (See Figure 1). The primary input, stressors, includes all aspects of the environment that "place a load or demand on the soldier."³⁹ While some of these stressors will vary by location and time (e.g., danger), others are omnipresent. As security personnel operate in the context of groups and organizations, moderators must be cultivated at each level of the institution to be mutually reinforcing and to minimize the effects of stressors on performance. Stressors, mitigated by moderators, result in strains, analyzed through disease incidence, surveys, and performance metrics.

Using the SAM framework, my analysis examines the relationship among the risk of injury (the stressor), medical support (the moderator), and security force performance (the strain).

C. RESEARCH QUESTION OF LARGE-N ANALYSIS

Framed in the context of the SAM, the research question for this chapter asks, "Are security forces more effective when they anticipate receiving medical care in the event they are injured?" In seeking to fully answer this question, several secondary questions were addressed. These questions include:

1. What variable should be used to represent security force effectiveness?
2. What variable should be used to represent the risk of personal injury to security forces?
3. What variable should be used to represent the provision of medical support for security forces?
4. Are security forces more effective when they have medical support?
5. Does the level of risk modulate the influence of medical support on security force effectiveness?
6. Is there a relationship between the provision of medical support for security forces and the quality of a state's healthcare system?

38. Bliese and Castro, "The Soldier Adaptation Model (SAM): Applications to Peacekeeping Research," 186.

39. Ibid.

D. ASSUMPTIONS

The analysis in this chapter limits the term “security forces” to police forces focused on internal state security. While military forces are often used to respond to both internal and external threats in many states, standardized data on military effectiveness is limited. Since all states require police forces to provide internal security a large data set exists. Although medical support for military units is often provided through military medical networks, police forces usually rely on civilian medical care for their forces, especially in areas distant from large urban areas. As Security Force Assistance and Foreign Internal Defense both aim to strengthen internal security institutions to foster internal security, this chapter assumes its findings will be generalizable to all security forces, as the delivery of security involves personal risk by all security personnel.

E. STUDY DESIGN

1. Methodology

The methodology used to answer the research questions involved hypothesis testing. Each null hypothesis was tested against available data using a 0.05 level of significance. If the hypothesis test failed to meet the level of significance, then I failed to reject the null hypothesis. If the null hypothesis was rejected, I accepted the alternate hypothesis. When both arms of the hypothesis test contained at least 30 data points, a two-sample T-test compared sample means under the assumption that the sample means followed a normal data distribution, as suggested by the central limit theorem. If either sample arm contained less than 30 data points, normality testing determined whether the data followed a normal distribution. If normally distributed, two-sample T-testing was used to test the hypothesis. If one of these samples failed to follow a normal distribution, non-parametric testing using the Mann-Whitney/Wilcoxon test was used to evaluate for significant differences between the samples. Using Minitab 16 Statistical Software to conduct statistical computations and generate charts and graphs, documentation of all statistical testing is compiled in Appendix A for further reference.

2. Variables

Using the SAM framework to investigate the relationship of casualty/trauma care availability on police security force effectiveness, I analyzed police productivity (dependent variable/the strain) in regard to the availability of medical support (independent variable/the moderator) and risk of injury (independent variable/the stressor) faced by security personnel (see Figure 2). While other variables contribute to the strains and moderators acting upon the performance of security personnel, these two independent variables (medical support and risk of injury) test the role of health support on security performance.⁴⁰ Consequently, for the purpose of my investigation, I focused on these two factors to allow comparison among states with otherwise discordant features.

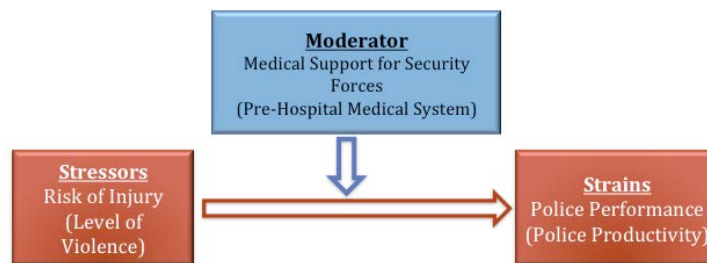


Figure 2. Study variables expressed in SAM system. The risk of injury and the presence of a pre-hospital medical system represented the independent variables influencing police performance, the dependent variable.

a. Strain/Outcome: Variable Representing Security Force Effectiveness

Few objective qualitative metrics on security forces and the legal systems that support them have been applied globally. For my investigation, police productivity, a quantifiable outcome measurement, provided a standardized metric for comparing the performance of police forces. While there may be disagreement on the use of police productivity as a metric of effectiveness, it appears to be the best metric available, as

40. Within each of these variables, regional and state-specific factors influence the risk of injury and provision of healthcare. Future research into these factors could identify targets for intervention and risk mitigation.

objective qualitative metrics for international security forces remain scarce.⁴¹ Speaking directly to the challenges of quantifying the quality of security forces, the United Nations Office on Drugs and Crime and European Institute for Crime Prevention and Control notes that

[such] an overall assessment would necessarily mean an in-depth look at the criminal justice systems of the different countries in theory and practice. And even with sufficient knowledge on all criminal justice systems of the world it would be a very ambitious task to translate this knowledge into a handy performance index, allowing for a ranking of countries based on the quality of criminal justice performance.⁴²

In fact, the metrics used by the United Nations Office on Drugs and Crime/European Institute for Crime Prevention and Control do not claim to measure quality or “imply that a system with high productivity rates performs better than a system with low productivity rates.”⁴³ Nevertheless, the metrics provided in its *International Statistics on Crime and Justice* provide the best available metric linking the willingness of security force personnel to make arrests and process the arrests through the legal system.

Police productivity is expressed as the average of three sub-metrics, which evaluate security sector productivity: ratio of suspects per police officer, ratio of suspects brought before a court per prosecutor, and the ratio of convictions per prosecutor. These sub-metrics measure the output of security forces as they expose, investigate and support the prosecution of criminals. In accordance with the SAM model, this metric represents a

41. Other security metrics combined non-performance factors (e.g., human rights violations and brutality) into their evaluation of security forces. The Failed State Index produced by the Fund for Peace, for example, incorporates the influence of corruption, availability of weapons, professionalism and the presence of private armies into their metric. The Failed State Index, *Conflict Assessment Indicators: The Fund for Peace Country Analysis Indicators and Their Measures*, Report (Washington, DC: Fund for Peace, 2011). <http://www.fundforpeace.org/global/library/cr-10-97-ca-conflictassessmentindicators-1105c.pdf>

42. Stefan Harrendorf, Markku Heiskanen, and Steven Malby, eds., *International Statistics on Crime and Justice*, report, HEUNI Publication 64 (Helsinki, Finland: Institute for Crime Prevention and Control and United Nations Office on Drugs and Crime, 2010), 132.
<http://www.heuni.fi/Etusivu/Publications/HEUNIreports/1266333832841>

43. Ibid., 121.

strain/outcome useful for evaluating the impact of medical support on the productivity of security forces.⁴⁴

b. The Moderator: Variable to Represent the Provision of Medical Support for Security Forces

The provision of casualty/trauma care to security forces varies significantly among nation-states, and there is currently no internationally recognized “standard of care” to guide medical support for security institutions. Despite this lack of guidance, or perhaps because of it, pre-hospital trauma care has begun to attract the attention of the international health community as an important element of essential medical services.⁴⁵ Pre-hospital medical systems (PHMS) connect the community, including security personnel, to their medical system by: responding to injuries and illnesses outside of the hospital, providing initial resuscitative care, stabilizing for transport, and moving the patients to the hospital for definitive care.⁴⁶ Without a PHMS, patients must be brought to the hospital before receiving any medical treatment.⁴⁷ In 2007, the World Health Organization (WHO) collected self-reported data from member states on the presence of a formal, publicly available pre-hospital care system. This yields a metric for the availability of pre-hospital medical care for security services. For those states with a PHMS, security force casualties have a reasonable expectation of emergency care and transport to the hospital if they are injured while performing their duties. Without PHMS, casualties may not be able to access emergency medical care in time to preserve their life or prevent permanent disability. While the quality of PHMS varies

44. Although performance metrics represent the best available data for the variable representing police behavior, its use limits the power of my study. Definitive conclusions regarding police effectiveness, therefore, are to be avoided given the tenuous relationship between performance and effectiveness.

45. Scott Sasser, Mathew Varghese, Arthur Kellermann, and Jean-Dominique Lormand, *Prehospital Trauma Care Systems*, Report (Geneva: World Health Organization, 2005), http://www.who.int/violence_injury_prevention/publications/services/39162_oms_new.pdf.

46. While military forces often field and maintain medical systems that provide point-of-injury care and evacuation services for their forces given the lack of reliable health services in conflict zones, police and constabulary services usually rely on the civilian medical system for medical care.

47. In the absence of a formal PHMS, wounded security personnel must be transported to hospitals or clinics using non-standard evacuation platforms, often in the backs of trucks or in civilian vehicles where no initial or en route care is provided. Evacuation plans are often ad hoc and not integrated into operational plans, which result in poor outcomes and increases morbidity and mortality.

widely, and metrics about the quality of the provided care were not available, the presence or absence of a PHMS provides a reasonable metric for measuring the provision of medical support for security operations.

c. *Stressor: Variable Representing the Risk of Personal Injury to Security Forces*

For my analysis, a state's level of violence represents the risk security officers face in the performance of their duties. In areas with higher levels of violence, security forces face a higher risk of injury. In areas with lower levels of violence, the risk to security personnel is assumed to be less.⁴⁸

3. Database

The majority of the data populating the study's database was drawn from the World Health Organization's (WHO) data registry and the *International Statistics on Crime and Justice* (ISCJ) report by the United Nations office on Drugs and Crime and the European Institute for Crime Prevention and Control (HEUNI).

The WHO data registry collects and reports public health data for all WHO member countries and provides an extensive dataset for analysis.⁴⁹ All health-related information, to include development metrics, economic factors, and disease rates are collected longitudinally. In 2008, the WHO published the *Global Burden of Disease: 2004 Update* (GBD) and included its data as part of the WHO data registry. As an update to data presented in 2002, the GBD summarizes the impact of disease in each of its 192 member states for 2004. Drawing upon the resources of the WHO and international organizations to collect and verify this data, the report presents the data in terms of normalized, age-adjusted metrics which also adjust for population distributions, allowing

48. The use of violence as a measure of risk, however, can be confounded by its use as a metric of security forces effectiveness, as used in other studies. In the forward of the WHO's 2002 "World Report on Violence and Health," Nelson Mandela writes, "[violence] thrives in the absence of democracy, respect for human rights and good governance." Alternatively, in my analysis, violence levels reflected the personal security risks security forces endured as they endeavored to restore security and stability. *World Report on Violence and Health: Summary* (Geneva: World Health Organization, 2002). http://www.who.int/violence_injury_prevention/violence/world_report/en/summary_en.pdf

49. "Global Health Observatory Data Repository," World Health Organization, <http://apps.who.int/ghodata/>, accessed September 8, 2012.

for comparison between states. As wounds from conflict and instability consume health care resources, the GBD reflects the health impacts of war and violence throughout the world in 2004.⁵⁰ Additional data from the WHO data registry data on health for 2004 was extracted to populate the database. When data was not available for 2004, I used data in close proximity to 2004. Information about the presence of a formal pre-hospital medical system (PHMS), for example, was only available for 2007.

Published in 2010, the IS CJ report provides key metrics on police, prosecution, and detention capacity for UN member states. Information on police density and productivity was extracted and added to the database from this dataset. The majority of the data reported for individual states covers the years 2004–2006.⁵¹ The data for some countries, however, falls outside this range or is not listed.

I further populated my database with open-source documents from the U.S. State Department website or the U.S. Embassy website responsible for the country of interest. The information from these sites indicates the current presence or absence of a PHMS. In these situations, the current information represents the best available data and I included it in the database.

My database excludes states undergoing large armed conflicts during the 2002–2004 period to remove the bias of skewed figures from wars and post-conflict situations. Using the Uppsala Conflict Data Program/Centre for the Study of Civil Wars, International Peace Research Institute, Oslo (UCDP/PRIO) Armed Conflict Dataset v.4-2012, 1946–2011, countries with more than 1,000 deaths/year between 2002 and 2004 are omitted.⁵² Countries with low-intensity conflict in 2004 remain in the dataset in order to evaluate the impact of increased violence on police performance with different levels of medical support. Using these criteria, nine countries were removed from the database: Nepal, Colombia, Sudan, Uganda, India, Liberia, Iraq, Russia and Burundi. In

50. *The Global Burden of Disease: 2004 Update* (Geneva: World Health Organization Press, 2008) http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html.

51. Harrendorf, Heiskanen, and Malby, *International Statistics on Crime and Justice*.

52. Lotta Themnér and Peter Wallensteen, “Armed Conflict, 1946–2011,” UCDP/PRIO Armed Conflict Dataset, accessed September 8, 2012, http://www.pcr.uu.se/research/ucdp/datasets/ucdp_prio_armed_conflict_dataset/.

addition, the following three states were excluded due to excessive war-related disability and death (greater than 1000 War Age-Standardized Disability Years per 100,000 people as reported in the GBD): Somalia, Democratic Republic of Congo, and the former Yugoslav Republic of Macedonia. The Democratic People's Republic of Korea was excluded due to a paucity of data.

Item	Amount	Item	Median	Minimum	Maximum
Total States Included	179	Population (thousands)	5799	2	1,312,433
Total States Excluded	14	All Cause Mortality DALY (per 100,000)	19,032	8,013	82,801
States with PMHS	140	Violence DALY (per 100,000)	236	8	2,031
States without PMMS	39	War DAYL (per 100,000)	16	0	838
States with Police Productivity Data	91	Burden of Violence (%)	0.99%	0.09%	9.98%
States without Police Productivity Data	88	Police Productivity (ratio)	0.077	0	1
		Under Five-Mortality (Death per 1000 live)	25	3	202

Table 1. Summary of Database Information

Altogether my database includes 179 countries with populations ranging from 2,000 to 1.3 billion, accounting for 4.9 billion people. Metrics reflecting the quality of the PHMS, its penetration into rural areas, and the use of dedicated medical support outside of the civilian medical support system remain unavailable. Summary information is provided in Table 1.

Police productivity graphed as a function of violence suggests an inverse relationship between the levels of violence and police productivity (See Figure 3). The majority of states appear to cluster in the region denoting low levels of violence and low to moderate levels of police productivity. For those states with high levels of violence, police productivity appears generally low, while states with high levels of police productivity have generally low levels of violence. There are no states with high levels of violence that also have high levels of police productivity. States without a PHMS appear to have lower levels of police productivity and higher levels of violence when compared

to states with a PHMS, suggesting that there is a relationship between having medical support and police productivity.

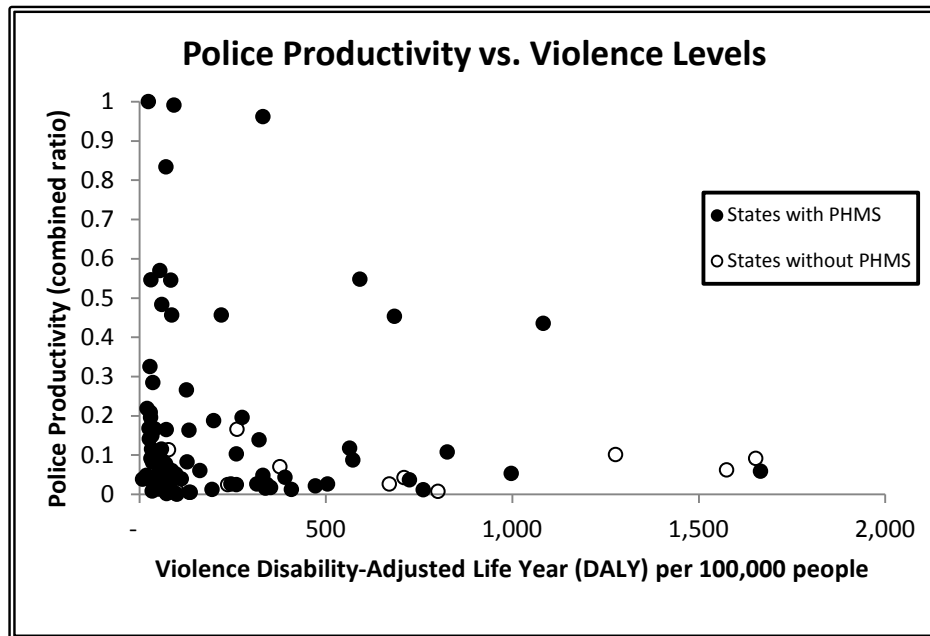


Figure 3. Scatterplot graph of violence levels and police productivity for states

4. Additional Definitions of Terms and Secondary Variables

Variables and metrics used in my database include:

- Age-standardized, Disability-Adjusted Life Year (DALY): The DALY computes the burden of a disease process by computing the “...years of life lost from premature death and years of life lived in less than full health...” as a result of a specific disease.⁵³ While the GBD provides DALY in several formats, my study uses the age-standardized metric. The age-standardized DALY accounts for rates of disease by age and gender according to the WHO World Standard Population.⁵⁴ This standardization allows comparison of states with different population age densities.⁵⁵
- Violence (Age-standardized DALYs/100,000 of population): The number of DALYs attributed to violence per 100,000 people.

53. *Global Burden of Disease*, 2.

54. *Ibid.*, 29.

55. Omar B. Ahmad, Cynthia Boschi-Pinto, Alan D. Lopez, Christopher JL Murray, Rafael Lozano, and Mie Inoue, *Age Standardization of Rates: A New WHO Standard*, report, GPE Discussion Paper 31 (Geneva: World Health Organization, 2001), <http://www.who.int/healthinfo/paper31.pdf>.

- War (Age-standardized DALYs/100,000 of population): The number of DALYs attributed to war per 100,000 people.
- All-cause Mortality/Morbidity (Age-standardized DALYs/100,000 of population): The number of DALYs attributed to all diseases or disease processes, to include conflict and violence, experienced by the population that affects their health and well-being.
- Burden of Violence (BOV): Burden of Violence represents the fraction of DALYs attributed to violence in relation to the total disease burden (All-cause Mortality/Morbidity).
- Under-five mortality rate: In my study, under-five mortality was used as an indicator of the quality and development of the civilian medical sector providing PHMS service. The under-five mortality rate represents the probability of dying by age 5 per 1,000 live births. Commonly used as a metric for the effectiveness of a state's health system, factors influencing its value include: the supply of health and nutrition services, food security, feeding practices, levels of hygiene and sanitation, access to safe water, female illiteracy, early pregnancy, access to health services, and gender equity. As an outcome metric, the under-five mortality provides feedback on how well a state's health system operates in general and in coordination with other ministries.⁵⁶
- Population (1,000's): The population metric represents the *de facto* population of each state. The WHO calculates population data from the most recent "World Population Prospects" report produced by the United Nations Population Division. Data was extracted for the 2004 time period.⁵⁷

F. RESULTS AND DISCUSSION

1. Medical Support's Impact on Security Force Productivity

To investigate whether security forces are more effective when they have casualty/trauma care available, the following hypotheses were generated:

H₀: Security force productivity is not associated with the availability of casualty/trauma care.

