



Case study in disaster relief: A descriptive analysis of agency partnerships in the aftermath of the January 12th, 2010 Haitian earthquake

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ABSTRACT

This study analyzes the disaster response and recovery efforts following the January 12th, 2010 Haitian earthquake through the eyes of 18 different relief agencies. Focusing on the formation and maintenance of partnerships after the catastrophic earthquake, this paper explores the concepts of cooperation, mutual understanding, and connectivity among agencies responding to the earthquake. The case study is based on results from interviews and interactions with 18 agencies during a month-long trip to Haiti in the summer of 2010. Of the agencies interviewed, it was found that agencies that had no partnerships or presence in Haiti prior to the earthquake were most likely to build new clinics, orphanages, and schools. Additionally, we found that agencies were more likely to develop new partnerships from new contacts rather than dormant contacts. By studying the partnerships between local and international agencies, it was found that their relationships were less stable than partnerships between international agencies. This study hopes to increase understanding and applicability of research in disaster relief networks by providing a new perspective into how agencies work together.

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1. Introduction

On January 12th, 2010 at 4:53 PM, an earthquake measuring 7.0 on the Richter scale struck 13 miles west of the Haitian capital of Port-au-Prince. There were reports of up to 59 aftershocks, each registering greater than 4.5 on the Richter scale, in the 11 days following the earthquake [1]. Official estimates of the death toll range from 200,000 to more than 250,000 people, making the January 12th earthquake the 5th most deadly earthquake in recorded history [1–3]. Estimates by the Inter-American Development Bank put the cost of the damage to the region somewhere between \$8.1 and \$13.9 billion dollars using data from previous disasters to guide their estimates [4]. Different sources of aid, personnel, and funding have poured into the region from around the world in an international effort to respond to the earthquake and give the Haitian people hope for a brighter future.

The size and scope of the disaster in Haiti has attracted much attention from governments and agencies around the world. While there is a great deal of good that can come from individual agency efforts, the importance of coordination between different agencies has been shown to increase agency efficiency [5]. Agencies responding to the earthquake could maximize operational efficiency

by working together to reduce duplicated services and maximize utilization of available resources. Using interviews from a cross-section of agencies responding to the disaster in Haiti, this research aims to identify trends in partnership development and utilization during the Haitian recovery. This paper addresses the following four areas in the context of optimal resource allocation: 1) key dynamics affecting partnership efficiency and logistics 2) trends in partnership development and utilization 3) changes in agencies' level of involvement before and after the earthquake, and 4) common metrics that could be used for agency efficiency assessment.

This paper is organized into 6 sections. Section 2 provides a discussion of relevant literature and provides an analytic framework for this research. Section 3 provides details about the approach for the study conducted in Haiti, while Section 4 provides results of 18 interviews conducted with agencies responding to the earthquake in Haiti acquired during a four-week trip to Haiti. Some case-specific results that provide insight into the dynamics of this particular study are reviewed in Section 5. Finally, Section 6 reviews the key conclusions from the study, as well as enumerating some research topics for further analysis.

2. Literature review

In this section we discuss some relevant literature. Through a discussion of some of the modern literature on disaster relief, we

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provide evidence that this study adds context and greater understanding to knowledge about disaster relief operations by refocusing on the agencies that respond. In this review we explore literature on partnerships between organizations from beginning to end. We also provide new context for the discussion by examining the impact that disasters and relief work can have on such partnerships.

2.1. Interagency cooperation

Interagency cooperation among different responding entities is a critical component of effective response operations. This has been identified as a significant factor in disaster response operations following recent disasters such as hurricane Katrina and the Indian Ocean tsunami [5,6]. Interagency cooperation has also been discussed in work on improving the work of the US military in Afghanistan and Iraq as part of a holistic exit strategy [7]. Despite this factor having been identified in previous research, it has not been well defined or expanded on sufficiently, and a more complete understanding of the dynamics within effective partnerships remains under development. Kapucu's work [8] following the September 11th, 2001 (9/11) attacks in the United States provides significant insight into the functionality of inter-agency partnerships. Additionally, it also identifies a lack of prior communication and a lack of trust as two of the most common reasons for communication challenges. Effective inter-agency cooperation is especially important when there is a severe lack of governmental oversight and regional management [9].

2.2. Common understanding in partnerships

In order for agencies to effectively coordinate their activities, there needs to be a common language and understanding of operational approach, resource allocation, and of an agency timeline. Bryson, Crosby, and Stone [10] state that since conflict will likely occur at some point or another in a partnership, these collaborative efforts are more likely to succeed if mechanisms are put in place early to "equalize power" in the relationship. Wishart [11] noted that agency representatives saw the best partnerships come out of relationships where those involved treated all others as equal rather than subordinate. Mitchell reported that the need for active partnerships has become widely recognized and accepted in the emergency response community [12]. He argued that "Partnerships that are solely marriages of interests are easily sundered by events; those based on something more substantial – like expansive, compelling ideas – are likely to prove more durable [12]." However, the dynamics that help control these partnerships effectiveness has not been previously documented following a major disaster recovery operation. This work aims to provide an extensive case study to explore some the potential trends in how agencies perceive each other during a disaster relief operation.

