Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 78 (2014) 10 – 21

Procedia Engineering

www.elsevier.com/locate/procedia

Humanitarian Technology: Science, Systems and Global Impact 2014, HumTech2014

# Development and Use of a Comprehensive Humanitarian Assessment Tool in Post-Earthquake Haiti

M. A. Zissman[a], J. E. Evans[a], K. T. Holcomb[a], D. A. Jones[a], M. R. Kercher[a], J. L. Mineweaser[a], A. C. Schiff[a,*], M. M. Shattuck[a,†], E. L. Gralla[b,‡], J. Goentzel[b], COL C. Heatherly[c], COL J. Czarnik[c], MAJ A. Rodgers[c], MAJ A. Wooten[c], M. Brennan[d], O. Mach[d], A. Cleaves[e], M. Hartnett[e], G. Simon[e], L.C. Ivers[f]

[a]*Lincoln Laboratory, Massachusetts Institute of Technology, 244 Wood Street, Lexington, MA 02420-9108*
[b]*Engineering Systems Division, Massachusetts Institute of Technology*
[c]*US Army XVIII Airborne Corps and US Army South*
[d]*Pan-American Health Organization*[§]
[e]*Global Relief Technologies*
[f]*Department of Global Health and Social Medicine, Harvard Medical School, Division of Global Health Equity, Brigham and Women's Hospital, Boston MA and Partners In Health, Haiti*

**Abstract**

This paper describes a comprehensive humanitarian assessment tool designed and used following the January 2010 Haiti earthquake. The tool was developed under Joint Task Force – Haiti coordination using indicators of humanitarian needs to support decision making by the United States Government, agencies of the United Nations, and various non-governmental organizations. A set of questions and data collection methodology were developed by a collaborative process involving a broad segment of the Haiti humanitarian relief community and used to conduct surveys in internally displaced person settlements and surrounding communities for a four-month period starting on 15 March 2010. Key considerations in the development of the assessment tool and data collection methodology, representative analysis results, and observations from the operational use of the tool for decision making are reported. The paper concludes with lessons learned and recommendations for design and use of similar tools in the future.

Selection and peer-review under responsibility of the Organizing Committee of HumTech2014

* A.C. Schiff is now with Medic Mobile.
† M. M. Shattuck is now with Harvard Humanitarian Initiative.
‡ E. L. Gralla is now with George Washington University.
§ M. Brennan and O. Mach served as short-term consultants to the Pan-American Health Organization.

Approved for public release; distribution is unlimited. The MIT Lincoln Laboratory portion of this work is sponsored by the Air Force under Air Force Contract FA8721-05-C-0002. Opinions, interpretations, conclusions, and recommendations are those of the authors and are not necessarily endorsed by the United States Government.


Selection and peer-review under responsibility of the Organizing Committee of HumTech2014
doi:10.1016/j.proeng.2014.07.033

*Keywords:* Earthquake; Haiti; Assessment tool; Joint task force; Department of Defense; Indicators; Questionnaire; Humanitarian assistance; Disaster response; Data collection;

## 1. Introduction

On 12 January 2010, a magnitude 7.0 earthquake 25km west of Port-au-Prince, Haiti resulted in a catastrophic disaster in which more than 220,000 people died, 300,000 were injured and 2.3 million were displaced. [1,2] 188,000 houses collapsed or were badly damaged, and 105,000 houses were completely destroyed. [3] The United States Agency for International Development (USAID) was charged by U.S. President Barack Obama to lead the U.S. government's (USG's) inter-agency response to the crisis. In the six months following the earthquake, the USG contributed more than $1.1 billion in humanitarian assistance. [4]

Elements of the U.S. Department of Defense (DoD) began arriving in Haiti under U.S. Southern Command (SOUTHCOM) leadership to provide assistance on 13 January. By 14 January, Headquarters, Joint Task Force – Haiti (JTF-Haiti) was established as part of the SOUTHCOM-led Operation Unified Response (OUR) to conduct humanitarian assistance and disaster relief in support of USAID and non-governmental organizations (NGOs). The goals of OUR were to mitigate suffering and save lives. At its peak, JTF-Haiti controlled 22,268 personnel both on the ground and off shore, distributing more than 36 million pounds of relief, including 2.6 million liters of water, 2.9 million ration packages, 17 million pounds of bulk food and 2.7 million meals-ready-to-eat. The Haiti earthquake response was the largest disaster response mission in modern U.S. military history. [5]