H_a: Security forces are more productive when casualty/trauma care is readily available.

56. *The State of the World's Children: 2008*, Report (New York, NY: United Nations Children Fund (UNICEF), December 2007), <http://www.unicef.org/sowc08/docs/sowc08.pdf>.

57. *World Population Prospects: 2004 Revision* (New York, NY: United Nations, 2005), <http://www.un.org/esa/population/publications/WPP2004/wpp2004.htm>.

Using a one-tailed T-test to compare the productivity of security forces both with and without a PHMS, analysis of the database reveals a significant difference in the productivity of security forces in states with a PHMS, leading to the rejection of the null hypothesis and acceptance of the alternate hypothesis ($p=0.000$) (see Appendix A, paragraph A). This finding supports the claim that medical support is associated with the productivity of security forces. While this finding cannot claim, nor is it proposed, that availability of casualty/trauma care caused higher levels of police productivity, the strong association, especially when viewed through the SAM framework, suggests that those security forces with a PHMS are more likely to be more productive. Alternatively, those without a PHMS tend to be less productive.

In the context of security building and stability operations, any effort to strengthen the internal security forces of another nation-state must include an assessment of the casualty/trauma care provided to security forces and include efforts to strengthen it as part of a comprehensive plan to strengthen all levels of security. These efforts could include developing programs to train security forces on basic first aid, developing indigenous ambulance systems with en route care, training physicians at local clinics in trauma care and resuscitation, and strengthening surgical capabilities.

In *Pre-hospital Trauma Care Systems*, the WHO advocates for the development of pre-hospital trauma care and proposes essential and desired components needed for an effective system.⁵⁸ It strongly promotes the development of locally sustainable systems and prescribes a tiered approach to pre-hospital care that is tailored to the needs of the community served by the medical system. In the companion document, *Guidelines for Essential Trauma Care*, the WHO recommends specific essential capabilities that medical systems should develop to care for trauma patients.⁵⁹ Evidence of the need to further develop trauma care capabilities in rural/less developed areas is provided by Mock, et al. Their study demonstrates significantly higher trauma mortality rates in rural areas of low-income countries: 6% mortality rates from trauma in high-income countries

58. Sasser, Varghese, Kellermann, and Lormand, *Prehospital Trauma Care Systems*.

59. World Health Organization, *Guidelines for Essential Trauma Care* (Geneva: World Health Organization, 2004), <http://whqlibdoc.who.int/publications/2004/9241546409.pdf>.

compared to 36% mortality rates from trauma in rural areas of low-income countries.⁶⁰ A recent meta-analysis by Henry and Reingold evaluating the efficacy of programs designed to develop trauma systems in developing countries pools the results of 14 studies and finds a 25% reduction in mortality after implementing trauma systems. Improvement in rural mortality was even more pronounced.⁶¹

As state legitimacy and security are often most threatened in rural areas, American efforts to strengthen the internal security forces of partner nation-states must include the nurturing and development of indigenous trauma systems to support the delivery of security.

2. Level of Risk

To investigate whether the level of risk faced by security forces modulates the influence of medical support on security force effectiveness, the following hypotheses were generated:

H₀: The level of risk facing security forces does not impact the association between higher productivity in states with a PHMS.

H_A: The level of risk facing a security force does impact the association between higher productivity in states with a PHMS.

In my analysis, I evaluated the impact of medical support in terms of its ability to influence security personnel behavior. In other words, when violence levels are low, the benefits of health support might not be fully appreciated, and may not have an impact on subsequent behavior. In contrast, the utility and impact of health support might directly impact security force behavior in areas of higher violence. Additionally, the findings suggest that there might be a level of violence that can no longer be mitigated by health support. If true, other interventions, in addition to health support, are required to ensure the effective conduct of security operations in those regions with high levels of risk/violence.

60. Charles Mock, "Trauma outcomes in the rural developing world: comparison with an urban level I trauma center," *The Journal of Trauma* 35 (1993): 518–523.

61. Jaymie Ang Henry and Arthur Lawrence Reingold, "Prehospital trauma systems reduce mortality in developing countries: a systematic review and meta-analysis," *Journal of Trauma and Acute Care Surgery* 73, no. 1 (July 2012): 261–8.

In the first test of these hypotheses, I compared the violence levels between states with police productivity data and found a significant difference between the levels of risk based on the availability of a PHMS ($p=0.025$) (see Appendix A, paragraph B). This finding, therefore, rejected the null hypothesis and accepted the alternative hypothesis that there is an association between the risks police forces face and the presence of a PHMS. In fact, having a PHMS was associated with countries with lower levels of risk. This suggests that countries with higher levels of risk are less likely to have a PHMS to support security forces.

In the second test of these hypotheses, I investigated whether a certain level of violence or risk severed the link between police productivity and the presence of a PHMS. Evaluating risk of violence as a percentage of the total disease burden of the country quantifies the risk to security personnel relative to other causes of death and disease. By dividing the DALY for violence by the DALY for All-cause Mortality/Morbidity (total disease burden), a Burden of Violence (BOV) was determined for each country. My analysis reveals that up to a BOV of 2.25%, police productivity continued to be significantly better with medical support ($p=0.002$) (see Appendix A, paragraph C). This finding rejected the null hypothesis and led me to accept the alternative hypothesis. However, once the level of risk increased above 2.25% BOV, the presence of medical support failed to improve the productivity of security forces ($p=0.9512$) (see Appendix A, paragraph D). This result, therefore, failed to reject the null hypothesis. Once the BOV exceeded 2.25%, the association between higher police productivity with a PHMS vanished.

These findings suggest that medical support significantly improves the productivity of security forces up to a certain level. Two likely causes of this ceiling effect are increased perceived risk by the security forces and the willingness of PHMS personnel to operate in areas of increased risk. Because the moderating effect of a PHMS appears to diminish once security personnel perceive the risk of injury as greater than the benefits of providing security, security forces need to enhance other moderators (e.g., send a larger force, provide better armor, and improve training) to counteract this change in productivity. Similarly, if the risk of violence also influences the reliability of the

PHMS, ambulance personnel must be willing to operate in areas of violence. If medical first responders are unwilling to enter areas of increased risk, medical support for security forces will be unavailable. One conclusion that can be drawn is that without the expectation of medical support, security forces are likely to modify their security productivity. Dedicated medical support units, tactically trained and with resources to augment security personnel in regions with high levels of risk, would help fulfill these expectations.

3. PHMS as a Reflection of Medical System Quality

Once a PHMS appeared to be associated with better police productivity and lower levels of risk/violence, I turned to other factors influencing the provision of PHMS. Because the PHMS extends the care provided by the local health systems, the quality of the health systems might be expected to influence whether a PHMS capability exists. To explore the association between medical system quality and PHMS availability, the following hypotheses were generated:

H₀: The quality level of the medical system had no impact on the availability of a PHMS capability to support security operations.

H_A: Higher quality medical systems were more likely to field a PHMS to support security operations.

Because the under-five mortality rates are a recognized outcome metric for health care quality, they enable me to make a comparison between health systems against an international standard. Using a one-tailed T-test, the under-five mortality rates of countries with and without a PHMS proved significantly different ($p=0.000$) (see Appendix A, paragraph E). Those states with a PHMS had significantly lower under-five mortality rates. This finding suggests a connection between the quality of the health system and the provision of PHMS.

While this finding appears intuitive, it highlights the need to evaluate and strengthen the civilian and security force medical systems providing medical support. Efforts to improve civilian institutions by focusing on aspects related to trauma care would prioritize medical strengthening engagements that directly impact security. While there have been calls from the international community for military forces to focus on

security while development organizations focus on development, my findings point to the need to develop medical support capabilities in the civilian medical sector as a key component of overall security strengthening efforts.⁶²

4. Limitations

Because my analysis relied on data collected for other studies or research efforts, the scope and the strength of its conclusions are bounded. As a large-*n* study, the study's descriptive power to demonstrate the relationship among risks, medical support and security productivity is, by definition, retrospective. While the data allows some discussion of an investigation into issues of quality, quality is not specifically measured or quantified other than in relation to quality metrics of the health systems. The lack of an international standard for police effectiveness represents a major limitation to investigating this topic. While police productivity is used as a representative factor for police force behavior, the potential gap between productivity and effectiveness prevents a more directed analysis. Another major limitation stems from the paucity of qualitative and quantitative metrics on the quality, reliability, and capabilities of each state's PHMS. While the concept of PHMS quality is explored in regard to providing reliable support to security forces, the binominal nature of the PHMS data restricts further analysis. Future efforts to establish both quantitative and qualitative measures of medical support for security operations would facilitate a more robust analysis and identify the key features a PHMS needs in order to strengthen security forces.

62. Dr. Adams's comments summarize the common arguments against military involvement in development activities by claiming that they do more harm than good. Gordon Adams, "We ask too much of the military," *Foreign Affairs*, October 29, 2012, http://adams.foreignpolicy.com/posts/2012/10/29/we_ask_too_much_of_the_military. The WHO's InterAgency Standing Committee for the Global Health cluster, a group representing 30 international health organizations, also addresses the criticisms and problems associated with military forces engaging in health development in "Civil-military coordination during humanitarian health action, Provisional Version," February 2011, http://www.who.int/hac/global_health_cluster/about/policy_strategy/ghc_position_paper_civil_military_coord_2_feb2011.pdf.

G. RECOMMENDATIONS

Based on the analysis conducted in this chapter, the following recommendations should be incorporated into U.S. efforts to strengthen partner nation-state security forces:

1. States should capitalize on the association between police productivity and the provision of casualty/trauma care in order to strengthen security. Because of the significant overlap in providing trauma care for military and civilian injuries, efforts to strengthen the medical sector's support of security personnel will have spillover effects to the civilian population, thereby increasing the dividend on the investment.
2. For operations in areas of high risk, security forces should have dedicated casualty/trauma care provided by personnel trained to operate with the security forces and equipped with appropriate equipment. This capability will ensure the provision of medical support when its need is likely the greatest.
3. Medical engagements by the U.S. to strengthen partner states must include development of the partner state's medical support system as a critical pillar of security development. These engagements should extend to the civilian medical system if security forces rely on them to provide casualty/trauma care, especially in rural areas. All medical engagements must be designed to build partner capacity and be focused on interventions that develop, support, or strengthen the medical support system for security forces. By viewing all actions through the lens of security, medical engagements would be limited to those activities that support security building.
4. Standardized metrics for the effectiveness of security forces, PHMS, and trauma care systems should be developed in order to provide feedback on interventions designed to improve these institutions and facilitate further research and informed policy.

H. CONCLUSIONS

Casualty/trauma care for security forces plays a key role in strengthening the effectiveness of security operations. By mitigating the stressor of potential injury,

casualty/trauma care encourages security productivity, a key component of effectiveness. These benefits, however, appear to plateau once the risk of injury exceeds a threshold above which security personnel are overwhelmed by risk or where the environment precludes effective and reliable medical support. As the U.S. seeks to strengthen the security forces of its partner nation-states, special emphasis and resourcing of medical support for those forces is essential. When training internal security forces, all health or medical development endeavors must target interventions that strengthen civilian first responder skills, evacuation capacity, and hospital trauma capacity.

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IV. MEDICAL SUPPORT AND THE WILL TO FIGHT: A GAME THEORY ANALYSIS

Give all the care you possibly can to your wounded, for if you neglect them, you will make your soldiers timorous and cowardly before a battle, and, not only that, but your personnel, whom you might preserve and retain by proper consideration for their health and welfare, will be otherwise lost to you through your own negligence.

–Byzantine Emperor Leo (886–912)⁶³

A. INTRODUCTION

In Chapter 3, the retrospective large-*n* analysis of the link between security force effectiveness and the provision of medical support established that members of security forces are more likely to be productive when they have a reasonable expectation of medical care in the event they are injured. This chapter explores the “why” of the relationship between security force performance and the availability of casualty/trauma care.

What does it take to establish security? There is little disagreement in the field of security studies that a legitimate government must maintain a monopoly on the coercive use of force within its borders and abroad.⁶⁴ How that force is used and who it serves speaks directly to the state’s viability and its acceptance by the population. The proper use of force, usually within the context of a legal system that prevents abuse or unrestrained control, supports the legitimacy of a nation-state. Citizens abdicate their use of force to the state with the expectation of peace and security, and the state assumes the responsibility to fulfill that expectation. Without security, progress, growth, and development fail. When the peace is broken, either by those contesting the rule of law or in pursuit of criminal activities, the state must re-establish its primacy through the use of security forces and the judicial system; this often requires the use of violence. In order for

63. As cited in Fielding H. Garrison, *Notes on the History of Military Medicine* (New York: Georg Olms Verlag, 1922), 80, <http://archive.org/details/notesonhistoryof00garr>.

64. Max Weber, “Politics as a Vocation,” in *From Max Weber: Essays in Sociology*, translated by H.H. Gerth and C. Wright Mills (New York: Oxford University Press, 1946), 78.

violence to be effective, however, the security forces must be willing to fight against those threatening the state. At the most basic level, security forces must be willing to put their lives at risk to serve the state's interests.

B. RESEARCH QUESTION FOR GAME THEORY ANALYSIS

This chapter explores the same research question addressed in Chapter 3 from a different perspective, through the lens of game theory.⁶⁵ The research question for this chapter therefore asks, “Are security forces more effective when they anticipate receiving medical care in the event they are injured?” In seeking to fully answer this question using game theory, several secondary questions were addressed. These questions include:

1. How does game theory assist in exploring the research question?
2. What “game” is explored to understand the link between health support and security force effectiveness and performance?
3. What variable should be used to represent the provision of medical support?
4. What variable should be used to represent security force effectiveness?
5. Does the level of risk faced by security forces influence their willingness to fight?
6. Does medical support mitigate the level of risks faced by security forces and influence their willingness to fight?

65. Essentially creating a new branch of mathematics in 1944, John von Neumann and Oskar Morgenstern published *Theory of Games and Economic Behavior* and provided a framework to model contests between players. Game theory explores the rational behavior of contestants when each player's best choice, or behavior, is contingent on the choice of his opponent. While initially “..hailed by some as a creation as important to the theoretical development of the social sciences as the calculus had been to the development of classical mechanics and physics...,” game theory has not been widely applied across the social sciences. It has, however, significantly influenced work in economics, political science, international relations, “..arms control and disarmament policies, international negotiation and bargaining processes, and so forth.” At its core, game theory models the behavior, strategies, and outcomes of contestants when they have different motives, goals, or outcomes. This chapter applies the principles and theories of game theory to explore, *ceteris paribus*, the influence of health support on the behavior of security forces and the willingness of members of security forces to put themselves in harm's way given varying levels of risk. While the foundations of game theory are grounded in complex mathematics, its principles allow a robust and logical approach to model and explore complex human interactions. Additionally, game theory analysis elucidates the strategies each player could implement to influence his opponent's behavior. Steven J. Brams, *Game Theory and Politics* (London: The Free Press, 1975), xi and 1.

C. ASSUMPTIONS

The heart of game theory assumes that contestants display rational behavior. As described by Dahl and Lindblom, “[an] action is rational to the extent that it is ‘correctly’ designed to maximize goal achievement, given the goal in question and the real world as it exists.”⁶⁶ Rational action, however, should not be confused with calculated action. While some, such as economist Anthony Downs, suggest rational behavior seeks “maximizing output for a given input, or minimizing input for a given output,” Dahl and Lindblom suggest a definition of rationality that includes dispositional factors.⁶⁷ They write

[a] satisfying emotional life seems to require opportunity for impulsiveness, spontaneity, the direct expression of “animal spirits” (the human spirit, some might say), risk taking without calculation of the consequences, joy, fun, anger. The most rational act is not necessarily the most carefully calculated one.⁶⁸

The concept of rationality, therefore, supports an intentional approach to decision-making that includes the motives behind the behavior. This view, discussed by Isaak, suggests that conscious acts are influenced by dispositional factors that include the unconscious.⁶⁹ Akerlof and Kranton further refine the interaction between intentional behavior and unconscious factors by introducing the concept of identity, or a person’s concept of self, to understand behaviors that appear otherwise irrational (i.e., suicide bombers).⁷⁰ In short, an individual’s identity provides the context, both conscious and unconscious, and boundaries for decision-making.⁷¹ Adapting this approach, my thesis assumes that both the state and soldiers behave rationally in the context of their identities,

66. Robert I. Dahl and Charles E. Lindblom, *Politics, Economics, and Welfare* (New York: Harper & Brothers, 1953), 38.

67. Anthony Downs, *An Economic Theory of Democracy* (New York: Harper & Brothers, 1957), 5.

68. Dahl and Lindblom, *Politics, Economics, and Welfare*, 40.

69. Alan Isaak, *Scope and Methods of Political Science: An Introduction to the Methodology of Political Inquiry* (Homewood: Dorsey Press, 1981).

70. George A. Akerlof and Rachel E. Kranton, “Economics and Identify,” *Quarterly Journal of Economics* 116, no. 3 (August 2000): 715–753.

71. This concept is explained more fully in George A. Akerlof and Rachel E. Kranton, *Identity Economics: How Our Identities Shape Our Work, Wages, and Well-Being* (Princeton: Princeton University Press, 2010).

often a complex amalgamation of history, priorities, and motives. Predicting the behaviors of others, especially those from a significantly different culture, assumes a deep understanding of each participant's identity. My analysis similarly assumes a complete appreciation of the identities and motives of the players involved in the explored games.

D. METHODOLOGY

This chapter uses game theory to explore the preferences and behaviors of a state and the personnel charged to provide security according to varying levels of risk. After defining the game between the two players—the state and security personnel—games are constructed for two possible scenarios: a high-security environment and a low-security environment. The risk of injury to security personnel in a high-security environment is relatively low, while, in contrast, low-security environments present a greater risk to security personnel. For each of these games, players' preferences will initially be represented by ordinal values in order to explore the likely outcomes and strategic moves available to each contestant. Following this analysis, I will use Utility Theory to calculate cardinal values for the game outcomes in order to further investigate the strength of the preferences and the role of risk in influencing behavior. Medical support for Afghan National Security Forces offers a contemporary example to illuminate the findings of my analysis.