2.3. Emergent agencies

Studies of other major disasters, such as hurricanes Katrina and Rita, in addition to the 9/11 attacks, provide insight into the dynamics of inter-agency relationships during the response and recovery phases. New agencies are often formed in the wake of a large-scale disaster [9,13], and must be considered by public officials [14] in the development of any holistic response model. Though these agencies have the potential to add more resources or a new perspective in the wake of a disaster, they also vary greatly in terms of reliability and efficiency. They often develop in order to meet some need, which the leaders believe to be unmet [13,14] and are often received with skepticism in the field by older, more

experienced agencies. Mhatre, Wenger, and Prater [15] observed that though emergent agencies are an integral part of the immediate work following a disaster (the response phase), they can just as quickly collapse, failing to survive as a useful part of the long-term recovery. In this study we explore the concept of emergence and expansion of these new agencies to see how they contribute and what kind of partnerships they tend to form.

3. Research objective and approach

The research approach and framework was derived from first-hand information about emergency management practices. Immediately after the earthquake occurred in Haiti, the research team began exploring possible avenues to enter the country to collect data from agencies responding to the disaster. The research team developed a survey and an interview script in partnership with agencies actively involved in the field of emergency management. To collect accurate data on circumstances in Haiti, and develop rapport with responding agencies, a member of the research team went to Haiti. Meeting agency representatives in person and conducting interviews in the field helped to increase research credibility, diversify the types of data shared, and increase the volume of information collected.

3.1. Terminology defined

In order to provide the reader with a consistent lexicon for this paper, this section explicitly defines some of the key words used in our discussion.

- **Agency:** An organization that provides some service or product. In this paper, we use the term generally to reference profit, non-profit, governmental, military, or volunteer organizations.
- **Benefit:** A specific functionality, resource, or methodology available through a partnership. This benefit may be achieved through a single partnership, multiple partnerships, or internally with varying degrees of efficiency.
- **Contact:** Defined in this paper as a loose relationship between agencies or personnel in agencies where no sharing of resources is taking place, nor is any information shared regarding operations, on a regular basis.
- **Cooperation:** Interaction between agencies that does not require sharing of any resources, but provides for increased efficacy in both operations primarily through communication and potentially sharing other information.
- **Disaster Recovery:** The long-term process of removing debris, rebuilding, and returning to "normalcy."
- **Disaster Response:** The initial pouring of supplies and relief and remediating of any remaining hazards from the initial disaster.
- **FBO:** Faith Based Organization. Generally considered a type of NGO with a special focus on a particular religion or belief structure. Churches and other agencies that are established with a specific location-centric focus are not considered International FBOs.
- **NGO:** Non-Governmental Organization. Such agencies are non-profit in the United States and are separate from a for-profit corporation. For this paper we use NGO to mean Non-Governmental Organizations from other countries.
- **Partnered Agency:** An agency that has partnerships in Haiti and provides a service, aid, personnel, or other services to an agency currently active and present in Haiti.
- **Partnership:** A partnership is a relationship that provides information, service, money, or other resources to two or more agencies involved in the partnership.

- **Present Agency:** An agency that has a physical presence in Haiti in terms of personnel, equipment, and/or a facility designed to provide a long-term presence.
- **Unformed Agency:** An agency that did not exist prior to the earthquake. May or may not have contacts with people or another agency in Haiti, but assumed to be immaterial since no agency existed prior.

3.2. Research logistics

Following a month-long period of preparation and contact with several agencies to set up interviews in Haiti, the researcher traveled to the Haitian Capital of Port-au-Prince for a 27 day trip from June 21st to July 18th. The researcher partnered with New Life Orphanage¹ for the duration of the stay in Haiti. The nature of the partnership also allowed the researcher to have a legitimate role in the recovery operation by coordinating logistics for the orphanage. A pastor from the Church of the Nazarene traveled with the researcher for the first week of the trip to assist the researcher in establishing credibility and connecting with agencies in the country.

The researcher interviewed an expanding network of contacts on the ground in Haiti by requesting information from partners and participants. Interviews ranged in length from 20 min to an hour depending on the size of the operation and the number of partners. The researcher traveled to the headquarters of the American response agencies, and their local partners, to meet with directors, public information officers (PIOs), and logistic officers. In addition to the interview, many of the agencies also allowed the researcher to meet officers in their agency and become more familiar with their day-to-day objectives and methods. If individuals were not available to be interviewed during the trip to Haiti, follow up interviews were scheduled.

4. Results

A total of 18 agencies were interviewed about response and recovery operations in Haiti. Data collected included the individual agency's operation, as well as information about partnerships utilized during the course of the recovery. These interviews provided 73 unique perspectives on inter-agency partnerships. Table 1 provides a detailed breakdown of all the types of partnerships documented during the course of the project. Here we discuss some possible inferences from the data on the issues of partnership development, utilization, and functionality by comparing and contrasting the agencies interviewed.