Haiti was already one of the world's poorest countries prior to the earthquake: estimates indicate that it produced less than half of its food needs; it had an unemployment rate of 70-80%; almost half of all Haitians did not have sustainable access to potable water; and 54% of Haitians lived on less than $1/day. [6] Prior to the earthquake, the international community had been providing support of various types. For example, the United Nations Stabilization Mission in Haiti (MINUSTAH) had been working since 2004 to ensure a "secure and stable" environment [7], deploying up to 9,151 personnel on the ground in Haiti. [8] Additionally, an array of NGOs provided a variety of humanitarian support – estimates of the number of NGOs working in Haiti range from 3,000 to 10,000 before the earthquake. [9] Many of these resident NGOs strengthened their efforts after the earthquake, even as other "surge" NGOs arrived and began to provide support. After the earthquake, many of these NGOs were loosely coordinated with assistance from the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) into a "cluster" system to help coordinate the response of the international relief organizations. [10]

JTF-Haiti and USAID thus formed part of a larger system of organizations working to provide humanitarian support to the people of Haiti. With so many disparate actors and no central governing entity, coordination was a challenge, as each organization sought to use its own efforts to best effect. Presumably, a common view of the need for humanitarian resources could help such a coalition coordinate their activities, permitting a unity of effort in the absence of a unity of command. This paper details an attempt to create such a common view of the humanitarian needs in Haiti for several months after the earthquake.

## 2. Assessing the Need for Humanitarian Resources

The JTF's main mission was to provide humanitarian support to the people of Haiti. [11] Humanitarian support takes many forms. At root it is a resource allocation process that seeks to direct services as health care or supplies, i.e., shelter and water, efficiently and effectively. Data on the ongoing needs for these supplies and services among disaster victims are necessary for making good resource allocation decisions and for assessing the effectiveness of humanitarian support efforts. However, such data are challenging to gather, analyze, and distribute during a massive disaster response.

JTF-Haiti had access to many sources of data indicating the quantities of humanitarian supplies arriving and being delivered within the country. Mainly, these data indicated the ***supply*** of humanitarian relief available across various

sectors (food, water, sanitation, hygiene, shelter, health, security, etc.), and these data were provided to the JTF leadership via situation reports sent by its elements (e.g., the 22nd and 24th Marine Expeditionary Units and the 2nd Brigade, 82nd Airborne Division), by other parts of the USG (e.g., USAID), by agencies of the United Nations, and by many of the NGOs.

On the other hand, the JTF had less information regarding the ***demand*** for humanitarian resources among the earthquake victims across these same sectors in a context that would facilitate the targeting of resources to those that were in most urgent need. Figure 1 shows a notional model for comparing the elements of supply vs. demand, e.g., this could be a comparison of the supply and demand for potable water in a particular part of Haiti impacted by the earthquake at a particular instant in time.

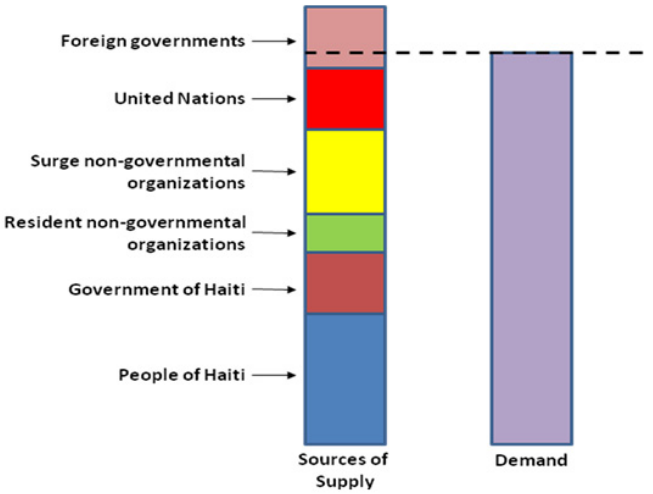


Fig. 1. Supply vs. Demand for Humanitarian Resources (notional).

In this notional comparison, various sources of supply are depicted on the left, e.g., the supply provided by the people of Haiti, the supply provided by the Government of Haiti, the supply provided by the various NGOs, the supply provided by the agencies of the United Nations, and the supply provided by foreign governments. The demand for the particular resource (e.g., potable water in a particular region) is shown on the right. In this notional example, supply exceeds demand. One would expect that the supply vs. demand comparisons would vary with resource type (e.g., water, food, shelter, etc.), location within the disaster area (e.g., some areas might be better served than others), and time (e.g., as the emergency subsides, perhaps supply begins to "catch up" with demand). Presumably, the host nation government (the Government of Haiti (GOH) in this case), the USG, other governments, the UN agencies and NGOs could use these types of comparisons to direct resources to the most critically needed areas and also to determine when their support was no longer needed.