E. DEFINING THE GAME

1. The Dilemma

States desire capable, reliable, and controlled security forces to dispense violence in a controlled manner, targeting only those who break the law. "The size of the defense budget serves to identify the relative importance of the coercive arm in comparison to other organs of state, and it conveys a general sense of the size of the military establishment in absolute terms."⁷² Fielding a force with restraint and finesse requires a

72. Ashley J. Tellis, Janice Bially, Christopher Layne, and Melissa McPherson, "Measuring Military Capability," in *Measuring National Power in the Postindustrial Age* (Arroyo: RAND Corporation, 2000), 136, http://www.rand.org/pubs/monograph_reports/MR1110.html.

significant investment in personnel, equipment, and training. For developing or emerging states, the cost of this force can easily outstrip the state's ability to pay for it.⁷³ The consequences of not fielding a security force, however, can be devastating to state security and impede economic growth.⁷⁴ Worse yet, fielding a force on the cheap may lead to extractive behaviors by the security forces and threaten state legitimacy. Similarly, developing and maintaining a health care system can be quite expensive. The technical expertise, equipment, and infrastructure needed to provide comprehensive healthcare can quickly overwhelm a developing country.

The dilemma for the state, therefore, is to ensure that the security forces have the resources and support they need to conduct their security operations in a sustainable manner. Viewing this dilemma through the lens of game theory informs the role of casualty/trauma care for the state's security forces and the risks associated with its absence.

2. Framing the Game

My analysis considers a theoretical, generic developing or emerging state with areas of violence within its borders. While the state receives outside funding and aid to establish and improve government services, funding is limited. The state must allocate its support to meet its many requirements. Allocating additional funding to provide casualty/trauma support to security forces would require decreasing funding to other areas of governance and development. For the cessation of conflict and continued growth, however, the state must establish security within its borders, especially in the rural areas where its control remains tenuous.

73. In Afghanistan, for example, NATO estimates that Afghanistan will not be able to support the cost of its security forces until 2040 or later. Found in NATO Parliamentary Assembly, *Preparing the Afghan National Security Forces for Transition*, Committee Report, 211 DSC 10 E bis, 2010, <http://www.nato-pa.int/default.asp?SHORTCUT=2084>.

74. United Nations, "A More Secure World: Our shared responsibility," Report of the Secretary General's High-level Panel on Threats, Challenges and Change, New York, December 2, 2004, <http://www.un.org/secureworld/report>, United Nations, "In Larger Freedom: Towards development, security and human rights for all," Report of the Secretary-General, New York, March 21, 2005, <http://www.un.org/largerfreedom/contents.htm>, and Daniel Trachsler, "Security and Development: Convergence OR Competition?" *CSS Analyses in Security Policy* 3, no.40 (September 2008): 1–3, <http://www.css.ethz.ch/publications/pdfs/CSS-Analyses-40.pdf>.

a. Variable to represent the provision of medical support

Casualty/trauma care includes initial treatment, evacuation, and definitive care of injuries sustained in the enforcement of security duties. While the role of health and medical support to prevent and treat communicable and non-battle injuries is well documented and an important component of medical support, this chapter restricts medical support to the provision of casualty/trauma care.⁷⁵ Casualty/trauma care, by its technical nature, is expensive and difficult to provide. While easier to implement in larger cities with shorter evacuation distances and a larger concentration of security forces, providing casualty/trauma care to rural areas is difficult and less efficient. The demand for casualty/trauma care, however, is based on the level of security where the soldiers are operating. As the risk of injury increases, the probability of needing casualty/trauma support increases. In my game, states decide whether they will make the investments, such as in infrastructure and human capital, necessary to field and maintain a medical casualty/trauma system that reliably provides support to security personnel.

b. Variable to represent security force effectiveness

Soldier preferences to provide security vary based on the perceived risks and benefits. The possibility of death or injury poses the principal risk. Factors such as professionalism, leadership, legitimacy of their cause, unit cohesion, doctrine, training, organization, and camaraderie contribute to the effectiveness of a security unit.⁷⁶ In terms of the individual benefits gained by being a member of a security force, employment, monetary remuneration, prestige, and personal pride are commonly cited.⁷⁷ When faced with the decision to place themselves at risk while conducting security missions, members individually weigh the risks and benefits of fighting within the

75. Many resources document the importance of Medical care to military forces to prevent diseases, treat non-battle injuries and illness, and preserve the fighting strength. Non-battle injuries result in more losses of combat soldiers than fighting, and the impact of medical support to sustain these forces is unquestionable. The impact of communicable diseases on fighting forces in World War I, for example, is documented in U.S. Army Medical Department, *Preventive Medicine in WWII, Volume IV, Communicable Diseases, Transmitted Chiefly Through Respiratory and Alimentary Tract*, editor, ed. Colonel John Boyd Coates, Jr (Washington, D.C., Department of the Army, Office of the Surgeon General, 1958), <http://history.amedd.army.mil/booksdocs/wwii/PM4/default.htm>.

76. Tellis, Bially, Layne, and McPherson, "Measuring Military Capability."

77. Galantino, "Work Motivation and the Peacekeeper."

context of their identity and personal narrative. Members of security forces must decide whether they are willing to face the risk of injury as they work to improve or maintain security. Alternatively, members of security forces could, while appearing to be conscientious, reduce their risk of injury by conducting operations that would have no real impact on security. For my game, soldiers, both individually and collectively, must decide whether they will either conduct effective security operations or shun them. Avoidance of effective security operations consists of either refusing to participate in security operations by avoiding service, or conducting operations that have no substantial impact on security. For the remainder of this chapter, the terms soldier, soldiers, security force, and security personnel are used interchangeably to represent both the decisions of individuals in the security forces and the organization, as a whole.

3. The Games

The game used to analyze the interaction between the security force's willingness to provide security and the state's provision of health care is illustrated in Figure 4.

		<u>SOLDIERS VERSUS THE STATE</u>	
		State	
		Provides Health Support C	Doesn't Provide Health Support D
Soldiers	Provide Security A	AC	AD
	Doesn't Provide Security B	BC	BD

Figure 4. Soldiers versus the state. In this game matrix, the four potential outcomes are designated by the intersection of each player's options.

In this game, there are four potential outcomes created by the intersection of the two players' choices/behaviors:

AC – The soldiers provide security, and the state provides health support.

AD – The soldiers provide security, and the state does not provide health support.

BC – The soldiers do not provide security, and the state provides health support.

BD – The soldiers do not provide security, and the state does not provide health support.

With the possible outcomes defined, players' preferences for the outcomes are rank ordered from best to worst using an ordinal scale: the higher the number, the greater the preference. Four represents the best outcome and one represents the worst outcome. Once determined, the preferences are placed into the game matrix for analysis of likely outcomes and the strategic moves available to each player to influence the outcomes.

F. ANALYSIS AND RESULTS OF GAMES WITH ORDINAL VALUES

1. Game 1: High-Security Environment, Low-Risk of Injury

a. Preferences for Game 1: High-Security Environment, Low-Risk of Injury

(1) Soldier Preferences in Low-Risk Environment. In a high security environment where the perceived risks of injury are low or negligible, the benefits of prestige, pride, and employment outweigh the health risks. In this situation, soldiers will favor aggressive performance of their duties independent of the provision of medical support. For those outcomes that do not include security forces providing security, soldiers favor having health support in the event they are attacked by opposing forces even though they are not actively performing security operations (e.g., a mortar attack on their base). See Appendix B, paragraph B for a chart listing the soldiers' ordinal preferences.

(2) State Preference in a Low-Risk Environment. The state highly favors the establishment and maintenance of a high-security environment. The cost of providing medical support, however, could be onerous and the state prefers, from an economic perspective, to minimize this cost when possible. If soldiers were willing to

fight without medical support, the state could use its resources for other activities, but its next best option would be to provide medical support rather than be left without security. The state, however, does not want to provide health support to a security force that will not provide security. See Appendix B, paragraph C for a chart listing the state's ordinal preferences.

b. Game 1: Soldier versus State in Low-Risk Environment

With relative preferences for the outcomes established, the game matrix is populated and player preferences are illustrated in Figure 5.

GAME 1: SOLDIERS VERSUS STATE IN LOW RISK ENVIRONMENT

		State	
		Provides Health Support C	Doesn't Provide Health Support D
Soldiers	Provides Security A	(4,3)	(3,4)
	Doesn't Provide Security B	(2,1)	(1,2)

Figure 5. Soldiers versus the state with high-security environment/low-risk of injury to soldier. In this game, each player has a dominant strategy (for soldiers to provide security and for the state to NOT provide health support) that is independent of the other player's choice. As illustrated by the flow diagram, outcome AD is a Nash equilibrium as no arrows depart this outcome. Nash equilibriums are points where neither player can benefit from deviating unilaterally.⁷⁸

The game matrix illustrated in Figure 6 clearly defines the game and relative ordinal preference for each outcome. Flow arrows illustrate each player's behavior based on his preferences and the behavior of his opponent. From the flow

⁷⁸. Phillip D. Strafin, *Game Theory and Strategy* (Washington, DC: The Mathematical Association of America, 1993), 66.

diagram, it is clear that each player has a dominant strategy when he acts conservatively (maximizing his minimum outcomes for each choice). The intersection of these dominant strategies leads to a likely outcome of AD: the soldiers provide security, but the state does not provide health support. This outcome is the best preference for the state and the next best preference for the soldiers. Because neither player can increase his preference by moving unilaterally, this outcome is a Nash equilibrium and a highly stable outcome which is resistant to change.⁷⁹

c. *Game 1 Strategic Moves*

While players can secure the likely outcome of AD by acting first, neither player can improve his position by moving first. It is clear that without communication between the players, soldiers will elect to provide security and the state will choose to spend its budget in other areas.

With communication between the players, however, additional strategic moves are available. Unfortunately for the state, the soldiers have the only viable strategic move in this game. If they are willing to risk the possible consequences and can make a credible threat, the soldiers have the ability to threaten to stop providing security unless the state provides medical support. If the state does not meet this demand and the soldiers make good on their threat, the result of the game is BD: soldiers do not provide security, and the state does not provide health support. The outcome of BD hurts both the soldiers and the state; it is the worst outcome for the soldiers and the least best outcome for the state. If this threat is credible and believed, the threat removes the outcome AD from the game and forces the state to provide health support in order to get AC, its next best outcome: soldiers provide security and the state provides health support.

The availability of this strategic move creates a dilemma for the state. Does it accept the cost of providing health support, its next best outcome, in order to guarantee the delivery of security and preempt this threat? Alternatives to giving in to the threat, such as disciplining those who make the threat, may be available to the state but

⁷⁹. Ibid.

may weaken the state's legitimacy by highlighting its unwillingness to provide for its security forces.

2. Game 2: Low-Security Environment, High-Risk of Injury

a. Preferences for Game 2: Low-Security Environment, High-Risk of Injury

(1) Soldier Preferences in a High-Risk Environment. In Game 2, soldiers enter an area of operations with poor security and active opponents. With an increase in the risk of injury, the soldiers change their preferred order of possible outcomes. Despite an increased perceived risk of injury, the soldiers still prefer to provide security so long as there is provision of medical support. The benefits of prestige, employment, and professionalism outweigh the risks of injury in the event someone becomes a casualty. This preference is consistent with the observed behavior of modern police and military forces throughout the world. Without the provision of medical support, however, soldiers reassign their preference to provide security to their worst option. This reordering is consistent with behaviors of even the most elite U.S. military forces. When aerial medevac becomes unavailable due to poor weather, for example, U.S. forces often modify or cancel combat operations to decrease the risk of injury. See Appendix B, paragraph D for a chart listing the soldiers' ordinal preferences.

(2) State Preferences in High-Risk Environment. With a change in security level, however, the state does not modify its preferences between the possible outcomes. The state's primary desire for the establishment of security remains paramount, but the state would prefer this outcome at the lowest possible economic cost. While it may be willing to invest in medical support should this be required to induce the soldiers to provide security, it would prefer soldiers to provide security without it. As in the first game, the state considers providing medical support to soldiers unwilling to provide security as its worst outcome. See Appendix B, paragraph C for a chart listing the state's ordinal preferences.

b. Game 2: Soldier versus State in High-Risk Environment

With the new soldier preferences established, the game matrix for Game 2 is illustrated in Figure 6.

GAME 2: SOLDIERS VERSUS STATE IN HIGH RISK ENVIRONMENT

		State	
		Provides Health Support C	Doesn't Provide Health Support D
Soldiers	Provides Security A	(4,3)	(1,4)
	Doesn't Provide Security B	(3,1)	(2,2)

Figure 6. Soldiers versus the state with low security environment/high risk of injury to soldier. With the change in soldier preferences given the higher risk of injury, the soldiers' preference becomes contingent upon the provision of medical care. The likely outcome moves to BD and, as the flow diagram illustrates, establishes a new Nash equilibrium. With an increased level of risk to the soldiers, the most likely outcome is the least best option for both players.

With the increased risk of injury to the soldiers, the game has changed significantly. While the state still has a dominant strategy to avoid providing health support, the soldiers' choice to provide security is based upon the actions of the state. When the state provides health support, the soldiers will provide security. When the state fails to provide health support, the soldiers do not provide security.

As in the first game without communication, the interaction between both players' preferences leads to the likely outcome of BD in pure strategies. The outcome BD, however, is the least best option for both players. With neither player having the ability to increase his preference unilaterally, the outcome BD is a Nash equilibrium and a stable outcome.

c. *Game 2 Strategic Moves*

Strategic moves in this game favor the state. While the soldiers can play first to secure the expected outcome of AD, the state has the ability to improve its outcome to its second best preference by providing healthcare first. This first move by the state would result in the outcome AC: soldiers provide security and the state provides health support. This outcome, which is the best preference for the soldiers, shows soldiers the potential benefit in waiting and letting the state make the first move in the hopes that the state will identify and take advantage of its first move opportunity.

By communicating with the soldiers, the state also can make a strategic promise. By promising to provide health support for those injured while performing their duties, the state can remove the lack of health support as a factor (i.e., the promise removes outcome AD). This change in the game results in AC: soldiers provide security and the state provides health support, the soldiers' best outcome and the state's second best outcome.

3. *Summary of Games and Strategic Moves*

These games clearly demonstrate the importance of providing medical support to soldiers and security personnel as the risk of injury increases. Because the establishment and maintenance of security requires soldiers to fight and risk injury when confronted by an opposing force, health support influences the provision of security when the opposition is credible and capable. Using ordinal values, the analysis predicts the following:

When the risk of injury is low:

- soldiers will provide security, even if the state does not provide health support,
- the expected outcome is a Nash equilibrium and is stable,
- each player has a first move advantage to secure the likely outcome, and
- soldiers can pose a valid strategic threat by stopping security operations unless the state provides health support.

When the risk of injury increases significantly:

- soldiers will only provide security when the state provides health support,
- the expected outcome is a Nash equilibrium and is stable,

- the state can improve its outcome by executing a first move and providing health support, resulting in the soldiers providing security, and
- the state has an incentive to make a strategic promise to provide health care if the soldiers conduct security operations.

G. ANALYSIS AND RESULTS OF GAMES WITH CARDINAL VALUES

1. Cardinal Scaling

The first two games use ordinal values to compare the various outcomes available to the state and soldiers. While ordinal ranking allows the model to explore the actions of the players, the use of cardinal values to represent relative utility provides additional insight into the strength of strategic moves and the benefit or costs of various outcomes.

Cardinal values and interval scaling are being used to provide a qualitative assessment of the players' behaviors and the relative importance of health support on security development and operations. Historical data are used for stochastic variables in the analysis and are drawn from mortality data in El Salvador before and after a U.S. intervention to improve medical support to security forces.⁸⁰ The interval scaling used in my analysis is illustrative and designed to reflect generally accepted behaviors and preferences by the state and security forces. Quantitative extrapolation to specific situations, however, would require investigation of the specific values of the state and security forces to develop accurate interval scaling.

2. Cardinal Values for State Preferences

The cardinal values representing the utility of the four outcomes to the state are based on the need and purpose of the security forces. The state has a great interest in the establishment of security and is willing to invest funding for the establishment and resourcing of security forces in order to set the conditions for economic growth and peace. In general, the perceived benefits of having security greatly outweigh the cost of

80. The Salvadoran military experienced significant attrition, low morale and decreased performance in its forces as their mortality rate exceeded 45%. A U.S. Mobile Training Team was sent to El Salvador in 1983 to emphasize combat-related medical care. As a result of the team's efforts training and equipping the Salvadoran military medical support system, mortality rates for those wounded in action dropped to 5% in approximately 18 months. Russ Zajchuk, F. William Brown, and James H. Rumbaugh, "Medical Success in El Salvador," *Military Medicine* 154 (1989): 59–61.

allocating funds to health support in order to create the conditions for stability and economic growth. The relationship among the different outcomes is illustrated in Figure 7. Further references concerning the computation of the state’s utility values are included in Appendix B, paragraph E.

INTERVAL SCALING FOR STATE PREFERENCES



Figure 7. Interval scaling of cardinal utilities for state outcomes. The relative value of each outcome is graphed on the interval scale between zero and 100. The graph demonstrates a definite preference by the state to have outcomes that involve the provision of security (AC and AD).

3. Cardinal Values for Soldiers’ Preferences

The interval scaling for soldiers’ preferences was developed using decision analysis to calculate the expected value of various outcomes. Decision analysis provides the ability to include stochastic phenomena in order to investigate the impact of variables on the expected value of different outcomes. By “[calculating] the expected utility of each course of action and [considering] the strategy that yields the largest expected utility,” we are able to explore how changes in the risk of injury change soldiers’ preferences.⁸¹ In developing the utilities for various outcomes, decision analysis assists in determining the various expected values of different outcomes as the risk of injury increases. The decision tree used to determine the expected value of soldiers’ outcomes is illustrated in Figure 8, and calculations are located in Appendix B, paragraph F.

81. Chris D. Arney, Robert Burncrot, Paul Campbell, Joseph Gallian, Frank Giordano, Rochelle W. Meyer, Michael Olinick, and Alan Tucker, *Principles and Practice of Mathematics* (New York: Springer-Verlag, 1997), 540.