Some interesting results regarding mutual understanding in a partnership were identified by exploring commonalities in the value of partnerships as rated by the agencies involved. With over 73 unique agency perspectives identified (as well as seen in Table 1), the data provides insight into some of the possible trends within diverse partnership types. While over 22 different types of agency-to-agency interactions were documented in the course of this study, the focus, and hence where much of the data was collected, were on the NGOs, FBOs, and local agencies as marked in light grey and dark grey in Table 1, and explored in detail in Table 2. For this discussion, we focus primarily on the characteristics surrounding NGO/FBO partnerships with each other and with local agencies, while using other partnerships to provide additional context and perspective.

Table 1

Partnership Types Documented. The lighter grey boxes highlight the interactions between international FBOs and NGOs, while the boxes highlighted in dark grey are the international-local establishment interactions.

Partner agency type	International establishment	International FBO (11)	International NGO (4)	Local church (2)	Total (18)
International FBO	1	13	0	1	15
International NGO	0	5	6	6	17
International NGO/FBO	0	4	0	0	4
Local church	0	8	2	1	11
Loose international network	0	2	0	0	2
Loose local network	0	1	0	0	1
International business	0	5	0	0	5
Local business	0	2	1	1	4
International governing body	0	1	1	0	2
International military	0	3	0	0	3
International church	0	5	2	1	8
Local government	0	0	1	0	1
Total	1	49	13	10	73

The agencies were categorized as large, medium, and small based on the number of facility locations, number of full-time personnel, and a permanent multi-national presence. Eight small agencies were interviewed, each having one or two physical facilities in the world, and few or no full-time employees. The medium size agencies, of which five were interviewed, had more than two locations and at least some full-time employees but no significant multi-national presence. Large agencies either had multiple permanent physical locations around the world, giving it a large multi-national presence, or an exceptionally high number of permanent facilities in Haiti, defined here as 10 or more.

4.1. General study results

The types of agency partnerships were broken up into four categories in order to identify characteristics unique to each group. The four categories that the data was separated into are:

1. NGO/FBO relationships with other NGO/FBO
2. NGO/FBO relationships with local agencies
3. Local agency relationships with NGO/FBO
4. Other agency partnership

The breakdown of the partnerships into these four groups allowed for a more complete assessment of the main inter-agency dynamics observed (groups 1–3). The “other agency partnership” group is an aggregate of the other types of relationships which were not the focus of our study. For each group, two measures were used to check for consistency within the set of partnerships observed: sole source percentage and activities facilitated.

The first measure used was the percent of partnerships which were the only source of a particular resource. By checking the percent of “sole source” partnerships in each group and comparing that to the total percentage of partnerships which were sole source, we were able to check that each data subset was an adequate representative of the whole group. The four categories of partnership, 1–4 as listed above, demonstrated sole source percentages of

¹ New Life Orphanage is connected with the Calvary Baptist Church of Haiti and cares for 74 kids by providing them with food, shelter, and schooling.

Table 2

The partnerships analyzed were broken up into 4 different groups for further analysis. The first two provides the number of partnerships in each category, while the remaining two rows provide some general results.

Partnership dynamics	International NGO/FBO to international NGO/FBOs	International NGO/FBO to local agency	Local agency to international NGO/FBO	Other agency partnerships
Number of interactions	28	10	7	38
Benefit sole source	43% - Sole source	40% - Sole source	43% - Sole source	38% - Sole source
Activities facilitated by partnership	25% - Construction/Demolition 17% - Medical support 17% - General operation support	50% - Food distribution 30% - Construction	41% - Food distribution 35% - Construction	24% - Housing construction/Demolition 21% - Food distribution 17% - Medical support 14% - Personnel 7% - Commodity

43%, 38%, 40% and 43% (out of 100%) respectively, indicating that the data remained relatively consistent between the different groups.

To ensure that the same types of relationships were being analyzed in parallel. The types of “Activities Facilitated by Partnership” were checked between the different groups to ensure that the same types of relationships were being compared. This second measure was used to check consistency for the international NGO/FBO-local partnerships. As seen in Table 2, the partnerships documented from both the local and international perspective agreed on the primary activities facilitated. Activities which these agencies listed as being significant were food distribution (50%–41% respectively) and construction (30%–35% respectively) for the NGO and local partnerships. These similarities provide sufficient basis to confidently explore these relationships for other trends.

4.2. NGO/FBO perspectives

The light grey shaded area in Table 1 indicates the set of 28 NGO/FBOs used to provide insight into the general dynamics and methodology of NGO/FBO-NGO/FBO relationships. Table 3 provides a breakdown of the specific dynamics of the NGO/FBO relationships and compares the results with the NGO/FBO perspective on local partnerships. The primary goal in the comparison is to identify and examine the elements of these perspectives that make them unique. The individual characteristics of NGO/FBO partnerships were analyzed, followed by a comparison of the NGO/FBO perspective on local partnerships. The International NGO/FBO partnerships documented in the study provide a great breath of information as to the types of services and benefits which could be obtained during a disaster recovery operation. The “Activities Facilitated by Partnership” row enumerates the different benefits

received from partnerships, whether sole-sourced or multi-sourced, providing evidence of the diversity of the overall sample.