Figure 2 shows how understanding the supply and demand for humanitarian resources enables better decisions and actions, using the OODA loop model (observe, orient, decide and act) [12] as applied to a disaster response operation.

Ideally, decision makers in humanitarian response efforts would have access to decision support tools and data permitting them to compare supply to demand for all resources types, for all parts of the disaster area, for various time intervals (past, current and near-future). These tools and data would be a key input to their resource procurement and allocation decisions, permitting effective and efficient direction of finite humanitarian aid.

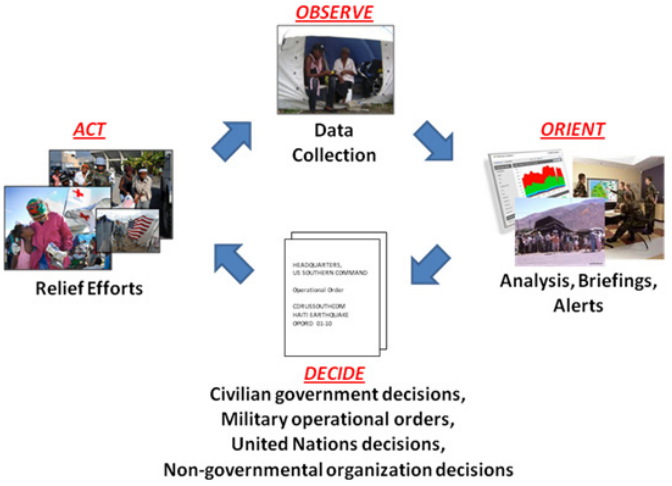


Fig. 2. The OODA loop for disaster response. Data collection enables understanding of the supply and demand for humanitarian resources, which in turn enables better decisions and actions.

To help inform its own decisions and the decisions of the international relief community, the JTF sponsored a comprehensive, continuous data collection and analysis effort that would ultimately measure the current needs for humanitarian resources at sites inhabited by displaced persons on a weekly basis for several months following the earthquake. This effort was intended to serve as an important input to the OODA loop (serving as "observe" and "orient" functions), thereby informing the decisions and aiding in the assessment of action impact across the humanitarian community.

## 3. Designing the Assessment Tool

In planning a humanitarian needs assessment of this type, JTF-Haiti faced a number of design trade-offs. Figure 3 shows part of the trade-space. The key challenge was that the data were required urgently: a *better* assessment could be produced by spending more time designing its elements and verifying its results, but the data were needed *faster* to inform urgent actions to provide relief to those in need. Some of the specific trade-offs made in the design of the assessment tool are detailed below.

- **Coordination**: To ensure that the data collection and analysis results would be most useful to the GOH and USG civilian relief organizations as well as the international community (United Nations agencies, NGOs, etc.), the JTF asked a small team of university-affiliated researchers to collaborate with these relief organizations to develop an assessment tool to be used for collecting the humanitarian needs data. This team was tasked to define a set of indicators, create a set of questionnaires, and establish a collection methodology that would inform the broad international relief effort. Within six weeks, initial drafts of the humanitarian indicators, questionnaires, and collection methodology had been drafted and widely circulated for comment, and within eight weeks (i.e., two months after the earthquake) a contract had been awarded by the DoD for execution of the collection/analysis effort as defined by the multinational team, and sustained data collection and analysis had begun. While a unilateral JTF-led design effort would have permitted the data collection to begin with shorter delay, the JTF believed that a collaborative design approach led by university-affiliated researchers and including many elements of the international relief effort would lead to a better product that was more likely to be accepted by all. The JTF also believed that this approach would provide a template that could be used in future disaster recovery efforts.


| | |
|---|---|
| Unilateral design | Design "by-committee" |
| Rapid questionnaire design | Translated, tested questionnaire |
| Fewer indicators/questions | More indicators/questions |
| Generic indicators/questions | Societal/disaster-tuned indicators/questions |
| Purposive sample | Random sample |
| Fewer samples | More samples |
| Immediate data release | Cleaned data |
| Rapid analysis | Complete, verified analysis |

Fig. 3. Assessment design trade space.