DECISION TREE TO DETERMINE SOLDIERS' EXPECTED VALUES

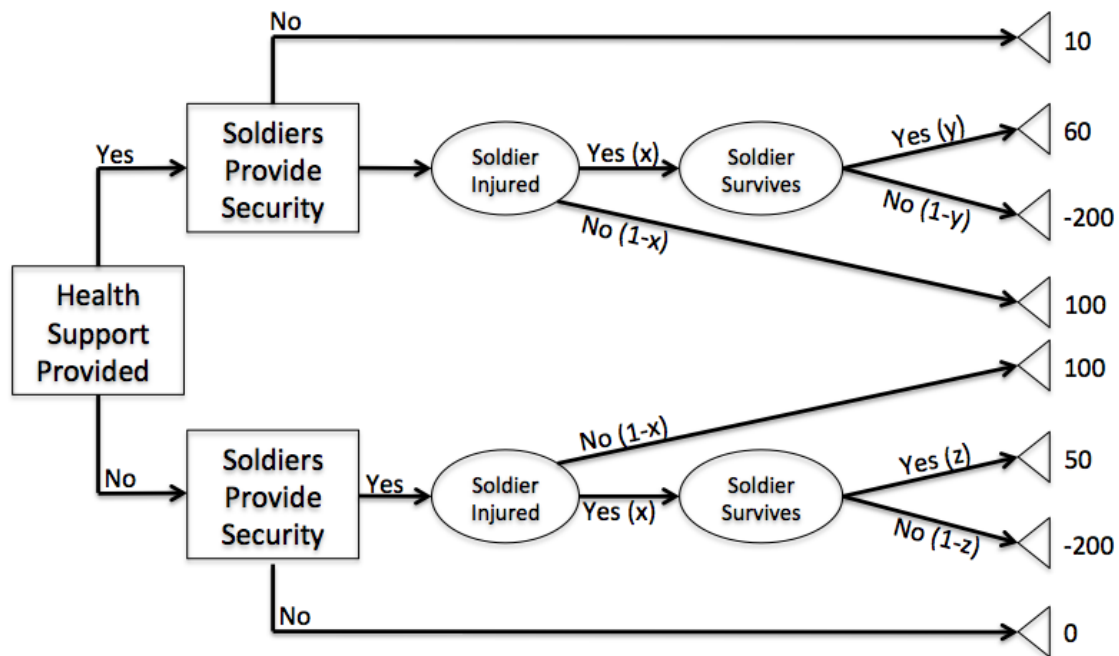


Figure 8. Decision tree for soldiers' expected values of providing security in the absence or presence of health support with varying levels of risk and survival. The variables are defined as the following: x is the probability of being injured, y is the probability of surviving if a soldier is injured and health support is provided, and z is the probability of surviving if a soldier does not have health support. For this analysis, the probability of surviving an injury/illness if medical support is provided (y) is 95%, the survival rate after U.S. medical training in El Salvador in 1983. The probability of surviving an injury/illness if medical support is not provided (z) is 55%, which was the survival rate in El Salvador prior to the U.S. medical support training. The values at the terminal nodes represent the value of the various outcomes.⁸²

4. Game 1 and 2 with Cardinal Values

With cardinal utilities for both the state and the soldiers' preferences calculated for a low risk of injury environment, utilities values are entered into the game matrices. Figures 9 and 10 illustrate Games 1 and 2 with cardinal values, respectively.

82. Zajtcuk, Brown, and Rumbaugh, "Medical Success in El Salvador."

a. *Game 1 with Cardinal Values: Soldier versus State in Low-Risk Environment*

GAME 1: SOLDIERS VERSUS STATE IN LOW-RISK ENVIRONMENT

		State	
		Provides Casualty Care C	Doesn't Provide Casualty Care D
Soldiers	Provides Security A	(99,90)	(98,100)
	Doesn't Provide Security B	(10,0)	(0,10)

Figure 9. Game 1 - Soldiers versus the state with low risk of injury to soldiers (1%) using cardinal values. The values of the players' preferences mirror those of the game with ordinal values. Both players continue to have a dominant strategy with an expected outcome of AD. This outcome, AD, continues to be a Nash equilibrium.

Analysis of this modified Game 1 matrix provides additional information about the factors and strength of the preferences for each player. For the soldiers, their dominant strategy to provide security is reflected by the large difference in the values of their options between providing security and not providing security. In contrast, the relative small difference between the outcomes for the state's preferences suggests a weak dominant strategy that might be easily overcome. As illustrated in Game 1 with ordinal values, the state has the ability to guarantee security by executing a first move advantage. The strength of the soldiers' dominant preference can reassure the state that the soldiers will choose to provide security if the state provides health support. Similarly, the power of the strategic threat available to the soldiers is demonstrated with utility

values. With a credible threat to stop providing security unless the state provides health care, the state risks a substantial loss of utility if it does not acquiesce to the threat.

b. Game 2 with Cardinal Values: Soldiers versus State in High-Risk Environment

GAME 2: SOLDIERS VERSUS STATE IN HIGH-RISK ENVIRONMENT

		State	
		Provides Casualty Care C	Doesn't Provide Casualty Care D
Soldiers	Provides Security A	(64,90)	(-9,100)
	Doesn't Provide Security B	(10,0)	(0,10)

Figure 10. Soldiers versus the state with high-risk of injury to soldiers (67%) using cardinal values. As with Game 2 with ordinal values, the soldiers' decision is contingent upon the provision of health support. With both players playing conservatively, the likely outcome is BD and represents a Nash equilibrium. In this outcome, the soldiers do not provide security and the state does not provide medical support.

Comparing Game 1 to Game 2, the increased risk of injury causes soldier preferences to adjust and their behavior becomes dependent on the provision of health support. With the same available strategic moves as in Game 2 with ordinal values, the state again has both a first move advantage to ensure the soldiers will deliver security and a viable strategic promise. Because the increased risk of injury has reduced the utility of both outcomes associated with providing security, the state has a significantly greater proportional reason to execute either of these moves.

The role of casualty/trauma care to mitigate the impact of increased risk to security forces is illustrated in Figure 11. While the expected value for security forces decreases with increasing risk, expected value decreases at a slower rate when casualty/trauma care is provided. Even at a high level of risk, casualty/trauma care prevents soldiers' expected values from falling below zero, the point at which soldiers would modify their behaviors and stop providing security. Sensitivity analysis on the risk level provides insight into its effects on soldier behavior. My analysis reveals that as the risk of injury approaches or exceeds 61%, soldiers decide to stop providing security (See Appendix B, paragraph G for sensitivity analysis computation and explanation).

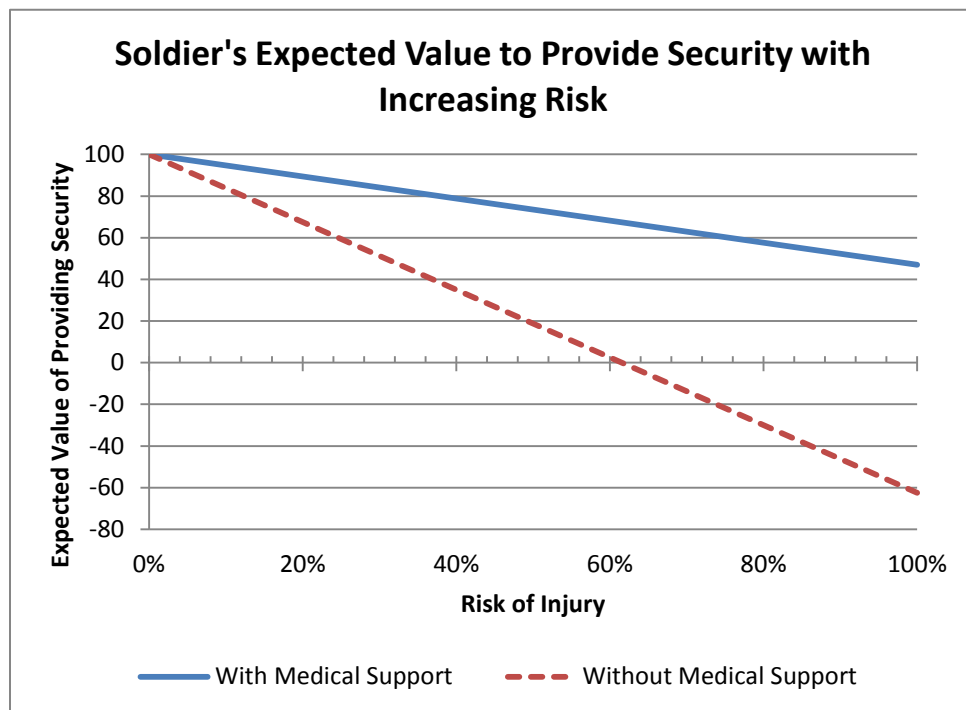


Figure 11. Soldier's Expected Value to Provide Security with Increasing Risk. As the risk of injury increases to security personnel, the expected value of providing security decreases at a greater rate when casualty/trauma care is not provided. When provided, casualty/trauma care mitigates the increased risk and prevents it from crossing the threshold where soldiers will not provide security.

While my analysis solely considers the influence of medical support in determining the behavior of security forces, other factors, such as training, leadership, logistics, etc., influence the behavior of security forces. Figure 11 illustrates that as risk to

security forces increases, medical support is a key factor and will significantly contribute to the decision-making milieu of the security forces.

H. APPLICATION TO AFGHANISTAN

Based on the conclusions drawn from the previous analysis, the role of casualty/trauma care for Afghan Security Forces is explored for purposes of illustration.⁸³

Following the defeat and displacement of the Taliban regime as the ruling authority in Afghanistan in 2002, an international coalition, led by the United States, began the long process of nation-building.⁸⁴ The U.S. predicated its exit strategy from Afghanistan on the concept of establishing security in Afghanistan through the development and training of local indigenous security forces. While the Afghan National Army possessed some organic medical support for its forces, the Afghan National Security Forces (ANSF), as a whole, predominantly relied on the U.S. medical system for initial treatment, evacuation, and initial trauma care. After the gradual reestablishment of military medical facilities, ANSF patients were usually transferred to Afghan military or civilian hospitals once they had been stabilized in coalition medical facilities. Unfortunately, Afghan health facilities, including Afghan military hospitals, provided dubious care and received relatively little support or training from International Security Assistance Force's (ISAF) medical resources.⁸⁵

While training programs to increase the medical capacity of the Afghan medical system were occasionally begun by medical commanders who sought to improve Afghan facilities and capabilities, these programs usually ended when the commander or unit

83. This example considers the situation in Afghanistan up until 2011, which is when I redeployed from the Afghan theater.

84. The Taliban's fall from power in Afghanistan was formally declared on 24 January 2002 in Richard L. Armitage, "Modification of Description of 'Territory of Afghanistan Controlled by the Taliban' in Executive Order 13129, " Public Notice 3899, *Federal Register*, 67;19, January 29, 2002, 4301. <http://www.bis.doc.gov/licensing/pdf/statetalibannotice.pdf>

85. Maria Abi-Habib, "At Afghan Military Hospital, Graft and Deadly Neglect," *Wall Street Journal*, 3 September 2011, <http://online.wsj.com/article/SB10001424053111904480904576496703389391710.html> and Sandra Basu, "U.S. Medical personnel in Impossible Situation Mentoring at Substandard Kabul Hospital, *U.S. Medicine*, August, 2012. <http://www.usmedicine.com/articles/us-medical-personnel-in-impossible-situation-mentoring-at-substandard-kabul-hospital.html>

rotated out of the theater. While most medical mentoring and military medical capacity-building focused on the Afghan National Army, support for police forces was negligible and ineffective. Afghan National Police (ANP) and Afghan Local Police (ALP) were completely dependent on coalition medical support for competent casualty/trauma care for their security operations. I advocated for police to receive their care from local civilian Afghan medical clinics, rather than continue with plans to build a separate police medical support system that would be difficult to staff and unsustainable.

Over the past ten years, the Afghan civilian medical system significantly improved its public health benchmarks, such as under-five mortality, vaccination rates, maternal mortality, and perinatal care.⁸⁶ Mentored by international health organizations and nongovernmental organizations, the Afghan civilian providers often sought to distance themselves from security forces by espousing humanitarian and apolitical perspectives in order to protect themselves under a banner of neutrality. Despite charges of militarizing the humanitarian space by the international health community, coalition military forces attempted to conduct medical capacity-building operations with civilian physicians and nurses.⁸⁷ With traumas and security-related injuries comprising less than 2% of the total number of Afghan deaths in the country, the Ministry of Health understandably focused on other priorities, such as primary care access and factors affecting under-five mortality and perinatal care.⁸⁸ Any casualty/trauma care systems had to be built on the foundations of this primary care system, which was lacking.⁸⁹

86. Brandon Howard, "An Afghan Success Story: The Balanced Scorecard and Improved Health Services," *The Globe*, 2010, p. 3–7. http://www.jhsph.edu/dept/ih/news/spring2010/afghan_success.html.

87. Don Hubert and Cynthia Brassard-Boudreau, "Shrinking Humanitarian Space? Trends and Prospects on Security and Access," *Journal of Humanitarian Assistance* (November 2010). <http://sites.tufts.edu/jha/archives/863>, Jean-Paul Chretien, "U.S. Military Global Health Engagement since 9/11: Seeking Stability through Health," *Global Health Governance*, 21 June 2011. http://blogs.shu.edu/ghg/files/2011/11/Jean-Paul-Chretien_U.S.-Military-Global-Health-Engagement-since-9-11_Spring-2011.pdf, and Ashley Boyle, "U.S.C. Title 10, Chapter 20, and the Militarization of Humanitarian Aid," *American Security Project*, 9 August 2012, <http://americansecurityproject.org/blog/2012/u-s-c-title-10-chapter-20-and-the-militarization-of-humanitarian-aid/>.

88. World Health Organization, "Global Health Observatory," 2012, retrieved from <http://www.who.int/gho/database/en/>.

89. John R. Acerra, Kara Iskyan, Zubair A. Qureshi and Rahul K. Sharma, "Rebuilding the Health Care System in Afghanistan: An Overview of Primary and Emergency Services," *International Journal of Emergency Medicine* 2, no. 2 (June 2009): 77–82.

Health care development was further challenged by the Afghan Medical Salary policy, last updated in 2005, which led to shortages of health care workers, especially in remote and rural areas.⁹⁰ This policy, designed to establish standardized salaries to stop nongovernmental organizations from enticing Afghan physicians out of the public sector with larger salaries, failed to adequately provide compensation to attract Afghan physicians to serve in rural areas or locations with improving security, resulting in a severe shortage of medical providers in rural clinics. As it happens, these rural clinics are the very clinics where wounded Afghan Police forces will need to be taken for medical support once U.S. forces begin their withdrawal from Afghanistan.

Despite the relatively high risk of injury in the performance of their security duties, the recruitment and effectiveness of Afghan Police, especially Afghan Local police (ALP), has been considered robust.⁹¹ The situation mirrors the scenario in Game 2 of the game theory analysis: an evolving security situation with periods of high risk of injury from enemy combatants, with coalition forces providing medical support to the nascent ALP forces. The provision of health support by coalition forces as a substitute for Afghan health support is equivalent to the state's first move advantage, akin to extending a strategic promise to provide health support in the game. This promise, however, does not come from the Afghan government, but U.S. forces and their medical system. While there is some medical training to ALP at the tactical level, until recently little to no development of the Afghan medical system beyond field care has been undertaken in a coordinated or systemic fashion throughout the country.

While many believe the job of developing the civilian health system falls to the Provincial Reconstruction Teams (PRT), PRT success in medical training and development has been sporadic and uneven. In Uruzgan Province in 2010–2011, for example, the U.S./Australian PRT did not consider civilian medical development one of its priorities. While other attempts to build medical capacity in Afghanistan have been

90. Salary Policy Working Group, "National Salary Policy for Non-Governmental Organizations and Ministry of Health Strengthening Mechanism Working in the Afghan Health Sector," Afghan Ministry of Health, 2005.

91. Lisa Saum-Manning, "VSO/ALP: Comparing Past and Current Challenges to Afghan Local Defense," *Small Wars Journal* (December 27, 2012), <http://smallwarsjournal.com/jrnl/art/vsoalp>.

attempted, there has been no unifying focus on training professionals in the health system to provide trauma care to support security operations once the U.S. medevac system departs. As in Game 2, U.S. forces are providing casualty/trauma care, and ALP are aggressively conducting their security operations. Once security is established in an area and the risk of injury decreases, the situation resembles the scenario illustrated in Game 1. Soldiers conduct their security operations regardless of the level of casualty/trauma support, although it is still available through their American advisors. Meanwhile, the dominant health strategy for the state (in this instance, the Afghan Ministry of Health) cannot afford to emphasize developing medical support for security forces due to the overwhelming medical needs of the civilian population.

The absence of competent casualty/trauma care for security forces may not be revealed until the U.S. stops providing casualty/trauma support to ANSF operations. As U.S. forces depart and ALP begin operating without U.S. medical support, Game 1 predicts ALP will continue to conduct their security operations until they are significantly challenged. If ANSF perceive their risk of injury as too high, Game 2 predicts that ALP will stop conducting security operations. Alternatively, security forces might elect to decrease their risk of injury by brokering treaties with insurgents or criminal elements to decrease the threat of injury and avoid confrontation.⁹² In lieu of fighting their opponents as part of effective operations, security forces will likely conduct faux security operations in order to save face, or they may stop conducting security operations altogether. Either of these outcomes will lead to an absence of effective security and weaken the Afghan government's legitimacy once the U.S. medical support is no longer available.

I. RECOMMENDATIONS

Based on the revelations elucidated through game theory analysis, developing and supporting a casualty/trauma system to provide care to security forces could increase the reliability of security forces. This leads to the following recommendations:

92. John Donnelley, "Fighting terror: the military campaign: how U.S. strategy in Tora Bora Failed: deals by Afghan allies may have let al. Qaeda leaders escape," *Boston Globe*, February 10, 2002, A.1.

1. States must recognize the dynamics identified in this game analysis and take steps to prevent a loss of security through the absence of casualty/trauma care to security forces. States might be tempted to perceive the activities of security personnel conducting their missions in a low risk environment as a success and discount the need to provide casualty/trauma care. This facade of reliability, however, may not be revealed until security forces are significantly challenged. Without casualty/trauma care, these forces may elect to stop conducting security operations or broker deals with their opponents. States can effectively prevent this by investing in competent and capable medical support for their security forces.
2. If states have limited resources, they should focus their casualty/trauma support in areas with the highest levels of insecurity in order to mitigate the perceived increased risk of injury. This may conflict with the need to provide medical services to civilians, but states do not face an either/or decision. Effort to focus civilian medical capacity development on trauma care benefits both the security and civilian sectors. While civilian medical care is important, ignoring casualty/trauma support to security forces prevents the establishment of lasting security, a prerequisite for effective development.
3. Foreign forces providing training and mentoring support to indigenous forces must identify and support indigenous development of an appropriate medical system to care for injured security forces. The casualty/trauma support system must be sustainable and appropriate for the level of care needed.
4. U.S. forces conducting medical engagements as part of stability or reconstruction efforts should focus their medical engagements on efforts that directly improve medical support to security operations. Depending on the country, this may require improving the civilian medical system.