The activities performed by the NGOs and FBOs that are facilitated by partnerships with similar agencies, had a low density in activity similarity. The most common activity facilitated through NGO/FBO-NGO/FBO partnerships was construction/demolition at 25%. What's notable about this statistic is it's similarity to the 30% of NGO/FBO-local partnerships for construction purposes. While the other types of activities facilitated by NGO/FBO-NGO/FBO relationships are for the most part disparate, it's important to note that 50% of partnerships with local agencies support food distribution operations.

NGO/FBOs in the study identified alternatives for certain types of relationships more than others, providing insight into the potential permanence of each type of partnership. NGO/FBOs had no known or shared alternatives for 63% of the partnership with other NGO/FBOs on which they rely to make their activities possible. However, NGO/FBOs had clearly defined alternatives for 60% of the partnerships with local agencies. A few of the reasons mentioned during the interviews for this were: 1) insufficient local capacity 2) inconsistent or unreliable service and 3) avoiding local dependence.

When the local and international agencies were in partnership, however, 60% of the NGO/FBOs interviewed had clearly identified alternatives, and 71% of the local agencies did not. It is important to note that the NGO/FBOs interviewed that were in NGO/FBO-NGO/FBO relationships had a similar understanding of partnership permanence as local agencies in local-NGO/FBO partnerships (63% and 71% respectively). It is also interesting to note that the methods of facilitation in local-NGO/FBO partnerships were not very diverse.

While the NGO/FBO partnerships documented did not display any clear trends, in Table 2 under “Key Advantages of Current

Table 3

By comparing the different perspectives of the two agency types in the NGO/FBO-local partnership, we can identify elements that demonstrate the perception of equality in the relationship.

Partnership dynamics	International NGO/FBO to international NGO/FBOs (28)	International NGO/FBO to local agency (10)	Local agency to international NGO/FBO (7)
Benefit sole source	43% - Sole source	40% - Sole source	43% - Sole source
Activities facilitated by partnership	25% - House/Facility construction/Demolition 17% - Medical support 17% - General operation support	50% - Food distribution 30% - Construction	41% - Food distribution 35% - Construction
Methods of facilitation	25% - Transport/Acquisition 21% - Personnel 17% - Funding 17% - Product acquisition 12% - Legitimacy	60% - Network utilization 50% - Personnel issues	57% - Free/Subsidized products 29% - Funding 29% - Personnel
Alternative to partnership	63% - Unknown	60% - Clearly identified alternatives	71% - Unknown
Key advantages of current partnership	17% - Free product/Support	30% - Short-term solution 20% - Low cost/Free	57% - Free/Subsidized products

Partnership,” 30% of partnerships with local agencies were viewed as a short term solution, and 20% as a free or low-cost solution. The specificity by the NGO/FBOs about the key advantages when working with other NGO/FBOs is important because it indicates a greater degree of specialization. The perspective on local partnerships points to much less specialization among local agencies, indicating that such partnerships may not be essential to an NGO/FBO. The low number of NGO/FBOs that planned alternatives in case an NGO/FBO partnership failed and the higher degree of specializations within these relationships indicates that there may be higher degree of communication and understanding in such relationships [8].

4.3. Trends in partnership development and utilization

The data collected in the interviews provided information regarding the initiation, development, utilization, and maintenance of partnerships with different types of agencies. Using the agency state scale of 1–4 as described in Section 2, you can see Fig. 1 explores the changes in agency state in response/recovery operations by comparing the state of each of 18 agencies interviewed before and after the earthquake. In this study we use four different levels of agency involvement before and after the earthquake. These four states are:

1. No contacts.
2. Contacts but no active partnerships.
3. Partnership with agencies actively in Haiti but no permanent agency presence in Haiti.
4. Active/permanent (or more than a brief, temporary period) physical presence in Haiti.

State 1 is the agency extreme of having no connection to the disaster location prior to the particular event. State 4 is representative of the other extreme where an agency has permanently dedicated resources and personnel to work in the region. State 2 was developed using emergency management literature which addressed the impact personal networks have on perspective, policy, and activity during an emergency [9,16]. State 3 was developed to classify agencies that provided funding or other

resources, but did have a permanent presence in the country [17]. All agencies interviewed were considered State 3 or 4 after the earthquake since they were at least involved in the recovery operation following the Haitian earthquake. The main result worth noting from Fig. 1 is that agencies that only had contacts before the earthquake developed a new, active, and permanent presence in Haiti after the earthquake, providing some insight into the best circumstances for relief development.

The reasons are difficult to determine for why agencies would develop new permanent, physical facilities in the country, when they only had contacts in the country prior to the earthquake. The appearance of new agencies after a disaster is a common occurrence and was observed after both 9/11 and hurricane Katrina among others [13,15]. The main reason mentioned by the agencies interviewed was that the organization was acting on information that there were specific, unmet needs in the country. Simo [9] noted a similar phenomenon following hurricanes Katrina and Rita in which the communication of needs allegedly not being met through previously established contacts served as a sufficient motivator for increased involvement. Another possible reason for this development is the high degree of NGO/FBO specialization, which provides ideal conditions for the development of new operations [14].

