

# Utilizing Facebook Application for Disaster Relief: Social Network Analysis of American Red Cross Cause Joiners

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## Abstract

With the exponential growth of Facebook users worldwide, survey researchers have strong interests to understand how these users are leveraging social media to connect individuals and share information with each other. This study explores the phenomenal trend of utilizing a Facebook application called Causes to help users organize into online communities for a specific cause and mobilize their resources for disaster relief during the Haiti earthquake disaster. Two separate samples of 100 joiners each from the American Red Cross (ARC) Cause on Facebook were randomly selected before and after the Haiti earthquake disaster to examine the differences of the composition (i.e., attributes) and structure (i.e., relational ties) of each social network. The social network analysis performed for this research study intends to fill the gap of historical research literature on recruitment to activism and support provision following a disaster in the digital age of the 21<sup>st</sup> century. The results of this study show how understanding the membership size of online communities, salient identity for the cause through organizational affiliations, interpersonal ties among the joiners, density of the network as well as gender diversity can be crucial recruitment factors to leverage for disaster relief efforts. The findings unveil implications on how survey researchers should further explore the beneficial partnership between disaster relief organizations and online social networks in mobilizing their resources for a speedy response to disasters.

**Key Words:** American Red Cross, disaster relief, Facebook Causes, social movement, social network analysis

## 1. Introduction

“As social media becomes more a part of our daily lives, people are turning to it during emergencies as well. We need to utilize these tools, to the best of our abilities, to engage and inform the public, because no matter how much federal, state and local officials do, we will only be successful if the public is brought in as part of the team.” FEMA Administrator, Craig Fugate, addressed the audience including leaders and experts from the government, social media (Facebook), emergency response and the non-profit sectors at the Emergency Social Data Summit on August 12, 2010. This full-day summit signified the increasing attention these organizations have on utilizing social media as the communication tool for future emergencies.

Even though social research has continued to gain momentum in studying online communities, only a very limited number of studies focus specifically on disaster communities formed on the Internet. As a result, researchers are not fully aware of how online social networks can be used to recruit members for social movements or to mobilize its members for disaster relief. The emerging opportunities to study these online disaster communities should also generate interest on predicting recruitment for disaster relief efforts. Moreover, the analytical techniques of network analysis should be leveraged to understand the composition of the networks (i.e., characteristics of the users or the organizations they belong to) and structural properties of the network (i.e., how connected individuals are within the community they join through either interpersonal or organizational ties).

This research study draws on the literatures that have examined recruitment to social movements and social tie activation in a disaster context to guide this research on disaster communities formed online. The ARC Joiners of Facebook's Causes application was chosen given Facebook's versatility to organize a community on its platform. The sample is limited to a random selection of joiners to the ARC Cause during a specific time period. Two separate samples of the ARC Joiners were drawn: one before the January 12, 2010 earthquake in Haiti, and the other after the disaster. In each case, the joiners were randomly selected to study the compositional and structural differences of the two networks as defined by relational ties between the sampled joiners as well as the other causes to which these sampled joiners belong.

## **2. Background**

The Haiti earthquake disaster on January 12, 2010 caught worldwide attention with the magnitude of earthquakes from 6.5 to 7.3 and a death toll of over 230,000 people as estimated by the Haitian government (Associated Press, 2010). The devastation of the earthquake in Haiti generated an outpouring of support for the disaster victims through both conventional and innovative means of fundraising. The advancement of technology offered the general public instantaneous ways to make donations online or by text from their mobile phones, which were the two methods ARC used to collect their donations for the Haiti disaster relief effort. Online social networks such as Facebook and Twitter also played a critical role in raising awareness of fundraising and disaster relief effort. This presents a unique opportunity for social researchers to study how popular social networks on the Internet, such as Facebook, can mobilize their users for disaster relief effort in an online environment.

