INTRODUCTION

There has been a perception that security cooperation (SC) represents an effective and low-cost means to realize national security goals. This belief in the importance of SC’s capacity-building was, for example, articulated in the 2010 Quadrennial Defense Review (QDR), which argued that “U.S. security is inextricably tied to the effectiveness of our efforts to help partners and allies build their own security capacity.”1 The point was further emphasized in the 2014 QDR, which stated that while the U.S. must maintain the capacity to act unilaterally when necessary, “[t]he Department of Defense will rebalance our counterterrorism efforts toward greater emphasis on building partnership capacity especially in fragile states.”2 In both of these cases, the belief has been that using SC to build partner nations’ security capacity, so that they can play a larger role in maintaining their internal political stability and contribute to regional security initiatives, will relieve some of the burden from the Joint Force our joint security objectives, thereby reducing the need for the U.S. to commit blood and treasure to realize U.S. national security objectives.

While we believe that its underlying logic is sound, we do not believe this strategic guidance gives sufficient direction to the military planners and operators who must translate a belief in the general efficacy of SC into concrete programs, projects, plans and missions. Indeed, it is not sufficient that staff officers and senior decision makers only employ SC principles, but they must do so in ways that maximize their effectiveness in realizing U.S. and partner nation objectives. Planning staffs must be able to identify the particular security tools and programs that are likely to bring the greatest return on their investments of scarce time, money and resources and the conditions within which the application of those SC tools will most likely succeed. This is particularly true during a time of constrained resources which require that “the U.S. should make careful, explicit choices about its partnership investments—a tailored rather than an omnivorous approach—based on prioritized desired effects” while pursuing an SC strategy that asks “how exactly might building the capacity and capabilities of U.S. partners lead, through their actions, toward outcomes that help protect U.S. national security interests?”3

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We believe that this is an appropriate time to ask these hard questions and raise these difficult issues, and we are pleased that this special issue has been conceived of to consider these and other matters concerning the practice and efficacy of SC. We seek to contribute to staffs’ and warfighters’ capacity to effectively plan to employ the tools at their disposal, which include SC, by articulating one means through which the impact of SC activities might be more rigorously assessed and the return on their investments in these programs calculated. Although we focus on one specific aspect of SC in this paper, global health engagement (GHE), we wish to emphasize that the approach advocated here can be applied to any category or sector of SC: to include foreign military financing, international military education and training, infrastructure, governance and so on.

THEATER SECURITY COOPERATION & DEFENSE HEALTH ENGAGEMENT

In 2013, the Office of the U.S. Secretary of Defense (Policy) issued the *Global Health Policy Cable*, which defined GHE as “DoD health or medical related activities conducted with a foreign nation’s armed forces, foreign civilian authorities, or other agencies as part of security cooperation efforts to promote stability and security, build partner capacity, build trust and confidence, share information, coordinate mutual activities, or maintain influence to meet U.S. Government (USG) national security objectives and military end states.” Since health cooperation between the U.S. and foreign nations is often less controversial than other types of SC activities, and in many instances spurs enhanced collegiality amongst health professionals, GHEs are often a favored means of building trust and partnership by the CCMDs, Service Components, Military Groups (MILGRPs) and Military Departments (MILDEPs). Indeed, in an effort to enhance support for an increasing GHE demand signal, the Assistant Secretary of Defense for Health Affairs, Dr. Jonathan Woodson, identified engagements and developing resources for GHEs as one of the Military Health System’s six strategic pillars in 2014. However, like other elements of SC, global health has seen increasing pressure to concretely demonstrate its effectiveness and contributions to U.S. security goals.

To begin to address such concerns, this article explores the SC data available in the Overseas Humanitarian Assistance Shared Information System (OHASIS) and then provides some simple

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summary and retrospective analyses that serve as initial steps in understanding the scope and efficacy of humanitarian assistance activities employed by the USG over the past decade. (It should be noted that the following analyses are focused on funding provided through the Overseas Humanitarian, Disaster and Civic Aid (OHDACA) appropriation and excludes a number of other GHE activities funded through the Defense Health Program and other sources.) The following sections will first briefly explore the data available in OHASIS and present descriptive statistics; then present and discuss the key findings from some initial, econometric analyses; and conclude with a review of how stakeholders can further utilize and operationalize data, such as those in OHASIS, to inform policy and gauge program and project efficacy.