As seen in Fig. 2, the breakdown of partnerships for the different agencies responding to the Haitian earthquake, shows the importance of actively maintaining partnerships if they were expected to be utilized in recovery operations. While this may be important in response operations, we highlight results that provide insight into what types of connections between agencies were used during the recovery phase of the disaster by the agencies interviewed. The percent utilization of partnerships established prior to the disaster, compared with the percent established after the disaster, shows that dormant contacts make up a small fraction of the partnerships utilized by agencies during the recovery phase.

We here define dormant contacts as other agencies in which resources or information was not being shared before the disaster, and no plan was established for any future cooperation. The minimal utilization of dormant contacts, as visually depicted by the dark grey segments of the bars in Fig. 2, indicates the need for further analysis into the specifics of what types of relationships prior to a disaster are

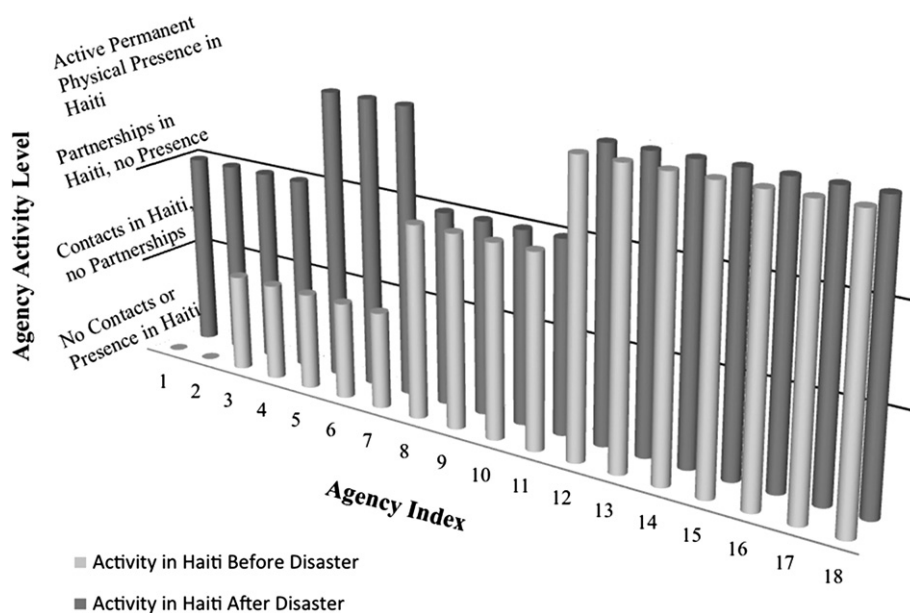


Fig. 1. Level of Agency Engagement in Haiti after January 12th, 2010. The level of agency involvement in Haiti before and after the earthquake compared for agencies at four different states. The agencies are numbered to provide a consistent method of identification without using the names of the participants.

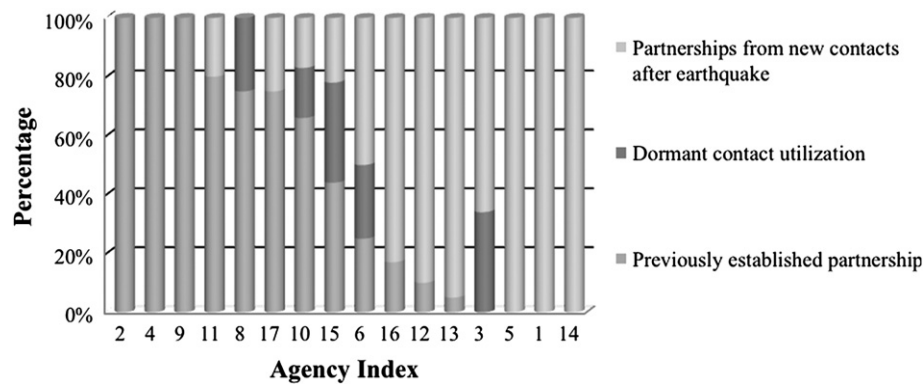


Fig. 2. Breakdown of Partnerships Utilized in Response and Recovery Operation. This chart is lacking agencies 7 and 18 due to inconsistencies with the data provided to the research team about their operations.

actually significant and effective. Partnerships which were active prior to the disaster, or which came out of relationships developed following the disaster, provided the large majority of partnerships utilized by an agency working in emergency recovery operations. This result is supported by previous research that points to the need for emergency procedures to be regularly practiced in order to ensure operation efficiency during an actual emergency or disaster [13]. Before a disaster strikes, it is important for a response agency to have allocated their resources in a way that maximizes the efficiency of the response/recovery operations. The result from Fig. 2 is extremely insightful as to how response/recovery agencies invest their resources. Though it is important to develop a list of contacts with which the agencies are familiar, partnerships did not develop nearly as often from these types of relationships.