J. CONCLUSION

Game theory provides a theoretical framework for exploring the influence of casualty/trauma care and the willingness of security forces to conduct missions in areas of varying levels of risk. Most states recognize that enforceable security is a prerequisite

for stability and economic and social development. If states truly desire to establish and maintain increased levels of security, they must proactively develop and support the medical system that provides care to their warriors. For those seeking to stabilize and improve weak or failed states, medical support development is a critical component of security development and critical to improving the chances of success.

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V. THE ADDITIONAL BENEFITS STRENGTHENING THE SECURITY FORCE MEDICAL SYSTEM

The U.S. military's comparative advantage in counterterrorist and stability operations lies in the quality of its manpower, not its quantity. U.S. forces are simply too expensive to be committed in large numbers to the defense of peripheral interests. This means avoiding direct U.S. interventions and instead emphasizing training, advising, equipping, and supporting allies and partners confronting internal security threats.

—Andrew F. Krepinevich, Jr.⁹³

While providing medical care to security forces strengthens the delivery of security by mitigating the risks of injury, a robust security force medical institution can strengthen a state beyond mere security; it can serve as the key state medical institution that drives medical development and advancement in the state overall. By leveraging its role and presence throughout the state, a capable security force medical system can enhance a state's legitimacy. By strengthening security force medical institutions beyond trauma/casualty care, U.S. efforts would redound in numerous ways.

Using an organizational approach, this chapter explores the indirect benefits of a strong security force medical system to: individuals considering service, those already in service, the security force institutions they serve in, the public health sector, the state, the region, and the United States of America.

A. BENEFITS TO THOSE CONSIDERING OR CURRENTLY SERVING IN SECURITY FORCES

For those considering service, the promise of adequate medical care and support incentivizes their willingness to join. In countries with substandard or developing medical capability, volunteering for service provides individuals access to competent and capable medical care for themselves and/or members of their family. In the United States military, for example, it is universally accepted that receipt of medical care is both an

93. Andrew F. Krepinevich, Jr., "Strategy in a Time of Austerity," *Foreign Affairs* 91, no. 6 (November/December 2012): 58–69.

incentive and a tool of compensation.⁹⁴ For those already serving, failing to receive proper access to medical care discourages continued service. Recent shortcomings and proposed changes to U.S. military medical care, for example, have prompted concerns about the U.S. military's ability to attract and retain qualified individuals, and military exit and retention surveys have consistently identified health and medical care as significant factors.⁹⁵ In developing or underdeveloped states, strong security medical systems could provide an incentive for both service and retention.

Providing medical care to family members influences security force personnel in the performance of their duties, as well. When medical services are extended to family members, security officers are confident that their family's medical needs will be cared for while the security officer is deployed or conducting operations. Rather than worrying about events back home, security personnel are able to focus on their duties. Efforts to strengthen the medical support to security forces and their families, therefore, strengthen the resolve of those serving in the security sector.⁹⁶

B. BENEFITS TO THE SECURITY INSTITUTIONS

As security institutions are composed of individuals, individuals' willingness to serve and remain in the security sector directly translates into benefits for security organizations. With increased recruitment and retention, security organizations are able to

94. Baker Spring, "Saving the American Dream: Improving Health Care and Retirement for Military Service Members and Their Families," Heritage Foundation, 17 November 2011, <http://www.heritage.org/research/reports/2011/11/saving-the-american-dream-improving-health-care-and-retirement-for-military-service-members>, and Department of Defense, "Task Force on the Future of Military Healthcare," December 2007, http://www.dcoe.health.mil/Content/Navigation/Documents/103-06-2-Home-Task_Force_FINAL_REPORT_122007.pdf.

95. Works representative of this view point can be found in Bill Gertz, "Trashing Tricare; Obama to cut healthcare benefits for active duty and retired U.S. military," *The Free Beacon*, February 27, 2012, <http://freebeacon.com/trashing-tricare/>, and Dana Priest and Anne Hull, "Soldiers Face Neglect, Frustration at Army's Top Medical Facility," *The Washington Post*, February 18, 2007, <http://www.washingtonpost.com/wp-dyn/content/article/2007/02/17/AR2007021701172.html>, Stephen B. Knouse, "A Diversity Exit Interview/Survey for the Military," DEOMI Research Series Pamphlet 01-4, Summer 2001, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA399424>, and Defense Manpower Data Center, "Overview of the 2000 Military Exit Survey," DMDC Report No. 2001-001, March 2001, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA400684>.

96. Association of the United States Army, "Key Issues Relevant to Taking Care of Soldiers and Families," Torchbearer National Security Report, April 2009, <http://www.ausa.org/publications/torchbearercampaign/tnsr/Documents/TBNR%20-SoldiersandFamilies.pdf>.

maintain a pool of applicants with a greater breadth of talent and potential. Larger recruitment and retention pools allow organizations to establish and maintain higher standards of conduct and behavior, as well as greater technical expertise. Improved retention decreases personnel turnover and provides a greater investment return on the resources spent to train security personnel.⁹⁷

Caring for the individuals in one's organization, a fundamental component of leadership and professionalism, strengthens the professional milieu of the security organization, improves morale, and communicates to the individual and his/her family that they are valued by the organization.⁹⁸ For an institution that strives to inculcate its members with a service mentality and professional behavior, providing medical care models the values the institution expects of its members.

From a readiness perspective, medical care ensures and protects the physical preparedness of the force to conduct security operations. History has repeatedly demonstrated the profound impact of disease and non-battle injuries on the ability of security organizations to deploy and maintain an effective force.⁹⁹ A medical system that seeks to prevent and treat the diseases and environmental hazards experienced in conflict strengthens the security institution by maintaining a fit and capable fighting force.¹⁰⁰

97. Congressional Budget Office, "Recruiting, Retention, and Future Levels of Military Personnel," October 2006, <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/76xx/doc7626/10-05-recruiting.pdf>.

98. Martin C. M. Bricknell and Donald Thompson, "Roles for international military medical services in stability operations (security sector reform)," *Journal of Royal Army Medical Corps* 153, no. 2 (June 2007): 95–98.

99. See Stanhope Bayne-Jones, *The Evolution of Preventive Medicine in the United States Army, 1607–1939* (Washington, D.C: U.S. Government Printing Office, 1968), <http://history.amedd.army.mil/booksdocs/misc/evprev/default.html> for a historical perspective on the development and impact of preventive medicine services and the impact of disease and non-battle injury during conflict. While this analysis ends at the beginning of World War II, recent conflicts continue to demonstrate the importance of preventive and medical treatment of military forces to maintain a capable fighting force.

100. Analysis of the recommendations resulting from the Gulf War and "Gulf War Syndrome" highlight many of the efforts and processes needed to protect military personnel from environmental and infectious threats while deployed. Institutes of Medicine, "Protecting Those Who Serve: Strategies to Protect the Health of Deployed U.S. Forces," (Washington, D.C: National Academy Press, 2000).

C. BENEFITS TO THE PUBLIC HEALTH SECTOR

The benefits of a competent security force medical system extend beyond the security sector. Security forces routinely operate in areas with stunted development and inadequate public services (e.g., public and private hospitals for the civilian populace). A strong security force medical system not only supports security operations under these conditions, but can be used to provide care to the civilian populace and build local capacity to support the public health sector. With expanded resources and an ability to operate in austere conditions, a robust security force medical system can provide medical care in areas where other government entities cannot, thereby providing essential care until the civilian sector develops. The security forces, in turn, benefit by demonstrating their service to the population. If done correctly and professionally, medical “civic action” missions connect the security forces to the population and demonstrate that the security forces are there to serve the people, and not the other way around.¹⁰¹ Thanks to the provision of medical care until security improves and their partnering with the health department or nongovernmental organizations to build capacity, the security force’s medical system can benefit both the public health sector and the population.

Security force capabilities in the areas of advanced communications, coordination, logistics, and transportation can also augment the delivery of civilian healthcare through partnerships with the public health sector. These partnerships can be used to test or explore new or innovative approaches to public health. In the late 1960s, for example, the United States launched a comprehensive campaign to improve traffic safety. Interagency efforts investigated techniques to reduce the death and morbidity

101. The meaning of “civic action” in my thesis reverts to the definition and goal of civic action coined by Edward Lansdale (COL, Retired) during his time advising in the Philippines. The original goal of the program “...set out to make the soldiers behave as the brothers and protectors of the people in their everyday military operations...” (Edward Lansdale, *In the Midst of Wars: An American’s Mission to Southeast Asia* (New York: Harper & Row, 1970), 70.). During Vietnam, initial civic action conformed to COL Lansdale’s original intent during MEDCAP I, but shifted to more U.S. direct care when the U.S. ground presence increased. Efforts to improve civilian medical delivery during this time period are detailed by Jeffery Greenhunt (Jeffery Greenhunt, “Medical Civic Action in Low-intensity Conflict: The Vietnam Experience,” in *Winning the Peace* edited by John W. De Pauw and George A. Luz, 139–161. New York: Praeger, 1992). In contrast to the original definition, civic action has instead come to represent the efforts that the U.S. military conducts to assist with the provision of essential services. Contemporary examples can be found in Adrian T. Bogart, III, “Block by Block: Civic Action in the Battle for Bagdad,” JSOU Report 07–8, November 2008. The use of civic action in my thesis conforms with the original definition by COL Lansdale.

associated with motor vehicle accidents, and one of these programs was the Military Assistance to Safety and Traffic (MAST) program in 1970. Leveraging military helicopters and flight medics to quickly respond to motor vehicle accidents outside of urban areas, the program was conducted as a joint endeavor between the Departments of Defense, Transportation, and Health, Education and Welfare. The pilot program demonstrated the efficacy and viability of using military aircraft in partnership with local health systems to respond to emergencies. Eventually civilianized, this program became the nucleus of the modern domestic aeromedical ambulance service. The willingness of all involved parties to partner to solve a public safety/health problem was facilitated by a robust and capable military medical system.¹⁰²

D. BENEFITS TO THE STATE

States obviously benefit by maintaining prepared, trained, and emboldened security forces to conduct security operations. A strong military and internal security force are critical to protecting the state. Both require a robust medical organization to support them. The state also benefits from maintaining a capable security force medical system that can: provide medical care to the civilian population when it is not available through the public sector, respond to disasters or emergencies when the civilian medical system is overwhelmed, and partner with other government agencies to develop solutions to complex problems. In fact, any endeavor that attempts to create security or stability through the use of security forces would benefit from a supporting professional medical system. Consider, for instance, the range of stability tasks needed after conflict, such as establishing civil security, maintaining civil control, restoring essential services, supporting governance, and assisting economic and infrastructure development.¹⁰³

Investment in the security force medical system also signals the state's attitude toward the value of its citizens, especially those who serve on behalf of their state. Being able to treat its citizens well, literally, makes the state's commitment clear to the

102. United States Congress, "Emergency Medical Services Development Act 1973 Hearings before the Subcommittee on Health of the Committee on Labor and Public Welfare United States Senate," 93rd Congress on S. 504 and S654. Jan 31, 1973 and Feb 1, 1973 Washington, D.C., 269–307.

103. Department of the Army, *FM 3–07: Stability Operations*, October 2008.

population at large and to the international community. While it seems logical to provide medical care to the injured who can be salvaged and returned to duty, providing medical care to those seriously wounded who are beyond the ability to return to duty communicates a national moral ethic of service and the expectation of reciprocity.¹⁰⁴ A capable medical system communicates the intent of the state to meet its ethical obligation to its warriors and reveals the value it places on service to the state.

E. BENEFITS TO THE REGION

As a strong and capable state security force strengthens a state, a robust state has the potential to stabilize a region. When states partner and strengthen their immediate neighbors, the region benefits from increased security through collaboration, dialogue, and reinforcing support. Security cooperation facilitates regional security and enhances the ability of partners to respond in coordination. Regional medical interoperability has the potential to leverage the medical strengths of multiple states to create synergies that enable them to solve challenging health problems and to contribute to regional security. When state security forces have robust medical capabilities, medical institutions are able to collaborate to solve regional health problems, address medical threats, and develop interoperability. Effort by U.S. forces to strengthen partner security medical systems not only supports regional ownership of local problems, but is more likely to result in appropriate and sustainable solutions to regional problems.

F. BENEFITS TO THE UNITED STATES OF AMERICA

The United States benefits whenever it works with partner nation-states to develop and strengthen their medical support, especially since encouraging and supporting security force medical systems establishes institutions that can be leveraged to directly rebuild civil society and become the locus for regional partnering and strengthening. Since health issues and medical threats rarely stop at borders, building up regional actors' ability to support each other during crises, disasters, and health

104. Nancy S. Jeckler, "Just Healthcare for Combatants," *The American Journal of Bioethics* 8, no.2 (2008): 13–14.

emergencies will decrease the requirement for U.S. forces to engage in overt interventions.

For the Geographical Commander, health engagements to strengthen partner military forces can be leveraged to connect the government with the population and strengthen state legitimacy. More significantly, during a regional disaster, medical crisis, or disease outbreak, state responses inevitably include security forces. Having established and maintained a working dialogue with the partner nation-state's security force medical establishment well ahead of an emergency, the Geographical Commander will have an accurate picture of the capabilities of his partners and their ability to handle the crisis and of the need for U.S. support. Established medical partnerships will expedite the identification of appropriate U.S. backing and support integration thanks to previously held medical exercises and training.

Prioritizing the strengthening of the medical support of security forces also provides a development focus that mitigates criticism by international and nongovernmental organizations who are conducting concurrent health development activities. NGOs often charge the U.S. military with "militarizing the humanitarian zone," and cite an increased risk to their workers who rely on their neutrality and impartiality for protection.¹⁰⁵ By first focusing on strengthening the partner security force medical system, the U.S. strengthens security and develops a cadre of indigenous trainers who could be used by the state to help develop the civilian health sector internally. This, however, does not imply that the U.S. military efforts should be restricted to the military. Some security forces, such as police or other paramilitary units, often rely on local civilian medical facilities for their care.

Engagements with civilian facilities or organizations that provide trauma/medical care to security forces must be part of any strengthening effort. In some instances, engagement with these organizations may be even more critical given the threat.

105. William G. Moseley, "Stop the Blanket Militarization of Humanitarian Aid," *Foreign Policy*, July 31, 2009, http://www.foreignpolicy.com/articles/2009/07/31/stop_the_blanket_militarization_of_humanitarian_aid and Rod Nordland, "U.N. Rejects 'Militarization' of Afghan Aid," *The New York Times*, February 17, 2010, <http://www.nytimes.com/2010/02/18/world/asia/18aid.html?hp&r=0>.

Consequently, engagements to strengthen these organizations should focus initially on the systems and training needed to provide reliable trauma and casualty care to support security operations. The next priority should be general medical care which would facilitate routine care to members of the security forces, as well as civilians. Efforts to expand the development focus to other segments of medical care, such as pediatric or obstetrical care, may best be addressed later, despite the need for these services. NGOs and IGOs, who often have more experience developing pediatric and obstetric capabilities, could then more easily focus on developing medical capacity that does not overlap with the care needed to support security forces.

Maintaining a focus on security and security support not only provides the justification for engaging with the civilian health sector, but limits the room for friction. The civilian populace, however, would still benefit from U.S. military efforts since the skills, equipment, and knowledge needed to support the security forces directly overlaps with certain civilian medical needs (e.g., motor vehicle accidents, domestic violence, and preventive medicine).

In conclusion, strengthening the medical systems supporting security operations offers many multifaceted and interrelated indirect benefits beyond improving security force effectiveness. These benefits extend from the individual security officer to the region.

VI. INTERVENTIONS TO BUILD PARTNER MEDICAL CAPACITY

The key to the entire program is in the selection of personnel. It will require personnel who are tactful and diplomatic, willing and eager to teach, and who have a sincere desire to contribute to the medical knowledge of these people. It must be remembered that these hospitals are not under our command. Any attitude of superiority or condescension on our part will be resented and our task made more difficult.

–Colonel Raymond E. Duke, MC, Chief, Plans and Operations Division, Medical Section, Headquarters, Army Forces Far East, on the type of trainers needed to assist in rebuilding South Korea’s military medical system, 1953.¹⁰⁶

Despite the direct and indirect benefits of nurturing a strong indigenous medical system to support partner security forces, U.S. military medical strengthening efforts have been primarily focused on providing care to civilians, rather than developing medical support for security forces. Over the past two decades of preparing and responding to disaster situations where U.S. forces augmented humanitarian efforts, military medicine has provided direct care when needed and then disengaged as soon as possible. Following guidance to avoid committing to long-term development, military medicine provided intermittent or temporary care designed to meet immediate humanitarian needs or build American good will abroad.

This chapter reviews the U.S. military medical system’s typical focus on providing direct care to foreign civilians, examines recent changes to joint doctrine advocating partner health system development, and proposes a framework and recommendations for developing within the U.S. military the capability to build partner medical capacity.

106. Raymond E. Duke, “Medical Assistance Program to the Republic of Korea Army,” *The Medical Bulletin of the U.S. Army Far East* I, no. 11 (October 1953): 186–7, 187.

A. EFFORTS TO RESTRICT LONG TERM MEDICAL ENGAGEMENTS

Medical support for U.S. armed forces constitutes a significant investment in both human and physical capital. As both a managed healthcare system caring for patients around the world and as a form of “soft” power used to support national strategic goals, U.S. military medicine is integral to every operation, both at home and abroad. In fact, the roles and capabilities of military medicine provide strategic, operational, and tactical military leaders with a capability that extends well beyond the support of combat troops by facilitating interaction with foreign civilian populations and humanitarian/development actors.¹⁰⁷ According to Joint Publication 4-02, Health Service Support, the Military Health System (MHS) “supports the operational mission by fostering, protecting, sustaining, and restoring health.”¹⁰⁸ The U.S. military meets these requirements by operating a worldwide medical system. During war, expeditionary medical resources extend the MHS network to military members in combat and contingency missions. While the primacy of the MHS mission focuses on maintaining the health of deployed U.S. forces, it commonly cares for civilians as part of disaster response and stability operations, and partners with other military medical institutions to provide tactical medical care.

Given the relative size, technical capability, and standard of care provided by the U.S. MHS, however, most partnering efforts to support foreign security forces or civilians results in U.S. medical personnel directly providing care, rather than working by, with, and through the indigenous military or civilian healthcare system.¹⁰⁹ As a result, recent stability operations have focused on short-term, intermittent medical

107. Donald A. Donahue Jr, Stephen O. Cunnion, Fred L. Brocker, and Richard H. Carmona, “The Soft Power of Solid Medicine,” *World Medical & Health Policy* 4, no. 2 (2010), www.psocommons.org/wmhp.