**OHASIS DATA AND APPLICATIONS**

*Overview*

Initially launched in May 2007, OHASIS allows SC engagement stakeholders to enter detailed information on the engagements on which they participate, such as engagement cost, the personnel involved and the location of projects. Based on the authors’ initial analysis, it appears that OHASIS is more consistent and complete than similar systems, such as the Global-Theater Security Cooperation Management Information System (G-TSCMIS), at least for OHDACA-funded SC activities. It is for this reason that the OHASIS data serve as the basis for the current inquiry, though G-TSCMIS, U.S. Agency for International Development (USAID), or other data sources, may be used for similar purposes when these are deemed more appropriate to the goals of the investigation.

For engagements where sufficient information was available in the “Executive Summary” and “Objective” fields, the authors were able to sort each OHASIS engagement into one or more of the 19 engagement types as depicted in Figure 1. Any engagement sorted into Category 1 (“Health”), was considered a GHE for the discussion of results that follows. These analyses were limited to projects that were entered into OHASIS as “completed;” cancelled, rescinded or otherwise incomplete projects were not included and although OHASIS contains data from as early as USG FY 2001, only data from FY 2002 through FY 2013 were used due to the relatively small amount of data available for FY 2001 and the strong likelihood, given this lack of data, that not all of the FY 2001 engagements were backfilled into the OHASIS database.
The present analysis includes 7,876 OHASIS engagements conducted from FY 2002 to FY 2013. There were 2,811 GHEs (35.7% of all engagements) and 5,065 non-GHEs (64.3% of all engagements). The total cost for all 7,876 engagements was $1.18 billion in constant 2009 U.S. dollars. The total cost of GHEs was $331.3 million (28.1% of total cost for all engagements) and the total cost of non-GHEs was $847.3 million (71.9% of total cost for all engagements). The average cost per GHE was approximately $118,000. The average costs per Category 1a, 1b, 1c, 1d, and 1e GHEs are approximately $295,000, $90,000, $59,000, $116,000, and $67,000, respectively. The disparity in costs between different types of GHEs is likely due to the different resources required for execution and the funding stream by which they were resourced. For example, Category 1b and 1c engagements are resourced largely by military health practitioners, and personnel costs (i.e. salaries) are not captured as costs in OHASIS. Conversely, Category 1a
and 1d engagements more frequently require supplies, equipment, and consulting services, the costs of which are captured in OHASIS.

By combining the OHASIS data with the additional, third-party data, it is possible to calculate the efficacy of these GHEs and their return on investment, thereby addressing, in part, the questions raised in the Global Health Policy Cable. Further, by determining the relative efficacy of different types of GHEs (or SC activities generally), such analyses can provide insight to staff officers conducting operational-level theater security cooperation planning and to senior decision makers, as they make critical planning and resourcing decisions.

*Some Simple Analytics*

It is clear that there is an almost inexhaustible supply of candidate measures of effectiveness (MOEs) that might be used as yardsticks against which to measure the efficacy of GHEs, far more than could be considered in one paper. The current project uses the strengthening of partner nations’ health systems as its MOE “of interest” because partner nation health capacity-building has often been articulated as a GHE objective that not only advances U.S. interests, but one that is also considered a global good that ought to be pursued in its own right. That said, under different circumstances, analysts and operational planners might wish to test GHEs’ efficacy against their ability to shape public opinion in host nations, provide access to Special Forces operators in otherwise inaccessible locales or provide unique training opportunities in austere conditions for our own Military Health System personnel.

Rigorous and replicable assessments require that operational goals and concepts, like strengthening of partner nations’ health systems, be operationalized using concrete metrics. This process of operationalization can often seem more like an art than a science and reasonable people can and will disagree about which variables best capture the concepts of interest. While, unfortunately, there is no definitive process through which these disagreements can be resolved, it is important to bear in mind that the staff officers should endeavor to try and select those metrics that most closely meet the spirit of the Commander’s intent and the needs of those charged with mission assessment and planning. In this case, we use the World Bank World Development Indicator (WDI) variable infant mortality as a proxy for health systems capacity because infant mortality is acknowledged as being an effective and broad measure of health systems’ ability to deliver critical services and desirable health outcomes.