It is also important to note that by comparing this result with an agency's state in the country prior to the emergency, we notice some characteristics that may help responding agencies to focus on the best set of partnerships. In order to more thoroughly examine this result, we first looked at changes in an agency's state before and after the emergency (seen in Fig. 1). The four distinct groups provide insight into how new agencies develop active partnerships and presence in a disaster zone. Given that the reasons for development patterns differ between the 4 categories of agencies (1–4 as mentioned above), it makes sense that the method of network development would also prove to be different. In order to provide more complete results, categories 1 and 2 ("no contacts", and "contacts") were combined in Fig. 3 as the light grey bars, while States 3 and 4 are charted as medium and dark grey respectively. Fig. 3 displays a bar chart with a percent breakdown of the agency's utilization of previously existing partnerships. This provides an in-depth look into the types of partnerships that agencies at different states in their "development" rely on when responding to a disaster.

The key feature of the light grey bars in Fig. 3 is the extremes in contact utilization which agencies at States 1 and 2 tended to use in response to a disaster. Agencies at these two states prior to the disaster chose solely to use or ignore agencies with whom a previous partnership existed. This pattern provided insight into how one could use resource allocation to model agencies involved in a disaster recovery operation. The result in Fig. 3 suggests that agencies responding to a disaster may have a natural tendency to develop and maintain specific types of partnerships. Through further research we hypothesize that this tendency could be identified and exploited to improve relief preparation and effort. The concept of developing an optimal mix of partnerships could provide a new approach to helping agencies prepare for, and respond to, a disaster. However, such an approach would be activity dependent due to the different operational requirements of different agency objectives (i.e. building houses vs. community health campaign).

The medium grey bars in Fig. 3 reinforce the conclusion that agencies with partnerships prior to the earthquake rely primarily on established channels for the majority of operations. Instead of attempting to develop new channels or their own operation, agencies operating at State 3 tended to use existing partnerships to continue their operations in the country. Fig. 3 provides clear examples of what types of agencies tend to rely on previously established relationships use this strategy in practice.

Finally, the dark grey bars in Fig. 3 show that a high percentage of partnerships used by agencies that were present in Haiti prior to the disaster were from entirely new contacts. The agency representatives that were interviewed pointed out that they had the infrastructure, network, or resources that could allow other agencies to accomplish their missions more effectively. As a result, other agencies tended to be drawn to them and they were more likely to have a lot of new partnerships. This observation provides a promising look into some of the dynamics that may impact inter-agency partnerships during disaster response and recovery operations.

5. Study discussion and limitations

The results from the interviews were supported by the first-hand experience of the researcher that traveled to Haiti. The subtler dynamics of inter-agency partnerships, and inner-workings of disaster agencies, provided valuable insight into how to design and focus future studies. Additionally, some areas of weakness in the study and interviews are discussed to provide insight into how best future work could be conducted.

The interaction between organizations was facilitated through personal interaction, online connections, and United Nations working groups. Each of these mediums provided assistance to agencies operating in Haiti, and in this study we focused primarily on American aid organizations and their local partners. However, the response to the earthquake includes agencies from around the world. Our research mandate was to focus primarily on gathering insight that impacted American relief operations and how their contact with each other and local agencies adapted to the earthquake relief operation. Future studies may benefit from taking a broader focus on international operations, however there are several challenges in connecting to diverse operations that the scope of our mandate did not provide time to fully develop.

5.1. Study participation

In the course of project and interview development, it was discovered that the Internal Review Board (IRB) required a letter from nationals of every other country to be interviewed prior to the trip. The purpose of the letter was to state that our research questions and

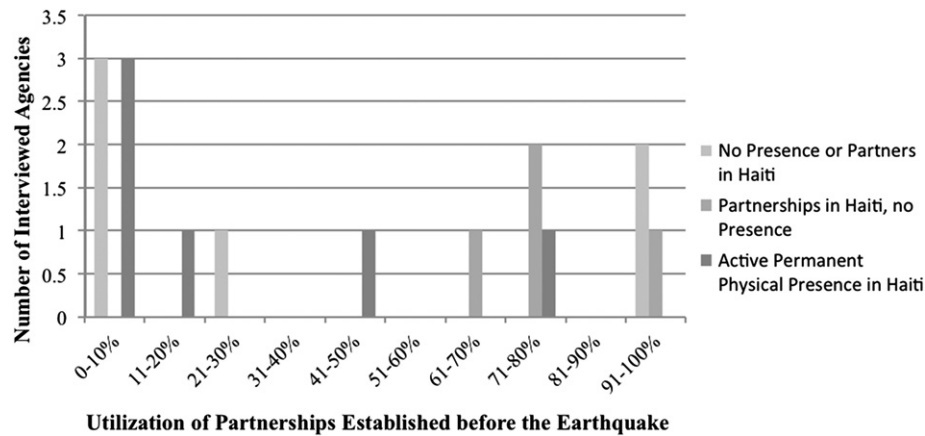


Fig. 3. Utilization of Previously Established Partnerships. This figure uses the data collected from 16 of the interviews (those with consistent partnership data) to correlate the state of an agency prior to the earthquake to their utilization of partnerships afterward. The agencies that had no presence or partnerships in Haiti are represented by the light grey bars; the agencies that had partnerships but no presence in Haiti, medium grey; and the agencies that had an active, permanent physical presence in Haiti, dark grey.

approach would not offend the sensibilities of people from other countries. Since the research team did not have the necessary permission to interview agencies from a large spectrum of countries, we focused on American and American partnered agencies, since they would already be familiar with American culture.