### **2.1 Recruitment for Social Movements**

One of the most examined research topics on social movements is differential recruitment, i.e., why do some individuals get involved while others are inactive? Some of the individual attributes cited as most correlated to activism are strong attitudinal affinity with the goal of the movement and/or set of grievances consistent with the movement ideology. However, McAdam (1986) indicated the study of social movements in the recent decades pointed to structural availability as being more important than attitudinal affinity in encouraging activism. In fact, McAdam further examined the arguments for the structural perspective by exploring the types of "prior contact" that could make a difference with activism based on the 1964 Mississippi Freedom Summer project.

McAdam found that prior contact with recruitment agent pulls individuals into high cost/high risk activism. The results showed participants belonged to more organizations (average 2.4 vs. 1.9), and they were more connected to other participants. In other words, ideological identification of the movement can lead the individual in the direction of participation and prior history of activism along with integration into the supportive networks can pull the individual into participation.

The focus on network analysis became prominent for the study of recruitment to social movement as increasing evidence indicated the importance of structural factors such as the ties among the social movement organizations to mobilize resources. The ties formed through overlapping membership among these organizations known as “multiorganizational fields” became the focus of the research for Fernandez and McAdam (1988) on the recruitment for the Freedom Summer project. They focused on the effects of the pattern of overlapping memberships in organizations on recruitment at two particular universities (i.e., University of California at Berkeley and the University of Wisconsin at Madison) that participated in the Freedom Summer project. Fernandez and McAdam found there was greater density of organizational overlap among participants, i.e., co-membership of organizations can drive participation (density refers to the number of ties among the individuals as a proportion of the number of possible ties).

## **2.2 Disaster Community & Support Provision**

Contrary to popular belief held by the general public that disasters often lead to looting, social disorganization and deviant behaviors, but instead the communities impacted by the disaster would suspend previous conflicts and unite in providing mutual support to one another. Tierney (2007:510) best summarizes this insight in her extensive summary of the sociology of disaster literature:

“Research accounts emphasized that disasters generate broad consensus regarding the value of life, property, and community and that affected populations are invariably more generous and helpful than during non-disaster times.”

The fundamental characteristic of a disaster community is the social cohesion formed through the feelings of dependency, trust and support of one another for physical and emotional safety which would intensify with the threat of disasters. More importantly, disaster can draw in people who are not directly or physically affected by the actual disaster into the disaster community, i.e., uniting both victims and non-victims.

In 2000, Hurlbert et al. studied support provision during disaster recovery period by examining how social network structures allocated resources for activation in the context of social support. The results showed that a denser core network did increase the ties activated, and these individuals turned to core network ties for informal support in a non-routine situation in both the preparation and recovery phase of Hurricane Andrew. For the effect of the network size, smaller core network ties activated for informal support within a larger core network. For gender diversity, the findings showed that core network with higher proportion of men increased the degree of network ties activated; however if a core network is composed entirely of men then it would decrease the ties activated. Furthermore, the proportion of support providers from within the core network was greater when the core network prior to the disaster had a higher density, was larger in size, and included men and women and kin.

### 2.3 Facebook & Causes

Facebook is arguably the most popular social networking Website today with more than 500 million active users worldwide as of July, 2010 (active users are defined as users who have returned to the site in the last 30 days). Facebook offers users more than 500,000 active applications to play games, interact with friends, or to form individual groups with a specific purpose, e.g., for business, education, entertainment, utilities, etc. Seven of every 10 Facebook users engage in at least one application every month. One of the most popular applications on Facebook is Causes, which is ranked second in its popularity with over 125 million monthly active users as of August 2010. According to the homepage of Causes (Facebook, 2010):

“Causes strive to empower people from all walks of life to have a positive impact on the world in which they live. We allow Facebook users to organize into communities of action focused upon specific issues or non-profit organizations.”

Among the various organizations and groups utilizing this application, one of the most prominent disaster relief organizations to use Causes to reach the masses is the American Red Cross (ARC) with over 64,000 members as of March, 2010. ARC raised over \$35,000 through the Causes application, and has shown steady increase in membership over the years (American Red Cross, 2010).