The intensity of health engagements was measured by the per capita OHASIS budget commitment to all prospective partner nations (including those that got zero GHE assistance) in each calendar year; if a partner was a party to several GHEs in one year, these were aggregated to capture the full U.S. GHE commitment to that country during that segment of time. So that we might compare the relative marginal effectiveness of different types of GHE methods, we

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8 The “country year” is both a natural unit of analysis and, because the World Bank records infant mortality data
broke health engagements out into three categories of GHE: TOTAL HEALTH (all OHASIS health engagements), CAPACITY HEALTH (categories 1a and 1d) and DIRECT HEALTH (categories 1b and 1c). To ensure that cause effect(s) follow cause, health engagements are lagged one year, which means that we are testing what (if any) impact one year’s GHE assistance had on the following year’s level of INFANT MORTALITY.

Ordinary least squares (OLS) regression, which we use to estimate the impact of GHEs on health systems’ capacity, requires that dependent and independent variables be distributed (approximately) normally. Both INFANT MORTALITY and OHASIS budgets are highly skewed however: relative to the rest of the world, a few countries have very high rates of INFANT MORTALITY and, while most countries get no U.S. GHE, many do get a little and a few get very large (relative) levels of GHE commitments. Thus, in order to reduce the influence of these outliers on the estimated results, we normalize both INFANT MORTALITY and OHASIS budgets by using their natural logs in the OLS regression models. Finally, in order to control for potentially confounding observable factors, a battery of control variables are also employed while confounding but unobservable, country-specific factors are controlled for by using country fixed effects.⁹

For the interested reader, the full, tabled regression results with control variables are presented in a Technical Appendix. Presently, we focus on Figure 2, which shows the models’ estimated marginal effects for increasing each of the three GHE activities for the “average” country’s INFANT MORTALITY rate.¹⁰ This Figure thus gives a simple summary of not only the marginal effectiveness of GHEs generally, but also the relative return on investment of all GHEs versus those that focus specifically on health systems capacity-building (CAPACITY HEALTH) and direct care (DIRECT HEALTH).

⁹ On the application of fixed effects in panel regressions, see Jeffrey M. Wooldridge, Econometric Analysis of Cross Section and Panel Data, second edition (Massachusetts: Cambridge University Press, 2010), 300ff. For a full accounting of the control variables used, please reference the technical appendix.

¹⁰ The average (or mean) country in our sample had a population of about 33 million, a GDP of $11758.26 per capita, spent $1467.77 on health per capita and government expenditures amounted to about 19.75% of GDP.
As seen in Figure 2, CAPACITY HEALTH engagements are both statistically and substantively more impactful than DIRECT HEALTH engagements. Indeed, the latter are not statistically significant at all, indicating that there is no clear relationship between the provision of direct health care by U.S. forces and improved host nation health systems capacity (when INFANT MORTALITY is used as a proxy). The TOTAL HEALTH variable is also statistically significant. Since TOTAL HEALTH is the combination of CAPACITY HEALTH and DIRECT HEALTH, one would expect its impact to be between the two yet, puzzlingly, its substantive significance is greater than that of CAPACITY HEALTH. Perhaps the observed relationship between TOTAL HEALTH and INFANT MORTALITY is stronger because the larger combined impact of CAPACITY HEALTH and DIRECT HEALTH engagements allows for a more precise estimation of the impact of “all” health engagements, or
perhaps because there is a synergy between CAPACITY HEALTH and DIRECT HEALTH that has yet to be explored. Further research on this issue is warranted by these results.

The estimated relationship between health engagements and INFANT MORTALITY is both favorable and welcome, it is however quite small: for example, a 1% increase in CAPACITY HEALTH results in only about $\frac{3}{100}$ % change in INFANT MORTALITY. Assuming that INFANT MORTALITY is a reasonable proxy for partner nations’ overall health capacity, one might thus argue that GHEs’ impact on national health systems’ capacity is substantively quite modest. On the other hand, when one considers the degree to which these relatively small defense health engagements are dwarfed by the far larger and more ambitious programs from the Department of State, USAID, the United Nations and other international actors, the fact that DOD’s relatively small investment in CAPACITY HEALTH has had positive effects on partner health systems that can be measured at the national level, should still be considered quite remarkable. The use of the regression methods introduced here allows staff officers, planning these engagements, to point to the real, favorable and objectively quantifiable impact of their (aggregated) activities with a degree of rigor and precision that has often proven elusive in SC assessments; which is also something that provides a number of planning and programming advantages over alternative assessment methodologies.