108. Department of Defense, *Joint Publication 4-02: Health Services Support*, July 26, 2012, I-1. http://www.dtic.mil/doctrine/new_pubs/jp4_02.pdf

109. While the U.S. military medical system does conduct partnered medical engagements as part of Medical Readiness Training Exercises (MEDRETE) under the Authority Title 10 U.S. Code 401, the aim of these exercises is to promote the skills and readiness of U.S. military participants, as well as serve the interests of both the U.S. and the host country. Review of media releases about these operations highlights the care provided by U.S. medical providers, rather than relaying that it was done to build partner capacity. In some areas, such as Honduras, MEDRETEs occur with relative frequency. But engagements, in general, are intermittent, episodic, and do not support a long-term capacity building strategy.

missions to provide disaster and humanitarian assistance medicine where indigenous capability has been devastated or non-existent. In situations which required strengthening the indigenous medical system, efforts to build partner capacity resulted from sporadic individual efforts or as a result of needs identified by the MHS. Efforts to reconstruct Afghan military hospitals, for example, were driven by the urgent need to transfer Afghan patients out of coalition hospitals to make space for coalition patients. Efforts to systematically strengthen the ANSF medical support system to provide its own care to its security forces were significantly overshadowed by the vast U.S. resources expended to provide direct medical care to ANSF security forces and civilians.

B. PROVIDING DIRECT CARE TO CIVILIANS AS PART OF COUNTERINSURGENCY OPERATIONS

During recent stability operations in Iraq and Afghanistan, U.S. military medical forces struggled to focus and restrict treatment to the care of combat casualties and were overwhelmed by requests to provide care to the non-military population. However, military medical resources were not resourced or tasked to replace civilian medical systems. While it proved relatively easier to prevent “mission creep” at military hospitals at larger bases, tactical medical providers with combat units at forward outposts were constantly asked to care for civilian patients, often brought to the aid stations by U.S. soldiers. As commanders attempted to leverage military medical capabilities as part of counterinsurgency strategies, pressure to use military medical resources to meet civilian needs increased.

To avoid long-term commitments, medical engagements were typically focused on providing immediate care to the civilian population, often in the hope of winning people over, connecting with them, and meeting their pressing medical needs. Unfortunately, these efforts resulted in little long-term value and were often considered unnecessarily risky and potentially harmful.¹¹⁰

110. Malsby, “Into which end does the thermometer go? Application of military medicine in counterinsurgency: does direct patient care by American service members work?” and Michael J. Tarpey, “The Role of the U.S. Army in Health System Reconstruction and Development During Counterinsurgency,” (master’s thesis, Army Command and General Staff College, 2012).

As an appreciation for the role of capacity-building in stability operations increased, many units attempted to include indigenous medical personnel in their medical engagements to give them the appearance of capacity-building. In reality, though, it was evident that building capacity requires a long-term commitment under a coordinated policy. With the guidance provided in *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* to “...seek to be the security partner of choice, pursuing new partnerships with a growing number of nations...,” efforts to strengthen the medical support to U.S. partner security forces seems to be the ideal way to “...develop innovative, low-cost, and small-footprint approaches to achieve our security objectives, relying on exercises, rotational presence, and advisory capabilities.”¹¹¹

C. GUIDANCE FROM CURRENT JOINT DOCTRINE

Prior to the directive to build partner capacity, joint publications had identified medical and health capacity-building tasks as components of stability operations. Joint Publication 3–07, *Stability Operations*, for instance, emphasized the use of U.S. medical services to provide direct care to both military and civilian populations to foster stability and provide essential services. Without specific guidance for BPC, however, military medical support continued to focus on providing direct care to civilian and security force members, rather than building indigenous medical capacity. While a focus on direct care is often necessary during initial stability operations, capacity-building endeavors must be started early during stabilization efforts to ensure local capacity exists before U.S. military forces depart. Joint Publication 4-02, *Health Service Support*, recognizes that care provided by U.S. medical personnel may be of higher quality than that supported by the indigenous public health service and recommends transitioning to building partner medical capacity to decrease U.S. direct care to civilians and strengthen the local medical system.

The efficiency and effectiveness with which U.S. forces can deliver humanitarian assistance, particularly medical and dental care, can have the unintended consequence of decreasing the population’s confidence in the

111. Department of Defense, “Sustaining U.S. Global Leadership: Priorities for 21st Century Defense,” 3.

[host nation's] ability to provide basic care. Possibly even worse, excessive U.S. humanitarian assistance may delay and undermine the reconstitution of existing medical and other basic needs infrastructure in the [host nation]. To mitigate these possibilities, primary consideration should be given to supporting and supplementing existing infrastructure.¹¹²

Additionally, JP 4-02 warns that during efforts to build partner capacity, "...care must be taken to ensure that health care standards are appropriate for the local population and at a level that can be maintained...."¹¹³

Joint Publication 3-29, *Foreign Humanitarian Assistance*, echoes the importance of medical personnel being prepared to conduct medical capacity-building missions.

Medical personnel may be called on to **assist in reestablishing** and supporting indigenous medical infrastructure, particularly those affected by disaster. Improving the medical systems near U.S. and multinational forces fosters self-sufficiency and may contribute to accomplishing the U.S. military mission sooner.¹¹⁴

Interestingly, Joint Publication 3-57, *Civil Military Operations*, lists health service support activities that support civil-military operations. The majority of these activities involve training and development engagements designed to strengthen indigenous medical systems and build partner capacity in the process (see Figure 12). The development of a health system to support the military field care and evacuation system, the major theme of my thesis, is listed among these activities.

112. Joint Publication 4-02, III-22.

113. Ibid., III-26.

114. Department of Defense, *JP 3-29: Foreign Humanitarian Assistance*, March 17, 2009, xxvii.

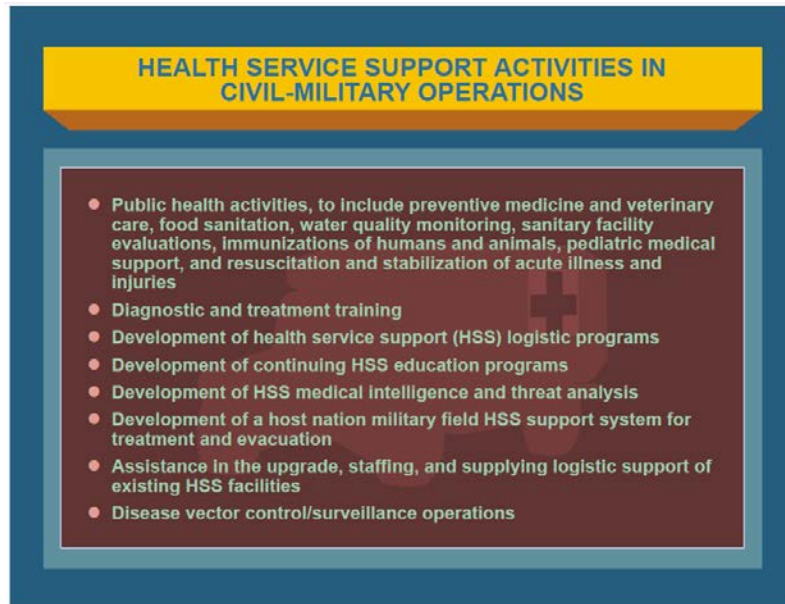


Figure 12. Health Services Support Activities in Civil-Military Operations¹¹⁵

Directly advocating the role of health service support during stability and civil-military operations, Joint Publication 4-02, *Health Services Support*, further recognizes the challenges of conducting health support activities during stability and civil-military operations (e.g., cultural differences, language, and sustainability). Highlighting the need for experts in global health and medical development to guide medical and health engagements, JP 4-02 advocates that “[military-civilian] teams that plan and conduct stability operations should include personnel with medical expertise, foreign language proficiency, and cultural understanding.”¹¹⁶ More specifically, it states that the military leadership

...should ensure that during medical civil-military operations missions the medical staff includes an international health officer or [subject matter expert] with regional medical expertise and linguistic proficiency that can foster partnerships with military, civilian, multinational and USG personnel...¹¹⁷

115. Department of Defense, *Joint Publication 3-57: Civil-Military Operations*, July 8, 2008, II-17.

116. JP 4-02, V-2.

117. *Ibid.*, V-5.

As with Joint Doctrine, Service-specific doctrine highlights similar themes of including building partner medical capacity activities into stabilization and reconstruction operations. Army Field Manual 8–42, lists “[promoting] and enhancing the growth potential of a HN medical infrastructure” and “[planning] for and developing programs which provide direct patient care support for both HN military and civilian populations” among the combat health support programs included in stability operations.¹¹⁸ Similarly, Army Technical Publication 3–07.5, *Stability Techniques*, recognizes that while Army units may need to “provide emergency medical care to address short-term needs, [ultimately], host-nation medical services require infrastructure, medical staff, training and education, medical logistics, and public health programs.”¹¹⁹ ATP 3–07.5 provides a framework to guide public health development by dividing public health support into three categories: initial response, transformation, and fostering sustainability (see Figure 13).

<i>Initial response</i>	<i>Transformation</i>	<i>Fostering sustainability</i>
• Assess public health hazards • Assess existing medical infrastructure • Evaluate the need for additional medical capabilities • Repair existing clinics and hospitals • Operate existing civilian medical facilities • Vaccinate	• Support improvements to waste management • Promote medical infrastructure	• Transfer responsibility to host nation • Support host-nation improvements • Monitor and report

Figure 13. Phases to support public health programs.¹²⁰

Despite several calls for the development of joint medical humanitarian specialists, as well as doctrine highlighting the importance of building partner medical capacity into of stability operations, there have been few efforts to formalize or institutionalize the U.S. military’s ability to strengthen partner medical systems

118. Department of the Army, *Field Manual 8–42: Combat Health Support in Stability Operations and Support Operations*, October 27, 1997, 1–7.

119. Department of the Army, *ATP 3–07.5: Stability Techniques*, August 2012, 4–13.

120. Ibid.

supporting security forces or civilians.¹²¹ Most previous efforts have consisted of ad hoc or one-off missions, usually in concert with disaster response.

D. RECENT MEDICAL ADVISING

The substantial stability operations undertaken in Iraq and Afghanistan led to the deployment of military advisors to support military and public health leaders, but the preparation and training for these individuals and coordination of their efforts with other agencies and combat units was typically lacking and uncoordinated. Even Provincial Reconstruction Teams, fielded in both theaters to direct and coordinate U.S. government efforts across all of the development and reconstruction domains, experienced varied levels of success, often the result of chance assignments of individuals with the right combination of skills and personality for the task. On some PRTs, medical and health development were under-prioritized or unsupported and were only used to provide medical coverage to convoys, rather than to engage and coordinate health development.

Institutional emphasis in developing a medical BPC capability has been fitful, at best. For military medical professionals assigned to combat forces engaged in counterinsurgency and stability operations, the ability or willingness to contribute to stability operations through medical capacity-building, in lieu of direct care activities, has been atypical.¹²² Until military medical personnel are trained and instructed on the value and techniques of medical capacity-building, they will invariably default to providing direct care.

The establishment of the U.S. Air Force's International Health Specialist (IHS) Program stands out as a notable exception. Established in 2001 by Air Force Surgeon General Paul K. Carlton, and modeled after the Army's Foreign Area Officer program, the IHS program seeks to establish a cadre of medical personnel

121. Edwin K. Burkett, "Foreign Health Sector Capacity Building and the U.S. Military," *Military Medicine* 177, no.3 (March 2012): 296–301 and Ramey L. Wilson, Alex G. Truesdell, and Jean E. Rinaldo, "Why the military needs humanitarian specialists," *Military Medicine* 170, no. 4 (April 2005): xi-xiii.

122. Many caring and compassionate medical professionals who deployed with combat troops were prohibited from engaging in development activities due to operational or policy constraints. Others, however, were unwilling or uninterested in supporting BPC missions. When I queried one such physician as to why he was not willing to assist the struggling local health system, he responded, "I did not come over here to be a Doctors' Without Borders!"

...fully qualified in their primary role as either [Air Force Medical System] health-care providers or support staff who have (1) additional language and cultural competency, (2) expertise in regional medical threats and infrastructure, (3) knowledge of joint and interagency coordination processes, and (4) the ability to build medical “bridges” to support coalition partnerships.¹²³

Once trained, the individuals are organized into regionally aligned teams to

...support theater engagement plan, create partnerships with medical colleagues from nations within their region, facilitate military-to-military and military-to-civilian interactions, and support medical-planning operations and deployment execution within their [area of operations].¹²⁴

Other than the IHS program, no coordinated programs have been designed to synchronize or oversee medical BPC efforts across the military services. While several recent studies have been conducted to assist the different services to develop strategies for building partner capacity for stability operations, none of these studies emphasizes the role of building partner medical capacity.¹²⁵ Unfortunately, resources developed to assist in capacity-building engagements or to capture lessons learned in current stability operations only list the medical support requirements for advisor teams, rather than promoting the idea of advisors who would improve the medical sector in either the civilian or security domains.¹²⁶ This is not surprising given the distinct separation between combat forces and most of those who serve in the U.S. military medical system.

123. Jane B. Ward, Kerrie G. Lindberg, Daniel S. McNulty, and Mona P. Ternus, “A Global Engagement Enhancer: The International Health Specialist,” *Air and Space Power Journal* 16, no. 3 (Fall 2002): 93. <http://www.airpower.au.af.mil/airchronicles/apj/apj02/fal02/Fall02.pdf>

124. Paul K. Carlton, Jr., “New Millennium, New Mind-Set: The Air Force Medical Service in the Air Expeditionary Era,” *Aerospace Power Journal* 15, no.4 (Winter 2001): 8–13, 11, <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj01/win01/win01.pdf>.

125. Jefferson P. Marquis, Jennifer D. P. Moroney, Justin Beck, Derek Eaton, Scott Hiromoto, David R. Howell, Janet Lewis, Charlotte Lynch, Michael J. Neumann, and Catheryn Quantic Thurston, “Developing an Army Strategy for Building Partner Capacity for Stability Operations,” Report, RAND Institute, 2010.

126. Examples include *Commander’s Handbook for Security Force Assistance*, Joint Center for International Security Force Assistance, July 14, 2008, and the *Security Force Assistance Planners’ Guide*, Joint Center for International Security Force Assistance, February 14, 2008. A notable exception is the *Medical Mentor/Trainer/Advisory Manual: Healthcare Development of the Afghan National Security Forces*, NATO Training Mission-Afghanistan, Combined Security Transition Command-Afghanistan, ISAF Joint Command, March 2010.

E. RECOMMENDATIONS FOR BUILDING PARTNER MEDICAL CAPACITY

While a complete review of the current authorizations and programs that focus on security force assistance and capacity-building programs is beyond the scope of my thesis, this chapter proposes several ideas or concepts that are based on prior advising and strengthening efforts and could be used as tools to strengthen medical support to foreign security forces through partnering efforts.¹²⁷ In reality, many of these recommendations have proven effective in building relationships and partnering with foreign military and state organizations by other military programs, such as the Army Foreign Area Officer program. Adopting their principles to the medical sector would help the military leverage the current capacity and expertise residing in the U.S. military healthcare system to build partner capacity through education, training, and enduring relationships.

Following the guidance provided in the National Defense Strategy, recommendations address three broad categories: advisors, exercises, and rotational presence.¹²⁸

1. Building Partner Medical Capacity through Advisors

At the core of developing an institutional capacity to build partner medical capacity must be a cadre of global health and development experts who can professionalize medical BPC and provide a bridge between the many stakeholders and actors. While many of the needed essential skills identified to conduct medical BPC exist in the military (e.g., public health officers, medical providers, civil affairs officers, and foreign affairs officers), individuals with the correct mix of skills and attitudes to primarily focus on global health and medical development are not found in any one

127. Nina M. Serafino, "Security Assistance Reform: 'Section 1206': Background and Issues for Congress," Congressional Research Service RS22855, January 13, 2012, Charles W. Hooper, "Going Farther by Going Together: Building Partner Capacity in Africa," *Joint Forces Quarterly* 67, no.4 (2012), Thomas S. Szayna, Derek Eaton, and Amy Richardson, *Preparing the Army for Stability Operations* (Santa Monica: RAND, 2007), Nora Bensahel, Olga Oliker, and Heather Peterson, *Improving Capacity for Stabilization and Reconstruction Operations* (Santa Monica: RAND, 2009),

128. Department of Defense, "Sustaining U.S. Global Leadership: Priorities for 21st Century Defense."

functional organization.¹²⁹ Instead, the skills are spread out among several different disciplines.

Public health officers develop training and community programs to promote health and readiness through preventive medicine programs and policy development on U.S. bases and in military units.¹³⁰ Medical providers, assigned to clinics and medical centers, possess the technical medical expertise to deliver medical care and teach the art of medicine. While Civil Affairs officers bridge the link between civil-military domains to assist in restoring essential services and interacting with the international development community, most of these professionals are in the Reserves and consider health as only one of their many concerns.¹³¹ Foreign area officers, trained in politico-military affairs and the language and culture of their assigned region, have no medical training or experience, but are positioned to create military relationships at the strategic and operational levels.¹³²

What is needed for building partner medical capacity and stability operations is to draw from these different skillsets to create medical development professionals able to: assess the medical needs of our partners, develop programs with partner nation-states to meet *their* needs, coordinate with the international and development community, synchronize the programs with the relevant U.S. regional strategy, provide key advice and technical guidance to our partners, and expertly leverage medical capabilities in the armed forces to facilitate partner training.

129. "Broadening Military Culture," Chapter 6 of Hans Bennendijk and Stuart E. Johnson, *Transforming For Stabilization and Reconstruction Operations* (Washington, D.C.: National Defense University Press, 2004), provides an analysis on the generic skills needed by those participating in BPC endeavors. Bennendijk and Johnson write that professional military education must play a role "...in changing the military's cultural mindset..." by preparing for stabilization and reconstruction tasks (page 92).

130. Department of Defense, "Emergency Health Powers on Military Installations," DoD Directive 6200.3, May 12, 2003, <http://www.vaccines.mil/documents/925d62003p.pdf>.

131. Of note, the military physicians serving as military surgeons in Civil Affairs battalions are often physicians with public health/preventive medicine training. Department of Defense, "Civil Affairs," DoD Directive 2000.13, June 27, 1994, <http://www.dtic.mil/whs/directives/corres/pdf/200013p.pdf>

132. Department of Defense, "Military Department Foreign Area Officer (FAO) Programs," DoD Directive 1315.17, April 28, 2005, <http://www.dtic.mil/whs/directives/corres/pdf/131517p.pdf>.

The health development professionals I envision with skills in the language and culture of their region, should be able to advise at multiple levels. Within our military organizations, they can serve as advisors to commanders about how best to build partner medical capacity to support security and stability. With our partners, they can serve as technical experts and advisors to develop and conduct strengthening programs. With the broader military medical and international development communities, they can serve as key nodes for synchronizing the smart application of health development to strengthen security.