- **Indicators and Questions**: "Indicators" are numbers or statements that help measure, simplify, and communicate changes and impact. [13] An example of an indicator is the quantity of water used per person in a household for cooking, drinking and washing. "Questions" are used to elicit indicator values, often indirectly, e.g., "How much water on average do you and your household have to use in a day now for cooking, bathing and drinking" and "How many people are in the household with you?" are questions to which the answers can be used to compute the "quantity of water per person per day" indicator. Indicators and questions were developed for multiple topic areas, including health, child health, food, water, sanitation, hygiene, shelter, security, education, protection, early response, early recovery, and top priorities. The assessment tool developed under JTF coordination contained 61 questions to be asked of displaced person households, 40 questions to be asked of "key informants" (camp leaders, mayors of communities, etc.), and 18 questions to be asked in health facilities. Indicators and questions were drawn from international standards for emergency aid in post-disaster settings [14] and adapted specifically for this disaster in Haiti, i.e., the questions were written in Haitian Creole and were phrased in a way that made sense for the context. For example, because displaced people would likely respond to a question about water quantity in terms of the usual vessels used for carrying water in Haiti – a *gwo bokit* ("big bucket") holds approximately 15L vs. a *galon* (a small container) that holds 3.8L – the questions were asked and answers were recorded that way, e.g., the interviewer would ask *Ki kantite dlo ou menm ak moun nan kay la itilize chak jou pou kwit manje, pou w bwè, ak benyen?* ("How much water do you and your household use in a day for cooking, bathing and drinking?") and would then record the result as the number of big buckets, small containers, or liters, depending on how the householder responded. Other questions were also highly attuned to the situation in Haiti, e.g., the section on shelter included a number of questions related to house and land ownership that were Haiti-specific.
- **Methodology**: The assessment methodology dictates how data are to be collected and how collection sites are chosen; these decisions in turn determine how the data are analyzed and the types of conclusions that can be drawn. Random selection of respondents and collection sites enables more general conclusions than purposive selection of specific sites; however, purposive sampling can be targeted toward specific problem areas and requires less data up-front. This assessment was designed to include both random and purposive sampling. The plan was to perform mainly random sampling of internally displaced persons (IDPs) in Port-au-Prince (i.e., a random selection of settlements and random selection of households within settlements) and purposive sampling in earthquake-affected IDP settlements in other areas of Haiti (i.e., a non-random selection of settlements but with random selection of households within the settlements). Additional purposive samples were to be taken where settlement sites were particularly at risk and where large numbers of IDPs were believed to have moved as a result of the earthquake. Finally, late-notice sites selected based on emergent information were to be included. A total of 12 teams (three interviewers per team) each visited one site per day, six days per week – 72 sites total

per week. At each site, the team interviewed a key informant, an official at a local health center, and as many individual households as possible (typically 15–20 per site). While the methodology design called for a mix of random and purposive site selection, in practice only purposive site selection was used because the required data on the total population of settlement sites, which would have been required to permit truly random sampling, could not be obtained in time.

- **Data release and analysis**: JTF-Haiti mandated that the data and analysis be made available to the international relief community immediately. Plans were made to release raw data within 24 hours of collection, with analysis to follow as soon as possible thereafter. This fast timeline for data release was implemented in practice, though the speed required permitted little data cleansing or error correction.

Other approaches are possible, e.g., a very rapid assessment using the pre-existing, standard "Initial Rapid Assessment" (IRA) tool was conducted under UN OCHA sponsorship within a few weeks after the earthquake. Because the OCHA-sponsored assessment was limited by time pressure and other constraints (e.g., the questions were not translated to Creole, there was limited time to tune the questions to the situation of post-earthquake Haiti, etc.), those results need to be interpreted with caution. [15] Other continuing, comprehensive assessments of areas stricken by disasters have been designed and performed. [16] Additionally, multi-cluster assessments have been quickly devised and implemented after disasters. [17] To the best knowledge of the authors, this effort in Haiti was the first continuous, cross-sector assessment to be designed and implemented so quickly after such a large disaster by a coalition of government (civilian and military), UN, and NGO collaborators.

## 4. Project Roles and Responsibilities

As already noted, JTF-Haiti sought to collect and distribute humanitarian needs data to help inform the organizations providing humanitarian relief in Haiti, particularly USAID, the United Nations agencies, and the NGOs. The JTF wished to ensure that the data and analysis would be maximally useful to the international relief community and also sought to reduce the risk that either the data or the analysis would be seen as biased by the JTF or the DoD. With those goals in mind, the following project roles and responsibilities emerged:

- **Project oversight**: U.S. Army civil affairs officers assigned to the JTF defined the need for humanitarian data and provided oversight for the entire process.
- **Project management team:** At the JTF's request, the team was managed in Haiti by MIT Lincoln Laboratory (MIT LL), a DoD federally-funded research and development center (FFRDC). FFRDCs are chartered to operate in the public interest with objectivity and independence. [18,19] A partnership was formed between MIT LL and two other MIT entities with relevant subject matter expertise: the MIT Sloan School and the MIT Engineering Systems Division (ESD). Members of ESD joined the in-country team.
- **Lead scientific advisor**: The management team identified and recruited a volunteer lead scientific advisor who is a physician and research scientist, has worked in Haiti for many years, speaks the local languages, and is well-respected in the Haitian medical community and among the NGOs.
- **CONUS-based support team**: A volunteer, continental United States (CONUS) based team consisting of scientists, engineers and physicians supported the Haiti-based management team. Members of the support team were drawn from other FFRDCs, universities, university-affiliated research centers, independent research laboratories, etc. to assist the management team mainly through the development of white papers.
- **Indicator and questionnaire development**: The scientific advisor took the lead in working with the international relief community to develop both the indicators and the questionnaire. She worked with OCHA and with each of the sector-specific cluster leads (or his/her designate) to identify the types of data that each cluster believed would inform its own decisions and the decisions of its members. She edited the questionnaire based on cluster input, making the necessary trade-off between the desire to collect as much data as possible vs. the need to keep the questionnaire a manageable size. Figure 4 is a photograph of a discussion led by the scientific advisor to discuss the assessment tool with OCHA representatives and the cluster leads. The questionnaire was pilot tested with native Haitian Creole speaking volunteers.

Fig. 4. A meeting with OCHA personnel and the cluster leads to discuss the assessment tool.
This meeting took place on 15 February 2010 in a cluster tent at the UN MINUSTAH Logistics Base.

- **Methodology development**: The project management team worked with representatives from the Pan-American Health Organization (PAHO) to develop the data collection methodology, which focused primarily on how sites would be selected for sampling and how households within those sites would be sampled for questioning. The methodology evolved significantly as additional data on sites became available and as implementation problems arose. As data collection continued, the project management team guided the methodology evolution.
- **Data collection and analysis**: The DoD wrote and issued a "request for quotations" (RFQ) that was circulated to qualified firms. The RFQ defined the task of data collection and analysis (referencing the questionnaire and methodology documents, among others). Firms were invited to submit bids to perform the data collection and analysis work, and the DoD ultimately selected Global Relief Technologies (GRT). GRT recruited a team of almost 40 native Haitian interviewers who visited sites, identified respondents, asked the questions in the questionnaire, and recorded results in handheld computers. GRT also analyzed the results and made both their analysis and the underlying raw data available to the international community via their Internet web site.
- **Assessment and communication**: The management team and scientific advisor with help from the JTF reviewed the data and preliminary analysis provided by GRT on a weekly basis, developed its own independent assessment of the results (using the GRT data and other data made available to it by the JTF and by the international community), and reported the results to USG inter-agency leadership, to U.S. embassy leadership, to JTF leadership, to USAID and other parts of the USG, and to the various international relief organizations (the clusters, UN OCHA, the Coordinating Support Committee, and the NGOs). These results primarily were communicated via PowerPoint briefings.

## 5. Results

GRT began collecting data on 15 March 2010, and their data collection continued until 2 May 2010.[**] More than 10,000 households were surveyed during that time. Figure 5 shows a photograph of a household interview. During the seven weeks of collection, raw data were uploaded to GRT's Internet web portal daily, and both raw data and analysis products could be (and were) downloaded by international relief organizations.

[**] USAID funded GRT to extend the data collection and analysis for a subsequent two-month period. That effort started on 17 May 2010 and concluded on 10 July 2010.

Fig. 5. Collecting data at a household. The interviewer is holding a handheld computer that is prompting her to ask questions and on which she records results.

Two major types of analyses were computed from the raw data and presented to responders: (1) information on the situation in particular camps, which enabled identification of specific problems in specific places; and (2) summaries of data across all the camps visited during the survey. The latter analyses provide average statistics for the camps visited, but because the sampling was purposive rather than random, one cannot conclude that these averages represent the situation in camps in general. Several examples of summary analyses, which were presented to responders in early May, are shown below.

Figure 6 shows the fraction of displaced people with access to at least 15L of water per day as a function of the location. The 15L baseline is the minimum recommended by the Sphere Project, which defines minimum standards for disaster response. [20] The data show that the fraction of people with access to the minimum standard recommended by the Sphere Project was well below 100%. In fact, it was below 50% in some places.