Finally, using the methods described above, we were able to measure the relative return on investment of different types of GHEs; something that is also an important development in our ability to gauge efficacy and adjust our GHE and SC plans accordingly. While, in this case, we were able to directly compare the relative efficacy of CAPACITY HEALTH and DIRECT HEALTH engagements, there is no real limit on the number and types of programs that can be compared in their ability to assist staffs and operational commands in meeting their goals and objectives. To take but one example, staff officers might compare the relative efficacy of International Military Education and Training (IMET) and Foreign Military Financing (FMF) to increase partner nations’ domestic political stability by simply substituting IMET and FMF activities for GHEs, using the State Fragility Index as an MOE in place of INFANT MORTALITY, and then estimating regression models similar to those employed above.

**CONCLUSION**

The descriptive analysis from OHASIS presented in this article contributes to the topic of this special issue on SC, by providing an initial picture of how much GHE is being used within Combatant Command and Service Component security cooperation efforts in terms of funding and numbers of projects. Next, simple models and analytics were presented to demonstrate how this data could be employed to help inform policy makers, the CCMDs, Service Components and MILDEPs on the efficacy and most effective design of GHE and other SC activities.

There will certainly be those who feel the DoD should be doing more GHEs and/or SC, and others who feel that the DoD should be doing less. Removing one’s own sentiments from the

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11 The State Fragility Index measures the robustness of states social, political, economic and military systems and maintained by the Center for Systemic Peace: [http://www.systemicpeace.org/](http://www.systemicpeace.org/).
equation, the forgoing analysis provides original quantitative results that illustrate DoD’s involvement in GHEs through OHDACA funding and identifies the types of engagements conducted with host nations over the last decade. This also shows that GHEs have a favorable and objectively measurable impact as a SC shaping tool. Among the next steps in considering the impact of GHEs and SC may be expanding the analysis and conducting further tests on the G-TSCMIS database across all SC sectors to gain further insights on the value of these activities to respective CCMDs, Service Components and MILDEPs. If these tests prove as conclusive as OHASIS has then CCMD and Component staff planners should be educated and trained in these methodologies so they can more effectively conduct planning and assessment activities for other theater security cooperation engagements.

Although we believe the methods introduced in this paper should comprise an important element of commanders’ and decision makers’ future analytic toolkits, we also understand that the questions being asked by the respective stakeholder(s) may require differing assessment and evaluation methodologies. We thus urge policymakers to make the widest possible use of all of the analytic methods at their disposal, such as rigorous qualitative analysis; surveys and field experiments; and lastly, but certainly by no means least, the professional military judgment of the Soldiers, Sailors, Marines and Airmen who have been entrusted with making the critical defense decisions affecting our nation’s interests and security. The mix of these methods will contribute and provide context to a more thorough understanding of the contribution of SC and to better planning and resourcing decisions across the DoD.

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Solomon Major is currently the senior analyst for the Measures of Effectiveness in Defense Engagement and Learning (MODEL) program where he manages quantitative and experimental research projects and products. Prior to joining MODEL, Dr. Major served as an Associate Professor at the US Naval War College. He holds a PhD in Political Science from Stanford University with a concentration in International Relations.
Ms. Victoria Ta was an active team member for the Measures of Effectiveness in Defense Engagement and Learning grant, supporting the efforts in measuring and assessing DoD global health engagements. She received her Master’s Degree in Public Health in Epidemiology in June 2013 from the George Washington University and her Bachelors in Public Health in 2011 from University of North Carolina at Charlotte. Ms. Ta currently resides in Arlington, VA.

Mr. Jared Spier worked with the Center for Disaster and Humanitarian Assistance Medicine from March 2014 to June 2015 where he provided data analytics expertise to the Measures of Effectiveness in Defense Engagement and Learning (MODEL) study. Mr. Spier earned a Bachelor of Science degree in Finance from the University of Maryland.
## Technical Appendix