With the increasing popularity of Facebook, individual activists or organizations have seized the opportunity to mobilize their network of Facebook friends toward a collective cause for disaster victims. This new segment of online disaster community is not well researched at all, and the landscape for disaster communities in the digital age has undoubtedly evolved. The aforementioned literature research findings on recruitment factors for social movement and network characteristics for support provision over the past several decades will guide this research study in demonstrating the changes of disaster communities in the age of online social media.

### 3. Method

The sample of the Facebook members was selected from the ARC Causes “Members” section which listed all the members who joined the cause in real-time. In order to further assess how an actual disaster event may impact the participation of these Facebook members on ARC Causes, a random selection<sup>1</sup> of 100 members out of the 553 total members who joined during a ten-day period before the Haiti earthquake disaster (i.e., between January 2, 2010, and January 11, 2010) and another 100 members out of the 4,386 total members who joined during a ten-day period after the disaster (i.e., between January 12, 2010, and January 21, 2010). In addition, all causes each sampled joiner belonged to were recorded and coded the data into 8 categories (i.e., administrative, animal protection, disaster relief, game, memorial, philanthropy, political, religion and social services). This sampling method allows for comparison of any differences of the social networks of the sampled members before and after the Haiti earthquake.

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<sup>1</sup> The random selection entails using SPSS to randomly select 100 cases out of the all the Facebook members joined the ARC Cause during the specified period. The required data of the randomly selected members from the “Members” section on the ARC Causes page data was then copied and pasted to an Excel spreadsheet.

All the causes collected for each sampled member belonged to ranged from as few as one cause (i.e., the ARC cause) to as many as 118 causes as well as the membership size of the cause. The data on the causes were collected during the time frame of April 14, 2010, to April 18, 2010, which was approximately four months after the Haiti earthquake disaster. The interpretation of results took the following assumptions into consideration: 1) the majority of the causes to which the sampled Facebook members belonged were joined before they joined the ARC Cause; 2) the rate of joining these other causes after they joined the ARC Cause is not significantly different from before they joined the ARC Cause.

## 4. Results

The fundamental data structure of social networks includes two types of variables: compositional and structural. Compositional variables refer to attributes of actors from sources other than the network itself (e.g., how many people joined an organization at a given time? What is the gender of the people in the organization?). Structural variables can be used to measure the ties between pairs of actors (i.e., connection between the actors or the organizations). Depending on the objective of the analysis, these variables are commonly used as measures for social network data.

The first set of research questions for this research is to investigate the compositional differences of the social networks among the Facebook members sampled from the ARC Causes before the Haiti earthquake disaster as compared to after the disaster. Specifically, the following differences between the two samples were examined: 1) the rate of Facebook members joining the ARC Cause; 2) the average number of other Facebook Causes these sampled ARC Joiners belonged to; 3) the average size of the Facebook Causes not related to ARC that ARC Joiners belonged to; 4) the types of Facebook Causes these joiners belonged to and 5) the gender diversity of two samples.

Historically, prior contact is a strong predictor of participation in low cost/low risk activism (e.g., the act of joining a Facebook cause). To study this further with the two ARC samples in the digital age of online social movement, the relational ties (i.e., linkage between a pair of actors) of a one-mode network of ARC Joiners before and after the disaster are used to examine how connected they are. The analysis of the network can start with the number of ties (or connections) among each sample of ARC Joiners. Any differences of how connected they are before and after the disaster can be a potential indicator of heightened recruitment by “prior contact” of the sampled ARC Joiners towards a common cause (based on liberal interpretation of data available).