The Air Force's IHS program provides a useful. By aligning BPC health specialists with the COCOM regions, medical experts would be able to support the theater security plan, work between the different levels of command, and provide a bridge to medical training resources. Expanding on the IHS program could include increased contact with partner countries, facilitated by placing medical advisors in partner military and state health organizations. From these locations, medical/public health advisors would be able to vertically and horizontally integrate the health development endeavors throughout a region.

2. Building Partner Medical Capacity through Exercises

With advisors positioned to establish and cultivate relationships with key leaders and organizations, U.S. medical resources could be leveraged during short-term visits, military exercises, and training to promote partner strengthening. By avoiding the continued practice of discrete training events that are not tied to long-term programs or development, advisors would be able to work with the host nation-state to identify training or support needs and coordinate for training during exercises. As the majority of military medical education and training resides in the medical education programs at military medical centers, the ability to resource specific events from medical education centers could improve the quality of training *and* enable U.S. military providers to use their skills to support strategic objectives.

A recent RAND report prepared for the Air Force's Special Operations Command on building partner medical capacity recommends a framework for conducting exercises

to strengthen partner medical programs. This framework divides an exercise into four phases and outlines the role of health development advisors across all four phases.¹³³ Throughout, technical experts from U.S.-based medical centers or centers of excellence can be rotated in to provide needed technical expertise or training during any part of this process (see Figure 14).

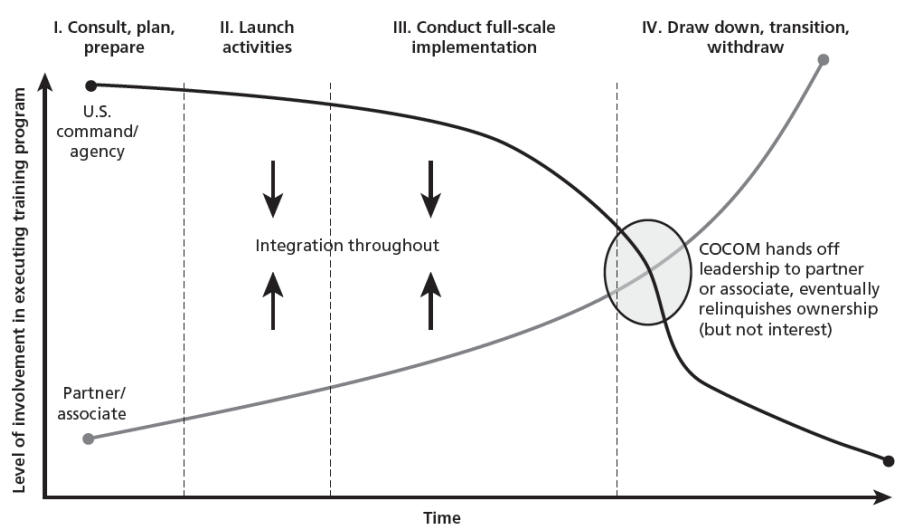


Figure 14. Framework for a Hypothetical Building Partner Capacity-Health Training Program¹³⁴

In addition to suggesting a framework for development activities, the RAND study proposes generic metrics for each phase of the endeavor (see Figure 15). These metrics would provide excellent feedback and conditions-based triggers for supporting

133. David E. Thaler, Gary Cecchine, Anny Wong, and Timothy Jackson, "Building Partner Health Capacity with U.S. Military Forces: Enhancing AFSOC Health Engagement Missions," RAND Technical Report No.1201 (2012), http://www.rand.org/content/dam/rand/pubs/technical_reports/2012/RAND_TR1201.pdf

134. Ibid., 35.

partner development efforts and assisting in linking the exercise to the long-term development of the medical system and other strengthening efforts.¹³⁵

I. Consult, Plan, Prepare	II. Launch Activities	III. Conduct Full-Scale Implementation	IV. Draw Down, Transition, Withdraw
Metric 1: Level of need for effort	Metric 5: Adequacy of contact points and regular consultations	Metric 9: Effectiveness and efficiency of processes	Metric 12: Readiness for hand-over
Metric 2: Level of broad endorsement from superiors and important audiences	Metric 6: Level of success in recruiting trainees and conducting training	Metric 10: Results of immediate outputs and intermediate outcomes over time	Metric 13: Level of benefit to the partner nation and the United States
Metric 3: Development of hedging options	Metric 7: Level of partner performance	Metric 11: Impact on U.S. military training and access	
Metric 4: Level of resource adequacy to execute effort	Metric 8: Readiness to scale up		

Figure 15. Generic Metrics for the Four Phases of a BPC-Health Effort¹³⁶

3. Building Partner Medical Capacity through Rotational Presence and Exchanges

While continual engagement with partner medical systems would be augmented by intermittent support from training teams from the United States, institutionalized and regular exchanges with our partners could provide a rotational presence that, over time, strengthens both the state partner and builds our ability to conduct medical partnering. While partnering has traditionally consisted of face-to-face interaction requiring that U.S. personnel be sent to interact with partners abroad, a rotation-based presence could also include bringing key individuals from the partner state to the United States to work in our system and, thereby, leverage the benefits of our technology directly.

Individuals from partner medical systems who show promise of becoming future leaders could be brought to the United States to train inside the U.S. military medical

135. Another excellent reference for designing development projects with embedded metrics can be found in Marla C. Haims, Melinda Moore, Harold D. Green, Jr., and Cythnia Clapp-Wincek, “Developing a Prototype Handbook for Monitoring and Evaluating Department of Defense Humanitarian Assistance Projects,” RAND Center for Military Health Policy Research, Technical Report, 2011. While this document provides a systems-based approach to designing programs that could be used as part of medical capacity building, it unfortunately falls short when specifically addressing health programs. For example, the recommended metric for capacity building in health infrastructure measures the number of personnel trained on construction techniques, not medical capacity.

136. Cecchine Thaler, Wong, and Jackson, “Building Partner Health Capacity with U.S. Military Forces: Enhancing AFSOC Health Engagement Missions,” 38.

system to gain additional expertise and skills. Similarly, U.S. medical personnel interested in working as future advisors could be sent to work within our partners' medical systems. The benefits of these exchanges is proven and well recognized within Security Cooperation communities, and the U.S. military has already heavily invested in complementary mutual exchanges.¹³⁷ These practices should be extended to the realm of public health and military medicine.

Similarly, in states of particular interest, institutionally-based partnerships could be strengthened on a persistent basis. As suggested by Bradley Boetig in a recent article in *Military Medicine*, establishing partnerships between military hospitals, for example, with partner hospitals “would yield benefits for a whole new realm of stakeholders including interagency partners, nongovernmental organizations, the service members themselves, and academic and training institutions.”¹³⁸ By providing a framework based on institutions, rather than individuals, “...the institution provides the continuity that sustains the relationship beyond the assignment cycle of the individuals.”¹³⁹ In this way, the relationships between partner individuals (and organizations) and U.S. advisors (and organizations) would be mutually reinforcing and would promote persistent strengthening efforts.

Technological advances in communications and networking provide additional tools to sustain and promote these relationships.¹⁴⁰ By integrating distributed learning with medical simulations and social networking platforms and video teleconferences, technology could be leveraged to strengthen capacity-building engagements. In

137. Department of the Army, “Joint Security Cooperation Education and Training,” Department of the Army Regulation 12–15, SECNAVINST 4950.4B, AFI 16–105, January 3, 2011, http://www.apd.army.mil/jw2/xmldemo/r12_15/head.asp and Manuel Torres, “Military exchange program benefits U.S., Canadian, Mexican military forces,” *U.S. Army North Public Affairs*, July 15, 2010, <http://www.northcom.mil/News/2010/071510b.html>.

138. Bradley J. Boetig, “Bilateral institutional relationships: a new mission for U.S. DoD medical capabilities in support of health diplomacy,” *Military Medicine* 177, no. 7 (July 2012): 763–765.

139. *Ibid.*, 764.

140. In Chapter 7 (“Supporting Technologies”) of Hans Bennendijk and Stuart E. Johnson, *Transforming For Stabilization and Reconstruction Operations* (Washington, D.C.: National Defense University Press, 2004), the additional roles and benefits of leveraging technology as part of stabilization and reconstruction operations are discussed and include education and training packages, simulations, and collaborative planning tools.

Afghanistan, for example, civilian providers near one of the forward operating bases requested training on burn management in the hospital setting. By establishing a weekly web-based training forum employing the same technology used for virtual meetings, specialty providers at the combat support hospital were able to remotely provide the Afghan physicians education and training. Thanks to the technology employed, any Afghan provider could access the training from a U.S. base on the network, ask questions during the training, and share their experiences.¹⁴¹ By using technology to disseminate and facilitate training, the experts/specialists at the hospital provided education without having to travel to each of the outlying bases. One can easily imagine similar endeavors supported by teleconsultation and collaboration that could sustain partnering relationships and augment face-to-face interactions.

In conclusion, doctrine and current policy guidance directs the military services to institutionalize how they plan to create the ability to build partner medical capacity. This specialized task requires the cultivation of global health experts who can serve as medical advisors to both partner states and military organizations in support of U.S. national interests, regional stability, and theater development/security plans. While a cadre of global health experts with cultural and linguistic capabilities are key to this endeavor, medical strengthening efforts should also leverage the full capabilities and resources of military medical departments to reinforce and support advisory efforts. Vertical and horizontal integration and coordination of these efforts, as well as the appropriate use of networking and medical technology, would ensure their success. Continued guidance and development of doctrine specifically directing and supporting BPC in the health and medical domain, especially to develop the medical systems of security forces, would not only strengthen partner medical sectors, but directly contribute to security and partner stability.

141. This example is based on a program I established in Afghanistan in 2007–2008. The success of the initial event led to subsequent sessions on neonatal resuscitation, pediatric infectious disease, and women's health.

VII. CONCLUSION AND RECOMMENDATIONS

Strong relationships are critical in order to assist [host nation] security forces to improve or establish capacity and capability that suit their missions and resources. Acute care of combat casualties, patient movement systems, medical logistics, and professional development are key components of success. Positive perception of these capabilities within security forces can improve health outcomes, enhance morale and confidence, and bolster line operator and medic relationships. Respect for leadership and the mission may both be enhanced by this attention to health issues.

—Dr. Edwin K. Burkett, Colonel, U.S. Air Force, Global Health Expert¹⁴²

In theory, building internal capacity in partner states may sometimes eliminate the need to deploy U.S. military forces abroad. The wars of the past 12 years have stressed the U.S. military, and small-footprint engagements, such as building partner capacity, appear to offer a promising solution, if not an antidote, to future military problems. Efforts to develop partner security forces through SFA and FID activities, however, have overlooked the importance of developing the medical support systems for those forces. For its part, U.S. military medicine, influenced by disaster and humanitarian response demands, focuses its BPC efforts predominately on strengthening civilian medical capacity, as opposed to security force medical care, during stability operations.

My thesis points to the importance of a strong medical system to support security forces and their operations. I have highlighted the direct and indirect benefits to be gained from a strong security force medical system, and I have recommended a health development framework to strengthen the security force medical system. While developing an indigenous, capable, competent medical support for partner security forces is not, by itself, sufficient to create or guarantee an effective security force, it is a necessary capability that has gone unrecognized and unsupported. This is unfortunate. Simply put, security forces will be more effective when assured proper and timely

142. Edwin K. Burkett, “Foreign Health Sector Capacity Building and the U.S. Military.” 297.

medical care, and the U.S. should prioritize security force health development during partnering engagements.

Medical support institutions must be strengthened in coordination with other aspects of security force development (i.e., leadership, professionalism, logistics, the rule of law, tactical training, and proper utilization). Due to the technical nature of medical support and the time needed to build medical capability, efforts to strengthen medical support organizations must be initiated early in the strengthening efforts. Waiting to develop medical support capabilities until the security force is ready to conduct security operations will likely result in inadequate medical support and directly impact security force effectiveness.

While there may be criticism about limiting or focusing U.S. medical strengthening efforts to support security forces rather than provide direct care, medical SFA should be the first priority. As with all development efforts, the initial needs of the partner state always overwhelm available resources. Although initially focusing on strengthening the partner's security force medical system will directly support the security sector, it will provide indirect benefits to other sectors. In contrast, if strengthening efforts focus on the civilian population instead of supporting security, security forces will be less effective and will have difficulty establishing security, directly degrading the potential success of any public health development program.

To shift our focus to strengthening security force medical support will require a fundamental adjustment in current thinking and plans. While engaging with partner civilian and public health systems will continue to be critical, all programs should pass a security litmus test: How does this engagement/program support or strengthen the security forces? While training nurse midwives and delivering care to civilians may seem ideal for helping to meet the needs of the populace, these needs can and should be met by humanitarian and international development actors. Development professionals, however, require security to deliver this kind of assistance. This is why it makes sense to focus on medical support to security forces, since this focus will directly contribute to creating the security conditions needed to allow full spectrum development to occur.

To conduct these missions, the U.S. military and its medical systems must cultivate a cadre of global health experts who are able to bridge the military-medical gap with our partners, be able to advise partners on development, and be able to strengthen partners' security force medical sector. By integrating these advisors vertically and horizontally with military organizations and by leveraging technology, strengthening efforts can synchronize and create a tipping point for progress and security.

A. AREAS OF FUTURE RESEARCH

Future research and investigation is needed in multiple areas to support medical BPC efforts. The tools and processes to identify, plan, conduct, and evaluate strengthening efforts need to be developed, tested, and validated. Efforts to develop and standardize measures of effectiveness are needed to facilitate process improvement and identify new threats or requirements. The skills, temperament, experience, and required training for those participating in strengthening programs must be defined, developed, and resourced. As specific requirements will vary based on the role of each participant, separate programs of instruction must be developed to create global health experts who can serve as advisors and to prepare those who will participate episodically or intermittently in these programs. Finally, where and how these efforts are coordinated, located, and resourced must be defined in order to maximize support for theater security goals and to promote sustainability. Should Civil Affairs or Foreign Area Officer programs be expanded to include this capability? Or should these efforts be housed in an independent program administered through U.S. military medical organizations? Only additional research and investigation into these questions and issues will ensure that medical BPC contributes to U.S. security and policy in coordination with other efforts to build partner capacity.

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VIII. APPENDIX A: STATISTICS SUPPORTING LARGE-N ANALYSIS

The following sections contain the statistical computations and graphs to support hypothesis testing conducted in Chapter 3. All statistical computations were performed using Minitab 16 Statistical Software Package. Minitab 16 created all results, tables and graphs during statistical testing.

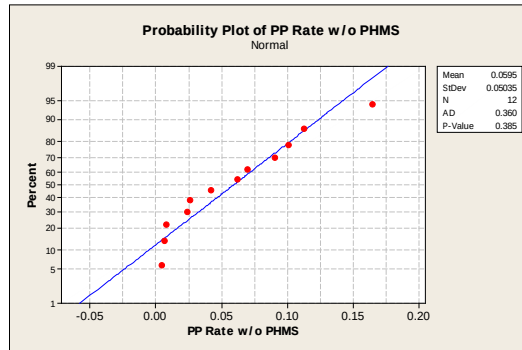
A. POLICE PRODUCTIVITY WITH AND WITHOUT PHMS

To investigate whether security forces are more effective when they have casualty/trauma care, the following hypotheses were generated:

H_0 : Security force productivity is not associated with the availability of casualty/trauma care.

H_A : Security forces are more productive when casualty/trauma care is readily available.

This hypothesis test compared the police productivity data for those countries with a PHMS to those with a PHMS. For the data set of countries with police productivity metrics that did not have a PHMS, a normal distribution of the data could not be assumed since the data set only contained 12 data points. Using a 0.05 level of significance, normality testing of this 12-data point set revealed that the data did not significantly differ from a normal distribution), so the data was assumed to follow a normal distribution ($p=0.385$). The chart below summarizes the normality testing on this data set:



Given the assumption that both data sets followed a normal distribution, a two-sample t-test was used to compare the means of the data sets.

The following chart summarizes the results:

Two-Sample T-Test and CI:				
Police Productivity (PP) Rate w/ PHMS, PP Rate w/o PHMS				
	N	Mean	StDev	SE Mean
PP Rate w/ PHMS	79	0.174	0.234	0.026
PP Rate w/o PHMS	12	0.0595	0.0504	0.015
Difference = mu (PP Rate w/ PHMS) - mu (PP Rate w/o PHMS)				
Estimate for difference: 0.1145				
95% CI for difference: (0.0546, 0.1744)				
T-Test of difference = 0 (vs not =): T-Value = 3.80 P-Value = 0.000 DF = 80				

Based on the computed p-value of 0.000, the difference between the two data sets was significant. The null hypothesis was rejected and the alternate hypothesis was accepted. Therefore, security forces are more productive when casualty/trauma care was readily available.

B. RISK LEVELS WITH AND WITHOUT PHMS

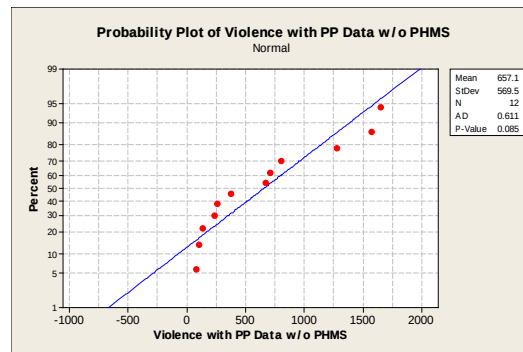
To investigate whether the level of risk faced by security forces modulates the influence of casualty/trauma care on security force effectiveness the following hypotheses were generated:

H₀: The level of risk facing security forces does not impact the association between higher productivity in states with a PHMS.

H_A: The level of risk facing a security force does impact the association between higher productivity in states with a PHMS.

This hypothesis test compared the risk/violence levels of countries with productivity data and a PHMS to those without a PHMS. For the data set of countries

with police productivity metrics that did not have a PHMS, a normal distribution of the risk levels could not be assumed since the data set only contained 12 data points. Using a 0.05 level of significance, normality testing of this 12-data point set revealed that the data did not significantly differ from a normal distribution, so the data was assumed to follow a normal distribution ($p=0.085$). The chart below summarizes the normality testing on this data set:



Given the assumption that both data sets followed a normal distribution, a two-sample t-test was used to compare the means of the data sets.

The following chart summarizes the results:

Two-Sample T-Test and CI: Violence with PP Data w/ PHMS, Violence with PP Data w/o PHMS				
	N	Mean	StDev	SE Mean
Violence w/ PP Data w/ PHMS	79	221	290	33
Violence w/ PP Data w/o PHMS	12	657	570	164
Difference = μ {Violence with PP Data w/ PHMS} - μ {Violence with PP Data w/o PHMS}				
Estimate for difference: -436				
95% CI for difference: (-805, -67)				
T-Test of difference = 0 (vs not =): T-Value = -2.60 P-Value = 0.025 DF = 11				

Based on the computed p-value of 0.025, the difference between the two data sets was significant. The null hypothesis was rejected and the alternate hypothesis was accepted. Therefore, the level of risk facing a security force does impact the association between higher productivity in states with a PHMS.