### Table 1. OHASIS Impact, OLS Regressions

<table>
<thead>
<tr>
<th>Dependent Variable (e.g. MOE) = ln(INFANT MORTALITY)</th>
<th>MODEL 1</th>
<th>MODEL 2</th>
<th>MODEL 3</th>
</tr>
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<tbody>
<tr>
<td>ln(ALL HEALTH)_{t-1}</td>
<td>-0.0036***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(CAPACITY HEALTH)_{t-1}</td>
<td></td>
<td>-0.0034**</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0014)</td>
<td></td>
</tr>
<tr>
<td>ln(DIRECT HEALTH)_{t-1}</td>
<td>-0.0065***</td>
<td>-0.0065***</td>
<td>-0.0065***</td>
</tr>
<tr>
<td></td>
<td>(0.0016)</td>
<td>(0.0016)</td>
<td>(0.0016)</td>
</tr>
<tr>
<td>ln(USG AID)_{t-1}</td>
<td>0.005***</td>
<td>0.005***</td>
<td>0.0054***</td>
</tr>
<tr>
<td></td>
<td>(0.0017)</td>
<td>(0.0017)</td>
<td>(0.0017)</td>
</tr>
<tr>
<td>ln(MULTILATERAL AID)_{t-1}</td>
<td>-0.1602***</td>
<td>-0.16***</td>
<td>-0.1624***</td>
</tr>
<tr>
<td></td>
<td>(0.0164)</td>
<td>(0.0164)</td>
<td>(0.0164)</td>
</tr>
<tr>
<td>ln(GDP/pc)</td>
<td>-0.1591***</td>
<td>-0.1597***</td>
<td>-0.159***</td>
</tr>
<tr>
<td></td>
<td>(0.0146)</td>
<td>(0.0146)</td>
<td>(0.0146)</td>
</tr>
<tr>
<td>ln(HEALTH/pc)</td>
<td>-0.0834***</td>
<td>-0.0836***</td>
<td>-0.0836***</td>
</tr>
<tr>
<td></td>
<td>(0.0142)</td>
<td>(0.0142)</td>
<td>(0.0142)</td>
</tr>
<tr>
<td>Constant</td>
<td>5.0801***</td>
<td>5.0816***</td>
<td>5.1023***</td>
</tr>
<tr>
<td></td>
<td>(0.0727)</td>
<td>(0.0728)</td>
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<thead>
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<th>1333</th>
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<tr>
<td>Countries</td>
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</tr>
<tr>
<td>R² within</td>
<td>0.6600</td>
<td>0.6596</td>
<td>0.6582</td>
</tr>
<tr>
<td>R² between</td>
<td>0.7982</td>
<td>0.7984</td>
<td>0.7984</td>
</tr>
<tr>
<td>R² overall</td>
<td>0.7710</td>
<td>0.7712</td>
<td>0.7713</td>
</tr>
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Standard errors in (parentheses). p < .10 = ‘*’; p < .05 = ‘**’; p < .01 = ‘***’.

Each of the models in Table 1 uses country fixed effects and controls for (the natural logs of) other U.S. Government aid programs (USG AID), MULTILATERAL AID, and host nations’ gross domestic product (GDP).

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These data are available from the United States Agency for International Development’s report on U.S. Overseas Loans and Grants: Obligations and Loan Authorizations, which is available online from at: https://eads.usaid.gov/gbk/docs/index.cfm.
national product (GDP) per capita, health expenditures (HEALTH) per capita and GOVERNMENT CONSUMPTION as a percent of GDP. The models indicate that TOTAL HEALTH and CAPACITY HEALTH have favorable and statistically significant impacts on host nations’ health outcomes (as measured by INFANT MORTALITY). Using a model in which both the aid and outcomes variables are logged requires that the impact of the GHEs on INFANT MORTALITY be converted into percentage terms for substantive interpretation.\(^\text{13}\) A one percent increase in TOTAL HEALTH is estimated to reduce INFANT MORTALITY by about \(\frac{4}{100}\) of a percent while CAPACITY HEALTH is estimated to reduce INFANT MORTALITY by about \(\frac{3}{100}\) of a percent. These effects are small, to be sure, but considering the size of GHEs, and the fact that these models estimate nation-wide effects, the impact is quite noteworthy, nonetheless. DIRECT HEALTH, on the other hand, not only has a lower substantive impact on INFANT MORTALITY, but the estimated relationship is not statistically significant. These results confirm both that OHASIS GHEs can have favorable impacts on host nation health and also that engagement type matters: at least when considering the building of host nation medical capacity (measured by infant mortality rates), building indigenous health capacity appears to have both a statistically and substantively greater impact on host nation health than U.S. personnel directly administering health care.

Of course, more complex models can be used to control for additional variables, test additional hypotheses, and account for selection effects and other biases that may otherwise confound statistical analysis.\(^\text{14}\) MODEL hopes that, by making these data widely available, academic and military analysts will be able to use OHASIS and similar econometric methods to compare a wide range of GHE and MOE data across countries and across time to determine what factors are contributing to the observed changes in host nation outcomes—whether these be political, sociological or health-related—and the simple tests and models reported above give only a flavor of the sorts of analyses that are made possible by the coding and release of the OHASIS data. It is hoped that, ultimately, the results of future analyses will offer policy, resource, and requirement recommendations to help planners and executors implement projects with the largest return on investment in the future.