In working with our contacts in Haiti, we primarily interviewed organizations that were willing to share a broad range of information pertaining to their operations. FBO's tended to be more open to working with the research team and flexible with data provision and analysis due to a higher level of trust and common purpose with the research team. Due to the nature of disaster relief operations, and the uncertain circumstances in Haiti following the earthquake, the number of agencies interviewed is too low to provide statistical validity for many of the results taken from the collected data. Thus, we focused on the cross-section of agencies interviewed, highlighting some of the unique dynamics observed and stop drawing broad conclusions from the data obtained.

5.2. Data collection methodology

The initial intent and design for the project was to utilize the contacts of earlier interview participants to develop more contacts by reference. This tactic provided a great deal of credibility for the researcher, and enabled a broader spectrum of data to be collected which was more specific to an agency's operation and capacity. However, agencies that shared information about their partnerships were less likely to provide contact information for their partners or endorse the researcher to other agencies. This factor limited the sample size of the initial study, but provided valuable insight into what types of data could be gathered without shutting off additional contacts. Integration of more focused and simpler lines of questioning into future interviews should allow the network to expand much more rapidly in further work.

The time needed to develop a contact, conduct the interview and receive a response to the follow-up email ranged from 7 to 53 days. While the actual interview time ranged from 20 min to an hour, the total number of hours spent on the contact development process ranged from 9 to 22 h per agency. The quantity of time required to obtain information from a specific agency was affected by factors such as the amount of information each person within the agency could share, the number of times a meeting was required to secure a promise of an interview, and the distance to the operation location. Given the large amount of time needed per agency, collecting data through survey using publically available lists of credible organizations may be

a less time consuming approach, though the amount of information provided will likely be less specific or thorough.

5.3. Data quality

The type, quality, and depth of the data collection during the interviews depended on the size of the agency, the researcher's relationship with the representative, and the sensitivity of agencies about their partnerships. Representatives were much less willing to share any information that could be traced to the agency, and obtaining specific details usually took multiple attempts or shifting the wording of the question to get an answer. Two significant issues that were encountered in data collection were: (1) the agency offering data was too large to store the information on site, hence were required to receive approval from the home office to share information, or (2) the agency was too small to have kept electronic records of purchases and goals met, especially in conjunction with a timetable. Table 4 provides statistics for the different agencies interviewed and the types of data provided.

Of the small agencies interviewed, 75% offered a timeline of activities and 50% actually gave a timeline; however, the timelines that were given covered too few operations (i.e., a single trip) or were incomplete. Despite repeated follow-up emails, these timelines were never supplemented significantly enough to support any detailed analysis. Among the medium sized operations interviewed, 60% offered a timeline of activities, and only 20% of the information provided was somewhat useful. All of the larger agencies offered a timeline, however only 20% of the agencies gave a full timeline, and none of the information provided gave significant insight into their overall operation.

5.4. Metrics for future work

One of the key metrics that was mentioned as being significant to agencies during the interviews was the cost of commodities. The

Table 4

The breakdown of agencies provides insight into how to target future research initiatives to collect data.

Size estimate	Small (8)	Medium (5)	Large (5)
Follow up email necessary	5	3	5
Response to follow-up	0	2	1
Offer of timeline	6	3	5
Timeline given	4	1	1
Useful timeline information obtained	0	1	0

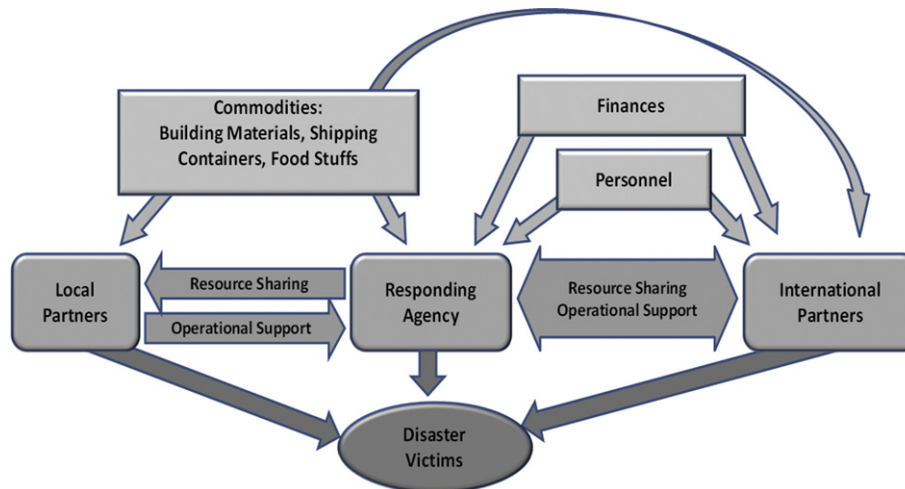


Fig. 4. Commodity Flow Network. The operation and resource support and sharing model framework developed based on the interview results. Light Grey indicates the initial resource input; Grey the partnership network and dynamics; Dark Grey the support of disaster victims and recovery activities.