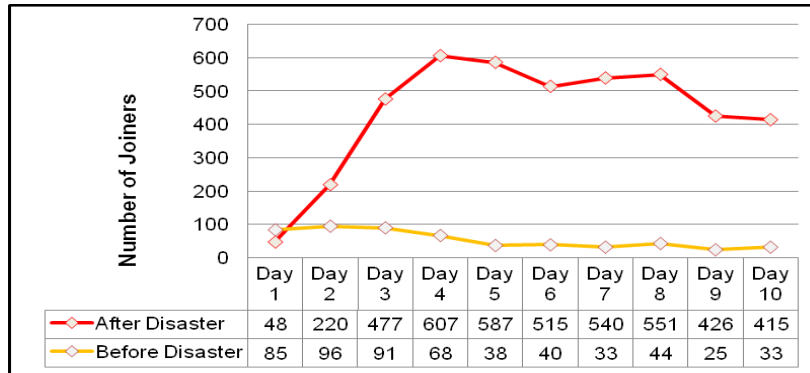
The second set of research questions is to investigate the structural differences of the social network of the ARC joiners sampled before and after the disaster. Specifically, the following differences between the two samples were examined: 1) relational ties of the ARC Joiners and Facebook Causes; and 2) the density of the networks for ARC Joiners and Facebook Causes.

### 4.1 ARC Network Composition: Trend of Joining the ARC Cause

Figure 1 clearly illustrates the drastic increase of Facebook members joining the ARC Cause in the period of ten days after the disaster compared to the period of ten days prior. The average number of joiners of the ARC Cause was 55 per day within the ten days before the disaster, and the average nearly increased tenfold to 439 per day within the ten

days after the disaster. Moreover, the difference between these periods is more than tenfold for Day 4 through Day 10 in comparing the days before and after the disaster. The spike of this trend can be attributed to a variety of influences such as media coverage by the major outlets (e.g., traditional media of television and radio as well as emerging media of the Internet accessible on different platforms). However, the forthcoming findings from the other composition variables also lead to evidence of influences from the members and causes of Facebook mobilizing their resources to recruit others to join the ARC Cause after the disaster.

**Figure 1. Number of Facebook Members Joining the ARC Cause**



**4.2 ARC Network Composition: Organizational Affiliations of ARC Joiners**

Figure 2 illustrates the differences with the distribution of Facebook Causes for the two samples of ARC Joiners. While the differences of the overall average number of Facebook Causes the sampled ARC Joiners belonged to can be considered small or perhaps not meaningful (11.6 Causes before the disaster vs. 12.3 Causes after the disaster), there are clear differences with the joiners before and after the disaster when analyzing the Facebook Causes at the incremental level. For Figure 2, 14 joiners before the disaster belonged to ARC Cause only compared to 8 ARC Joiners after the disaster, suggesting that the ARC Joiners sampled after the disaster were more active in other causes they belonged to other than ARC. Similarly, these joiners sampled after the disaster belonged to more Facebook Causes (i.e., 13 ARC Joiners belonged to 25 or more Facebook Causes) compared to the joiners before the disaster (i.e., 10 ARC Joiners belonged to 25 or more Facebook Causes). The distribution of higher incremental numbers of Facebook Causes the ARC Joiners belonged to can indicate Facebook members sampled after the disaster were more active in disaster relief or philanthropic causes which will be further explored later in this paper.