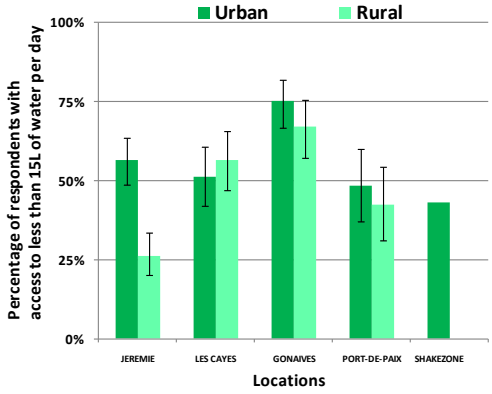


Fig. 6. Example result showing fraction of people with access to baseline amounts of water as a function of location. Error bars indicate 95% confidence intervals. The horizontal axis indicates five different regions of Haiti. Jeremie, Les Cayes, Gonaives and Port De Paix lie outside the area most heavily impacted by the earthquake. “Shakezone” indicates the region within approximately 25km of the epicenter (including all of Port-au-Prince). For each of the five regions, the left bar shows access in urban areas, and the right bar shows access in rural areas.

Figure 7 shows how the fraction of people with access to a waterproof shelter varies as a function of whether the site in which they are living is being actively managed by an NGO or not. In this particular case, the data indicate that residents of sites that are actively managed by NGOs have better access to water-proof shelters.

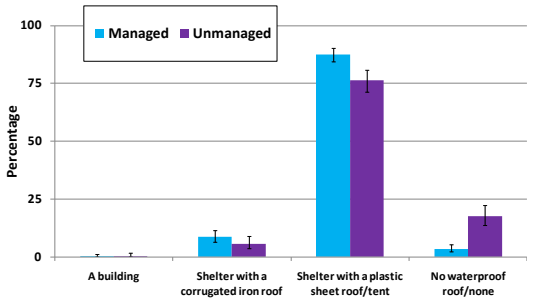


Fig. 7. Results indicating that residents of sites that are actively managed by NGOs have better access to water-proof shelters vs. residents of sites that are not actively managed. Error bars indicate 95% confidence intervals.

Figure 8 shows how food insecurity as measured by the Coping Strategy Index [21] (CSI) varied with time for displaced people in Port-au-Prince. In general, the results show that the CSI did not vary appreciably in this particular seven-week period.

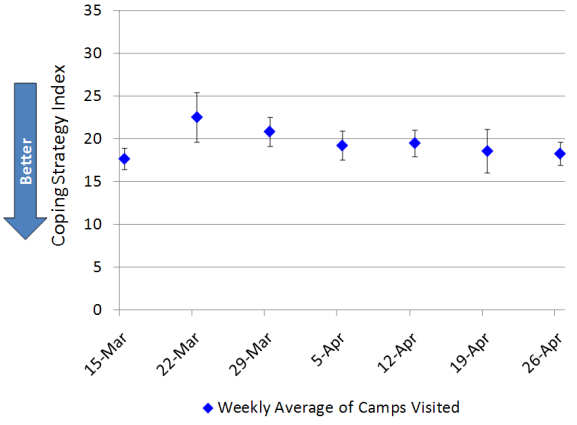


Fig.. 8. Result showing the trend in the "Coping Strategy Index" (CSI), a measure of food insecurity that runs from 0–49 (lower is better), for camps in Port-au-Prince. Error bars indicate 95% confidence intervals.

The survey responses also permit correlation of data from households with data from key informants. For example, a key informant report that latrines had recently been provided to a camp was shown to be correlated with a change in the fraction of households reporting availability of latrines. In this particular case, the fraction of households reporting access to latrines rose from 15% to 82%.

A complete treatment of the results of the data collection/analysis effort is beyond the scope of this paper – a comprehensive assessment of the results will be reported in a companion paper. [22]

## 6. Lessons Learned

Key lessons learned during the process of planning and executing the data collection and analysis are listed below:

- **Tactical use of the data and analysis was limited**. The JTF had hoped that the data collection and analysis would influence real-time decision making by the Government of Haiti, the international community and USG relief organizations. For example, when the water trend data showed that as many as half of all displaced persons did not have access to at least 15L of water per day and that the situation was not improving, an appeal was indeed made to the Government of Haiti to delay its plans to end the free distribution of water. Except for a few such instances, however, this assessment effort was unable to provide actionable results useful for tactical decision-making. While the indicators, questionnaire and methodology had been conceived and thoroughly vetted by the community, the community was mostly unable to consume the real-time raw data. Effective coupling of the periodic release of analysis results into the decision cycles of each of the major relief organizations was not adequately planned. The decision cycles of major relief organizations were not necessarily known outside of each organization.
- **Retrospective use of the data and analysis is more likely**. It seems more likely that the data and analysis will prove useful to those conducting "after action" assessments of the relief effort. For example, the results show that in many cases, residents of formally-managed camps had better access to humanitarian resources than residents of unmanaged camps, suggesting that efforts should be made in future massive disasters to assign formal managers to all camps. A number of the assessment shelter questions provide information on housing and land ownership of the IDPs that should be useful for developing strategies for permanent housing of the IDPs. Both the raw data and analysis have been made available to the UN OCHA, various NGOs and the USAID-led USG inter-agency after action review.
- **Tailoring the assessment tool is important**. Tailoring the assessment tool to Haiti proved to be difficult but important, and it avoided some of the issues identified in the earlier IRA effort. However, the processes of working with the clusters to ensure a collaborative approach for identification of indicators of interest, creating and translating the questions, and loading the questions into the handheld computers all resulted in delay in initiation of data collection. In this particular case, the delay associated with tool development was not the only factor in the delay in commencing the assessment, because the questionnaire and methodology development was completed within a week of the GRT contract award – in a sense, it was ready "just in time"; nonetheless, it would have been helpful to have had a set of indicators and a representative set of questions tuned to Haiti that were already agreed-upon by major relief organizations (and, by extension, other locations likely to be impacted by massive disasters) available in advance. It would also have been helpful for DoD to have had a contractual vehicle in place in advance for conducting surveys and analyzing results.
- **The indicators, questionnaires and methodology should be flexible**. The indicators and questionnaire were held fixed for the entire two-month assessment period despite the fact that, in some cases, the needs of decision makers might have been better met by modifying the tool. Formal procedures for considering and approving changes to the indicators, questionnaire and methodology could have been defined and followed to introduce more flexibility in content over the two month period. The methodology, on the other hand, changed over the course of data collection. The approach for randomly selecting sites to be surveyed was quickly abandoned when it became clear that random site selection was (1) difficult or impossible to achieve in the absence of reliable data on site populations; and (2) unlikely to satisfy either the JTF or the international community who were interested in targeting specific sites that were emerging for various reasons as "priority sites." In practice, site selection was 100% purposive. Selection of households within sites was random though its implementation deviated from the plan for reasons of practicality and safety. The number of households surveyed per site remained fixed, despite the fact that decision makers might have preferred a survey of fewer sites with more households surveyed per site (thereby reducing uncertainty in the results). If quickly assessing a subset of the humanitarian needs had been particularly important, a smaller number of questions could have been used on some of the surveys thereby increasing the number of households surveyed per site. Other successful methodological changes were made (e.g., surveying only displaced persons rather than all residents in areas outside Port-au-Prince); the success of these changes reinforces the lesson that flexibility is important.

- **Obtaining international community participation takes effort but is critical**. The JTF was successful in sponsoring the development of an assessment tool, assessment data and assessment analysis that was by-in-large accepted by the international relief organizations. Collaborating with the international community was challenging, however, because each organization has a unique set of objectives, sensitivities, priorities and timelines, because many had other sources of data to include in their decision-making processes, and because some civilian humanitarian organizations were reluctant to coordinate with a military-led assessment.
- **The assessment team requires a variety of skills**. The assessment team was largely composed "on the fly," beginning two weeks after the disaster, through a series of serendipitous communications and meetings and depended to no small degree on volunteerism. This team formation process was successful, but not ideal, and likely not repeatable in the "next" emergency. Having a university-based DoD FFRDC lead the effort provided a reasonable bridge between the JTF on the one-hand (who felt comfortable working with a DoD FFRDC, but who might not have been comfortable working with other types of university-affiliated teams) and the international community on the other-hand (who felt comfortable working with a university-affiliated team, but many of whom would have been reluctant or unable to work directly with the DoD). Identifying a scientific advisor with in-country experience and credibility was critical, and getting advice from epidemiologists who had significant disaster response and data collection experience was also very important. Contracting the raw data collection and preliminary analysis to an experienced firm was effective. Drawing on the resources of a CONUS-based support team was helpful, though keeping the CONUS team activities well aligned with the in-country team requirements proved difficult. Finally, JTF sponsorship, which included access to senior leaders, situational awareness information and logistical resources (in addition to financial resources) proved critical. Clearly, it would be useful to design and form such a team in advance of the next disaster, rather than depending on serendipity and the availability of such diverse personnel.
- **A pre-disaster baseline would be useful, but will likely be unavailable**. As described above, the humanitarian situation in Haiti was grim even before the earthquake. Because humanitarian assessments were not being executed before the disaster in a standardized, comprehensive, and quantitative way, it became impossible to do a meaningful "before vs. after" comparison.
- **Diverse stakeholder goals complicate the indicator/questionnaire development**. The lack of baseline quantitative data contributed to an inability to clearly separate disaster-related problems and progress from longer-term development problems and progress. Ideally, the indicators one would select for a survey would be dependent on whether the consumer of the survey outputs was providing short-term relief or long-term development aid. Disaster response and early recovery phases often overlap. This assessment was designed to focus on short-term relief, but was implemented during a transition from short-term to intermediate and longer-term aid. It might have been more useful had it included questions focused on long-term development aid.