two commodities that agencies were most willing to share data on were the cost to get shipping containers into the country (one of the key bottlenecks) and the cost to house volunteers. Though agencies shared freely about the cost to construct a single home, these costs differed based on the size, modification and the material cost to construct houses, making this information much harder to compare accurately. Other commodities that were mentioned included transportation costs for trucking, and passenger travel. Though a statistically significant quantity of data pertaining to these issues was not collected during the course of this study, metrics for future inter-agency efficacy assessment could be developed. Fig. 4 was developed from the results of the survey and provides a framework for future work in this area. Fig. 4 demonstrates the flow of resources, as well as some of the major factors affecting partnership development and sustainability.

Building space and time were viewed as finite resources with no active monitoring unless capacity was pushed. The most common perspective on space utilization was to randomly assign until the maximum capacity was reached and then select between competing alternatives only when forced to do so. Though time management was clearly a strong-point of many agencies, any attempt to break-down the time spent was met with confusion or concern by the agency representatives. The use of time for one project was usually seen merely as an inhibitor to doing an alternative activity rather than choice. Additional study into emergency managers' use of time could prove extremely valuable. An in-depth case study on this topic could be an excellent way to identify trends and document how different emergency managers, and agencies, change procedures over time during response and recovery operations.

6. Conclusion

In this study we have discussed results from a broad case study of agencies responding to the 2010 Haitian earthquake. Using data collected during a trip to Haiti and interviews with 18 different relief organizations active in the response, new insight into how these agencies work together was provided. In addition, we have also provided methods and guidance for how future studies could be conducted in this field and what areas might benefit the most from more extensive research. The results of the surveys also provide some questions about whether the commonly accepted trends in humanitarian logistics accurately represent the actual dynamics experienced by agencies responding to large disasters such as Haiti. Interagency relationships have been the focus of

many studies in social science literature, but this study provides a different approach that necessitates further research in the development of more accurate and applied modeling of disaster relief.

In addition, this study provides qualitative input from emergency managers on how to conduct a future study to measure the impact of different partnerships and groups. Using commodity costs, a future study could provide a more accurate method of modeling dynamic resource allocation disaster relief operations. We propose that more complete modeling of responding agencies could be accomplished by delimiting the type, source, and cost, of several key commodities following a disaster, and correlating this data to the partnership composition of responding agencies. Game theory would be a suitable methodology to formally model such partnership [18]. Additionally, more accurate recommendations could be made regarding the optimal partnership mix for agencies entering a disaster. Though time-lapsed data for agency expenditures would prove extremely useful in expanding such a model, any effort to identify trends in emergency recovery operations would likely need direct support from a large agency.

Through improved application of resources and increased knowledge of partnership expectations, managers will be able to develop and maintain better productive and efficient relationships in disaster relief operations. Through the development of models that integrate these new results, emergency managers will be better prepared to respond to future disasters with confidence. It is estimated that it will take Haiti over two decades to recover from the January 12th, 2010 earthquake and return to its previous state. In the complex and interconnected world we live in, helping the large number of agencies working in Haiti, Japan, and other disaster struck countries work together will require an increased understanding of inter-agency relationship dynamics in disaster relief operations.

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Appendix A. Interview Forms*Interview Form A.1*

Interview Data Sheet Overall Agency Information	Agency:	
	Primary Contact:	
	Initial Interview Location/Date:	
Agency Success Metrics:		
Agency Cost Metrics:		
Metrics used for Partnership Assessment:		
Agency Core Competencies:		
Current Bottlenecks/Obstacles in Operation:		Partners to overcome Obstacle:
		Partner: Contact:
		Partner: Contact:
Partners:	Contact:	Reasons/Goal of Partnership

Interview Form A.2

Interview Data Sheet Overall Agency Information	Agency:					
	Primary Contact:					
	Initial Interview Location/Date:					
Total Benefit Cost Calculation:	Costs					Totals
Conversions:						
Agency Benefits:						

Interview Form A.3

Interview Data Sheet Partner Information Sheet		Agency:					
		Partner:					
Partner Location:				Partner Contact:			
Costs		Conversion Unit:		Benefits		Overall Agency Benefits	
Partnership Cost:		C =		Partnership Benefit:		Total Per Benefit:	
Type:	Amount:	Factor:	Total:	Type:	Amount:	Total Costs	Total Benefit
Money		1T = FC					
Time							
Other							
Activities Facilitated by Partnership:				How:			
1							
2							
3							
Alternative Method to Partnership:				Key Advantages of Current Partnership:			

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