**Figure 2. Average Number of Causes ARC Joiners Belonged to**

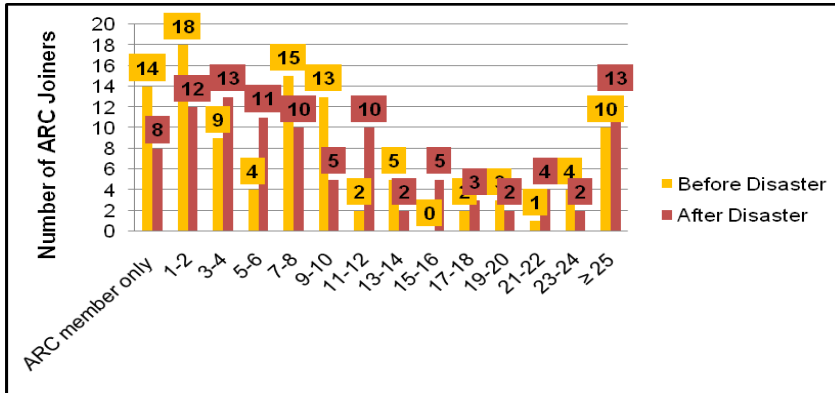
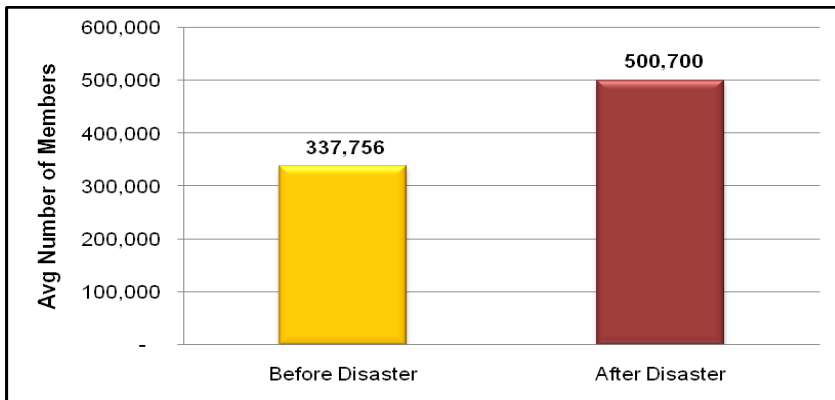


Figure 3 shows the average size of the causes collected from the sampled ARC Joiners. Note the ARC Cause was excluded from the calculation of the average size of causes. There is a sizeable difference of 162,944 Facebook members when comparing the average membership size of causes before and after the disaster (i.e., 500,700 Facebook members after the disaster and 337,756 before the disaster). For the causes that sampled ARC Joiners belonged to before the disaster, the membership size ranged from as few as 6 Facebook members to as many as 6,176,464 Facebook members. Similarly, for the causes that sampled ARC Joiners belonged to after the disaster, the membership size ranged from as few as 1 Facebook members to as many as 6,158,144. While the range of the membership size of the two samples is similar, the drastic difference between the average number of Facebook members can indicate the causes with larger membership size or causes that joined in forces (i.e., bloc recruitment) were more successful in recruiting new members after the disaster by mobilizing their active members to recruit others.