## 7. Conclusions

An adaptable, cross-sector assessment tool was collaboratively developed and implemented in post-disaster Haiti. While its real-time tactical utility in the immediate emergency context proved to be limited, the resulting data and analysis should prove useful to those studying the efficacy of the overall relief effort. The collaborative approach, the specific set of indicators and questionnaire, and the lessons learned could help inform future disaster relief assessment efforts, in Haiti and elsewhere.

Based on our lessons learned, we recommend that:

1. Studies be conducted on how resource allocation decisions were made in initial phases of the Haiti humanitarian relief effort, specifically to determine the role that data from this assessment could or should have played in those decisions.
2. A humanitarian assessment tool that is both succinct and generic, and that has instructions for rapid adaptation rapidly after a disaster, be created. Ideally, the tool would be ready to use within one week after a disaster, including the time required for translation and adaptation to both the specific disaster and the local context.

**Acknowledgments**

The authors wish to thank the following individuals who provided guidance and assistance through the course of the assessment process: Col Peter Vandenbosch, LTC David Hubbard, LTC Paul Hurley, LTC Noel Pratap, LTC James Ware, Lt Col Todd Broyles, Maj Lamar Settlemires, Capt Kristen Cavallaro, Dr. Lise Martel, Esty Sutyoko, Loretta Hieber-Girardet, Daniel Christensen, Dr. Israel Soibelman, Dr. Anjali Sastry, Dr. Richard Garfield, Peter Horjus, Dr. David Stollar, Carol Stollar, Dr. Robert Deresiewicz, Alan McLaughlin, Dr. Jack Thorpe, Dr. Curtis Boylls, Dr. Franz Busse, Richard Byrne, Dr. Amelia Bartholomew and Joseph Zissman.

**References**

[1] United States Geological Survey, http://earthquake.usgs.gov.
[2] United Nations Stabilization Mission in Haiti (MINUSTAH), "Haiti: 6 months after…".
[3] Humanitarian Communication Group (HCG) of United Nations Office for the Coordination of Humanitarian Affairs, Haiti Earthquake Response, 8 January 2011.
[4] United States Agency for International Development (USAID) – Bureau for Democracy, Conflict, and Humanitarian Assistance (DCHA) – Office of U.S. Foreign Disaster Assistance (OFDA), Fact Sheet #63, 16 July 2010.
[5] United States Southern Command, Operation Unified Response: Support to Haiti Earthquake Relief 2010.
[6] USAID Country Profile – Haiti, June 2009.
[7] United Nations Security Council Resolution 1542, 30 April 2004.
[8] United Nations Security Council Resolution 1892, 13 October 2009.
[9] United States Institute of Peace, "Haiti: A Republic of NGOs?", 26 April 2010.
[10] The World Health Organization, The Cluster Approach, Managing WHO Humanitarian Response in the Field.
[11] United States Southern Command, Operation Unified Response: Support to Haiti Earthquake Relief 2010.
[12] Chester W. Richards, "A Swift, Elusive Sword: What if Sun Tzu and John Boyd did a National Defense Review," Center for Defense Information, May 2001, Page 18.
[13] Oxfam GB, "Impact Measurement and Accountability in Emergencies: The Good Enough Guide", 2007, p. 45.
[14] Sphere Project, Humanitarian Charter and Minimum Standards in Disaster Response, 2010.
[15] CDC Summary of Initial Rapid Assessment (IRA) conducted by UN OCHA in Haiti – DRAFT, 19 February 2010.
[16] Tripartite Core Group, Post-Nargis Periodic Review III, January 2010.
[17] McRAM Team, Multi-cluster Rapid Assessment Mechanism (McRAM) in Pakistan, 2009.
[18] Federal Acquisition Regulations, Part 35.017.
[19] U.S. Congress, Office of Technology Assessment, A History of the Department of Defense Federally Funded Research and Development Centers, OTA-BP-ISS-157 (Washington, DC: U.S. Government Printing Office, June 1995).
[20] Sphere Project, Humanitarian Charter and Minimum Standards in Disaster Response, 2010.
[21] Dan Maxwell, et al., The Coping Strategies Index: Field Methods Manual, July 2003.
[22] In preparation.