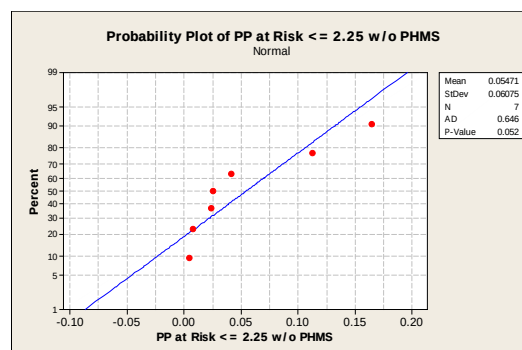
C. EFFECT OF LEVEL OF RISK ON ASSOCIATION BETWEEN POLICE PRODUCTIVITY AND THE PRESENCE OF A PHMS UP TO 2.5% BOV

To investigate whether the level of risk faced by security forces modulates the influence of medical support on security force effectiveness up to a BOV level of 2.5%, the following hypotheses were generated:

H₀: The level of risk facing security forces does not impact the association between higher productivity in states with a PHMS.

H_A: The level of risk facing a security force does impact the association between higher productivity in states with a PHMS.

This hypothesis test compared countries with productivity data and a BOV of up to 2.5% and PHMS to those without a PHMS. For the data set of countries with police productivity metrics that did not have a PHMS, a normal distribution of the police productivity could not be assumed since the data set only contained 7 data points. Using a 0.05 level of significance, normality testing of this 7-data point set revealed that the data did not significantly differ from a normal distribution, so the data was assumed to follow a normal distribution ($p=0.052$). The chart below summarizes the normality testing on this data set:



Given the assumption that both data sets followed a normal distribution, a two-sample t-test was used to compare the means of the data sets.

The following chart summarizes the results:

Two-Sample T-Test and CI:				
PP at Risk <= 2.25 w/ PHMS, PP at Risk <= 2.25 w/o PHMS				
	N	Mean	StDev	SE Mean
PP at Risk <= 2.25 w/ PHMS	69	0.183	0.243	0.029
PP at Risk <= 2.25 w/o PHMS	7	0.0547	0.0608	0.023
Difference = mu (PP at Risk <= 2.25 w/ PHMS) - mu (PP at Risk <= 2.25 w/o PHMS)				
Estimate for difference: 0.1285				
95% CI for difference: (0.0529, 0.2041)				
T-Test of difference = 0 (vs not =): T-Value = 3.46 P-Value = 0.002 DF = 33				

Based on the computed p-value of 0.002, the difference between the two data sets was significant. The null hypothesis was rejected and the alternate hypothesis was accepted. Therefore, the level of risk facing a security force does impact the association between higher productivity in states with a PHMS when the BOV is up to 2.5%.

D. EFFECT OF LEVEL OF RISK ON ASSOCIATION BETWEEN POLICE PRODUCTIVITY AND THE PRESENCE OF A PHMS WHEN THE BOV IS GREATER THAN 2.5%

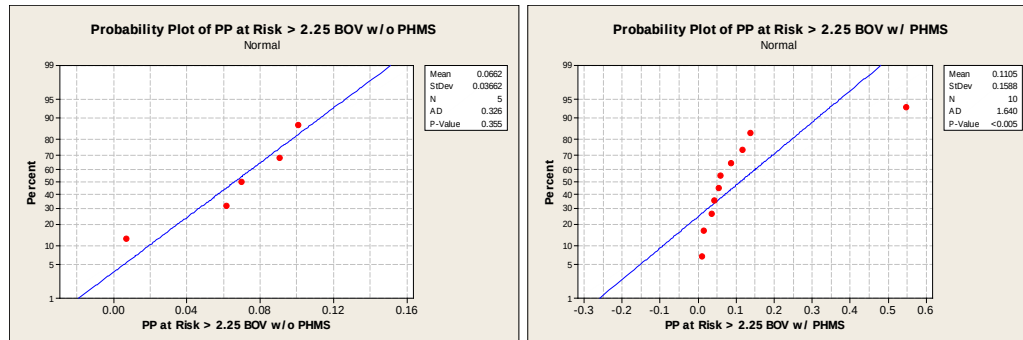
To investigate whether the level of risk faced by security forces modulates the influence of medical support on security force effectiveness above a BOV level of 2.5%, the following hypotheses were generated:

H₀: The level of risk facing security forces does not impact the association between higher productivity in states with a PHMS.

H_A: The level of risk facing a security force does impact the association between higher productivity in states with a PHMS.

This hypothesis test compared countries with productivity data and a BOV above 2.5% and a PHMS to those without a PHMS. For both data sets, a normal distribution of the productivity data could not be assumed since each the data set contained less than 30 data points. Using a 0.05 level of significance, normality testing of both data sets was performed. For the data set representing the police productivity levels in countries without a PHMS and BOV greater than 2.25% (n=5), normality testing revealed that the data set did not significantly differ from a normal distribution, so it was assumed to follow a normal distribution (p=0.355). However, the data set representing the police productivity levels in countries with a PHMS and BOV greater than 2.25% (n=10), normality testing showed that the data significantly differed from a normal distribution

and a normal distribution could not be assumed ($p < 0.005$). The charts below summarize the normality testing on these data sets:



Because one of the data sets failed to follow a normal distribution, nonparametric testing was required to compare the two sample sets. The Mann-Whitney Test was used to compare the medians of the two data sets.

The following chart summarizes the results:

```

Mann-Whitney Test and CI:
PP at Risk > 2.25 BOV w/ PHMS, PP at Risk > 2.25 BOV w/o PHMS
      N      Median
PP at Risk > 2.25 BOV w/ PHMS    10    0.0555
PP at Risk > 2.25 BOV w/o PHMS     5    0.0700

Point estimate for ETA1-ETA2 is -0.0040
95.7 Percent CI for ETA1-ETA2 is (-0.0551,0.0760)
W = 79.0
Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.9512
  
```

Based on the computed p-value of 0.9512, the difference between the two data sets was not significant. The null hypothesis was not rejected. Therefore, the level of risk facing security forces does not impact the association between higher productivity in states with a PHMS when the BOV is greater than 2.5%.

E. DIFFERENCE IN UNDER-5 MORTALITY FOR STATES WITH AND WITHOUT PHMS

To investigate an association between medical system quality and PHMS availability, the following hypotheses were generated:

H₀: The quality level of the medical system had no impact on the availability of a PHMS capability to support security operations.

H_A: Higher quality medical systems were more likely to field a PHMS to support security operations.

This hypothesis test compared the under-five mortality rates of countries with a PHMS to those without a PHMS. A normal distribution of the under-five mortality rates were assumed since both data sets contained more than 30 data points. Given the normality assumption for both data sets, a one-tailed, two-sample t-test was used to compare the means of the data sets.

The following chart summarizes the results:

Two-Sample T-Test and CI:					
Under-5 Mortality w/ PHMS, Under-5 Mortality w/o PHMS					
	N	Mean	StDev	SE	Mean
Under-5 Mortality w/ PHMS	140	36.0	42.2	3.6	
Under-5 Mortality w/o PHMS	39	83.7	55.7	8.9	
Difference = μ (Under-5 Mortality w/ PHMS) - μ (Under-5 Mortality w/o PHMS)					
Estimate for difference: -47.70					
95% CI for difference: (-67.01, -28.40)					
T-Test of difference = 0 (vs not =): T-Value = -4.96 P-Value = 0.000 DF = 50					

Based on the computed p-value of 0.000, the difference between the two data sets was significant. The null hypothesis was rejected and the alternate hypothesis was accepted. Therefore, higher quality medical systems were more likely to field a PHMS to support security operations

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IX. APPENDIX B: NOTES SUPPORTING GAME THEORY ANALYSIS

A. INTRODUCTION

In Chapter IV, game theory explored the relationship between security force effectiveness and the provision of casualty/trauma support under varying levels of risk. This Appendix provides further documentation and/or explanation of concepts introduced in Chapter IV.

B. SOLIDER PREFERENCES WHEN SECURITY ENVIRONMENT HAS A LOW RISK OF INJURY

In a high security environment where the risk of injury is low, the soldier rank orders the outcomes in the following way:

Soldier Preferences when there is a Low Risk of Injury

- 4 – Best – Soldier provides security, and state provides casualty support.
- 3 – Next Best – Soldier provides security, and state does not provide casualty support.
- 2 – Least Best – Soldier does not provide security, and state does provide casualty support.
- 1 – Worst – Soldier does not provide security, and state does not provide casualty support.

C. STATE PREFERENCES WHEN SECURITY ENVIRONMENT HAS EITHER A HIGH OR LOW RISK OF INJURY

In a high security environment where the risk of injury to security personnel is either high or low, the state's preferences are listed in the following order:

State Preferences for Low and High Risk of Injury

- 4 – Best – State does not provide casualty support, but soldiers fight.
- 3 – Next Best – State provides casualty support, and soldiers fight.
- 2 – Least Best – State does not provide casualty support, and soldiers do not fight.
- 1 – Worst – State provides casualty support, and soldiers do not fight.

D. PLAYER PREFERENCES WHEN SECURITY ENVIRONMENT HAS A HIGH RISK OF INJURY

In a low security environment where the risk of injury is high, the soldier rank orders the outcomes in the following way:

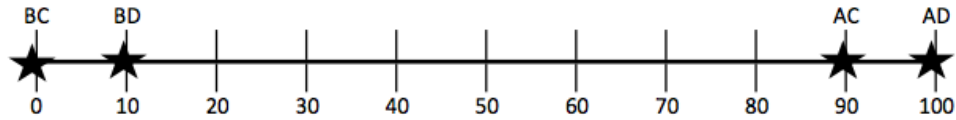
Soldier Preferences where there is a High Risk of Injury

- 4 – Best – Soldier provides security, and state provides casualty support.
- 3 – Next Best – Soldier does not provide security, and state does provide casualty support.
- 2 – Least Best – Soldier does not provide security, and state does not provide casualty support.
- 1 – Worst – Soldier provides security, and state does not provide casualty support.

E. STATE UTILITY VALUE OF POSSIBLE OUTCOMES

To determine the interval scaling for the state's outcomes, one must consider the primary need and purpose of the security forces. The state has a great interest in the establishment of security and must be willing to invest in the establishment and resourcing of security forces in order to set the conditions for economic growth and peace. With this in mind, an interval scale between zero and one hundred was used to represent the state's preferences. The best option, AD, was given a value of 100 and the worst option, BC, was given the value of zero. The second best option, AC, was given a value of 90. In this outcome, the benefit of security greatly outweighed the cost of allocating funds to casualty support. Similarly, the least best option, BD, was given a value of 10. While the state preferred BD to BC because it would not have to pay for the casualty support when soldiers don't provide security, BD was only slightly better than BC due to the continued lack of security. The relationship among the different outcomes was illustrated in Figure 7.

INTERVAL SCALING FOR STATE PREFERENCES

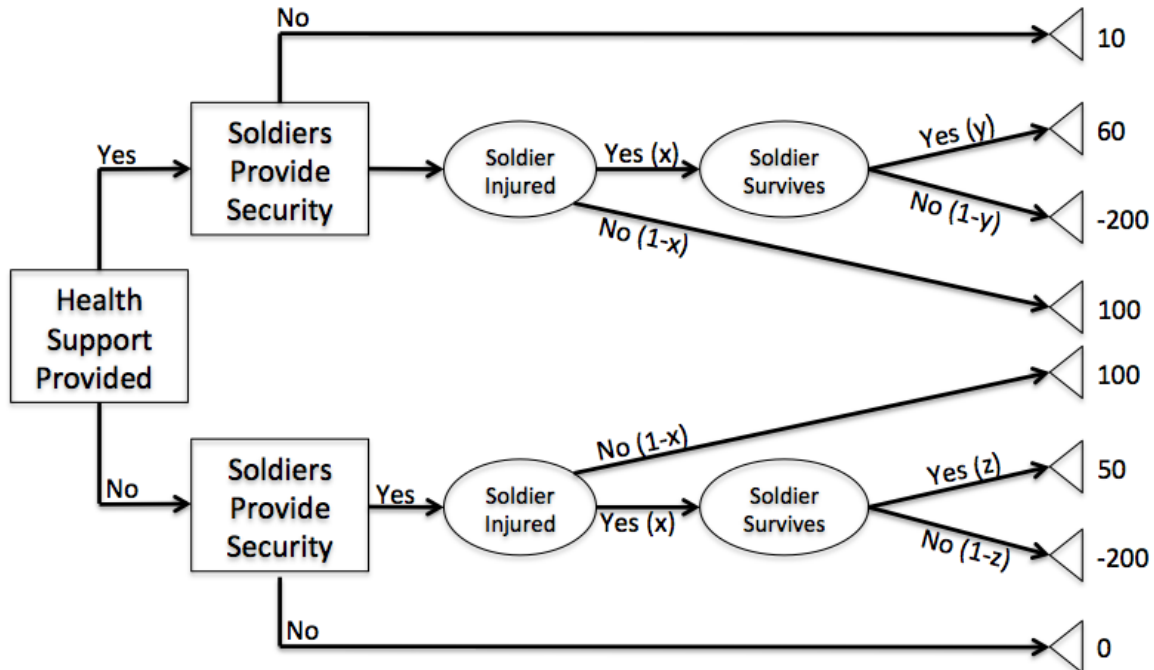


Interval scaling of cardinal utilities for state outcomes (From Figure 7)

F. **SOLDIER UTILITY VALUE OF POSSIBLE OUTCOMES IN LOW-RISK ENVIRONMENT**

Utility theory allows the computation of soldier expected values of the different outcomes through the use of a decision tree. The decision tree for soldiers' expected values (Figure 8) permits the manipulation of several variables to determine the expected value of different scenarios. On the decision tree, the three variables are the probability of injury (x), the probability of surviving an injury if casualty care is provided (y), and the probability of surviving an injury if casualty/trauma care is not provided (z).

DECISION TREE TO DETERMINE SOLDIERS' EXPECTED VALUES



Decision Tree to Determine Expected Value for Soldier Outcomes (From Figure 8)

The values listed at the terminal nodes of each decision branch represent the relative value of the outcome. Using a scale of -200 to 100, relative values are determined according to the following rationale: death always results in -200, and soldiers who provide security and are not injured (regardless of the provision of casualty/trauma care), rate the outcome as 100 points. Refusing to fight when there is no casualty/trauma care support is zero, and refusing to fight when there is medical support results in 10, a slightly higher number which reflects the benefit of having access to casualty/trauma care in the event they are attacked on their base. Wounded soldiers who survive their injury value the outcome based on the provision of casualty/trauma care. If a soldier survives an injury with casualty/trauma care, the value is 60. If a soldier survives an injury without casualty/trauma care, the outcome is 50, slightly lower to account for greater suffering, pain and increased morbidity.

Stochastic variables are determined based on the scenario. For Game 1 (a scenario with a low risk of injury), the risk of injury (x) is 1%. In the second game (a scenario with a higher risk of injury), a value of 67% is used. These values are selected to show the impact of varying levels of risk and do not specifically represent a specific location or situation. A perceived risk of 67%, though, reasonably represents the perception of risk a soldier might be caught in an ambush or when defending against a deliberate attack. For the survival rates with medical support (y) and without medical support (z), historical survival rates are drawn from U.S. military experience in El Salvador during in the early 1980s. Prior to the efforts of a U.S. Army Mobile Medical Training Team (MMTT) to improve security medical support, the survivability rates were 55% (z) for those wounded in battle. After the training, survivability rates increased to 95% (y).¹⁴³ The details of the efforts of the MMTT are discussed more extensively in Chapter 4, section G. The level of medical support assumed in my analysis could be reasonably provided by trained physicians in a developing country and includes the use of antibiotics, plain radiography, aseptic surgery, and safe general anesthesia. My analysis does not assume current first world standards of care in the United States or those provided by military medical

143. Zajtchuk, Brown, and Rumbaugh, "Medical Success in El Salvador."

support to American soldiers on the battlefield, which would require a greater level of medical investment in both personnel and technology (such as advanced surgical techniques, MRI/CT scanners, and advanced telemetry).

Using the decision tree in Figure 9 and the assigned risk levels discussed previously, the following utilities are calculated for each of the outcomes in Games 1 and 2.

Soldier Values of Outcomes in the Low-Risk Environment – Game 1

AC – The soldiers provide security, and the state provides casualty support.

$$\text{Utility} = (0.01 * ((60 * 0.95) + (-200 * 0.05))) + (0.99 * 100) = 99.47$$

Utility = 99

AD – The soldiers provide security, but the state does not provide casualty support.

$$\text{Utility} = (0.01 * ((50 * 0.55) + (-200 * 0.45))) + (0.99 * 100) = 98.37$$

Utility = 98

BC – The soldiers do not provide security, but the state provides casualty support.

Utility = 10

BD – The soldiers do not provide security, and the state does not provide casualty support.

Utility = 0

Soldiers Values of Outcomes in a High Risk Environment – Game 2

AC – The soldiers provide security, and the state provides casualty support.

$$\text{Utility} = (0.67 * ((60 * 0.95) + (-200 * 0.05))) + (0.33 * 100) = 64.49$$

Utility = 64

AD – The soldiers provide security, but the state does not provide casualty support.

$$\text{Utility} = (0.67 * ((50 * 0.55) + (-200 * 0.45))) + (0.33 * 100) = -8.875$$

Utility = -9

BC – The soldiers do not provide security, but the state provides casualty support.

Utility = 10

BD – The soldiers do not provide security, and the state does not provide casualty support.

Utility = 0

G. SENSITIVITY ANALYSIS ON LEVEL OF RISK

Sensitivity analysis on the level of risk experienced by the soldiers is conducted to determine the level of risk that influenced soldier behavior. The increased level of risk between Game 1 and Game 2 results in soldiers' preferences shifting from providing security at all times to only providing security when health support is available. As illustrated in Game 1 (Figure 9), soldiers change their strategy when the utility of AD falls below the utility of BD. In Game 2 (Figure 10), this change in behavior occurs when the expected value for AD becomes negative. Using the decision tree, I compute the level of risk (x) that changes behavior by setting the value of the utility function to less than or equal to zero (the value of BD) and then solve for x.

$$(x*((50*0.55)+(-200*0.45)))+((1-x)*100) \leq 0$$
$$x \geq 0.61538$$

From this calculation, I estimate that soldiers will stop providing security once the risk of injury approaches or exceeded 61%. While this value is specific to the utilities established in these games, the ability to calculate a threshold value that results in a change in soldier's behavior is conceptually useful.

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