**Figure 3. Average Membership Size of Facebook Causes**

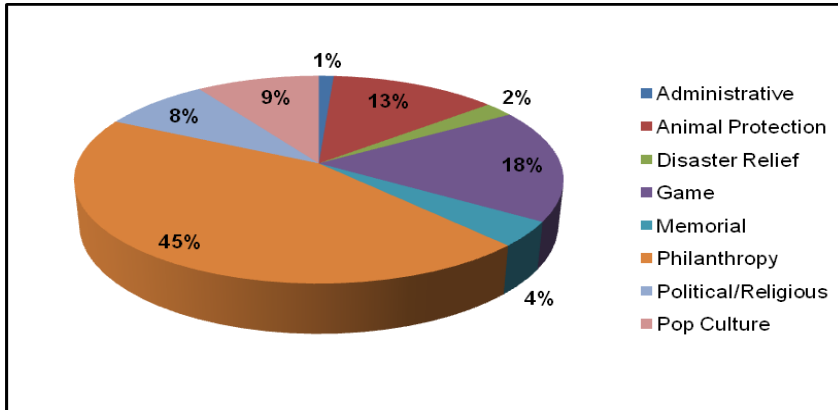


**4.3 ARC Network Composition: Identifiable Recruitment Community**

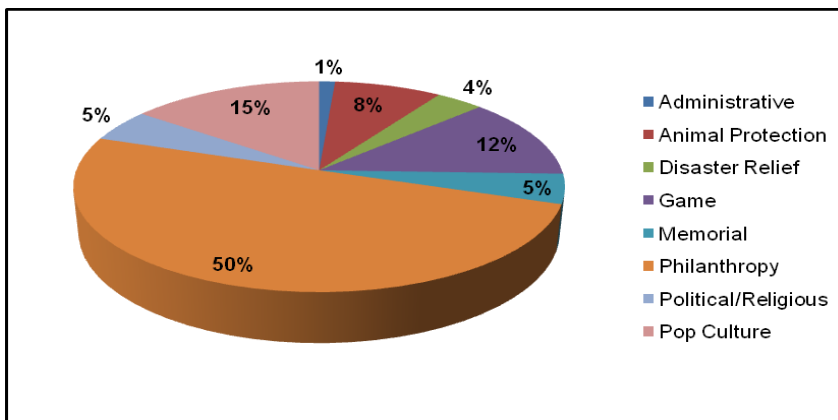
The ARC Joiners sampled after the disaster belonged to almost twice as many disaster relief causes compared to the joiners sampled before the disaster. Figure 5 shows that 4% of the Facebook Causes the sampled ARC Joiners belonged to after the disaster are related to disaster relief (i.e., 24 out of 658 total causes), and Figure 4 shows that 2% of the causes the joiners belonged to before the disaster are related to disaster relief (i.e., 14

out of 614 total causes). Note the number of Facebook Causes coded differs from the original sample size (i.e., 614 vs. 625 before the disaster and 658 vs. 664 after the disaster) due to the fact that a fraction of these causes were disabled since the sample was drawn, so the disabled causes could not be coded and subsequently included in the calculation. Over half of these disaster relief causes are related to the Haiti earthquake such as Feed Hungry Children in Haiti, Help Earthquake Survivors in Haiti, Help Haiti Now !!!, Hope for Haiti Now: A Global Benefit for Earthquake Relief, etc.

**Figure 4. Proportion of Types of Facebook Causes for ARC Joiners Before Disaster**



**Figure 5. Proportion of Types of Facebook Causes for ARC Joiners After Disaster**



In addition to the increase of Facebook Causes related to disaster relief, the causes related to philanthropy also increased from 45% before the disaster (i.e., 273 out of 614 total causes) to 50% after the disaster (i.e., 330 out of 658 total causes). This indicates that ARC Joiners sampled after the disaster were more likely to come from philanthropic causes such as child abuse, diseases/illnesses, domestic violence, environment, military, etc. – the more prominent examples in terms of membership size include A World Without Breast Cancer, Amber Alert on Facebook, Free Postage For All Families of Deployed Military, Society Against Child Abuse, Stop Global Warming, etc. On the other hand, there is a decrease of Facebook Causes related to games from 18% before the disaster (i.e., 108 out of 614 total causes) to 12% after the disaster (i.e., 82 out of 658 total causes). The most popular causes for games by far were related to Farmville, with over 70% of all causes related to games have “Farmville” in the name of the cause both before

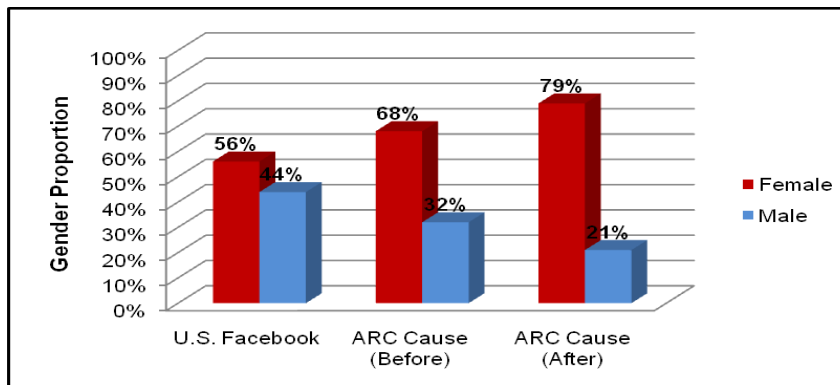


and after the disaster. The diminished share of these causes for games could result from the greater proportion of causes related to disaster relief and philanthropy as these causes were more likely to recruit new ARC members when the salience of disaster relief is heightened by the Haitian episodes.

#### 4.4 ARC Network Composition: Gender Diversity

Interestingly, when comparing the gender composition of the networks before and after the disaster in Figure 6, female joiners of the ARC Cause dominated the sample after the disaster with 79% compared to 21% of male joiners. Moreover, there is an increase of 11% of these female joiners sampled after the disaster when compared with the proportion of female joiners sampled before the disaster (i.e., 68%). The proportion of female joiners of the ARC Cause sampled before and after the disaster also exceeded the proportion of female members of the Facebook population in the U.S. (i.e., 56%) by 12% before the disaster and 23% after the disaster. Historically, the disaster research literature consistently reported men providing more support than women in the event of a disaster. However, this finding may indicate a new trend in the digital age that women are more likely than men to participate in low cost/low risk form of activism on the Internet in providing emotional support rather than physical support.

**Figure 6. Gender Diversity of ARC Joiners**



#### 4.5 ARC Network Structure: Relational Ties of ARC Joiners

According to Table 1, there was greater number of relational ties, i.e., linkage between pairs of ARC Joiners after the disaster compared to before the disaster. For ARC Joiners with more than one Facebook Cause in common, there were 2,614 ties (i.e., 1,307 dyads or pairs of actors with ties between them) after the disaster compared to 2,114 ties (i.e., 1,057 dyads) before the disaster. There were also consistently more linkages after the disaster for ARC Joiners with more than four Facebook Causes in common after the disaster. Moreover, 22% ( $22/100 = 0.22$ ) of the ARC Joiners sampled before the disaster had no relational tie to other ARC Joiners outside of the ARC Cause itself (i.e., isolates) compared to the 12% ( $12/100 = 0.12$ ) isolates sampled after the disaster. Note that 8 out of the 22 isolates in the sample before the disaster belonged to more than one cause but only had a relational tie to other sampled joiners through the ARC Cause only. The remainder of the isolates did not belong to any other causes other than the ARC Cause. Similarly, note that 4 out of the 12 isolates in the sample after the disaster belonged to more than one cause but had a relational tie to other sampled joiners through the ARC Cause only. The remainder of the isolates did not belong to any other causes other than the ARC Cause.

**Table 1: Relational Ties of ARC Joiners Before and After Disaster**

<b>Relations</b>	<b>Ties</b>	
	<b>Before</b>	<b>After</b>
<b>Isolates</b>	22	12
<b>&gt;1 relation</b>	2114	2614
<b>&gt;2 relations</b>	882	1062
<b>&gt;3 relations</b>	430	476
<b>&gt;4 relations</b>	202	218

These results indicate the ARC Joiners were more connected to each other after the disaster compared to before the disaster which may be attributed to heightened recruitment efforts by prior contacts for these ARC Joiners. It should be acknowledged, however, that other factors such as attitudinal affinity for disaster recovery, constant media coverage of the disaster, etc. may also increase the connection among the ARC Joiners.

#### **4.6 ARC Network Structure: Relational Density of ARC Joiners**

Network density, measured by the number of ties among the actors as a proportion of the number of possible ties, can provide an index of the degree of dyadic connection in a population. For example, information about network density can be leveraged to assess the speed at which information can be shared within the network based on how connected the actors are. For the samples of the ARC Joiners before and after the disaster, the density of the network can contribute to how quickly existing ARC members recruit others to join the ARC Cause.

The most dense relation in the two samples is among the ARC Joiners after the disaster. The density for the network with ARC Joiners after the disaster is consistently higher for the four levels of relations detailed in Table 2. The density for ARC Joiners with more than one Facebook Causes in common after the disaster is 0.26 ( $1,307/4,950 = 0.26$ ) compared to 0.21 ( $1,057/4,950 = 0.21$ ) for ARC Joiners before the disaster. This indicates that 26% of all possible ties are present for the sample after the disaster compared to 21% for the sample before the disaster. The gap of the density between the two samples becomes closer for ARC Joiners with more than four Facebook Causes in common after the disaster ( $109/4,950 = 0.022$ ) compared to before the disaster ( $101/4,950 = 0.020$ ).

**Table 2: Relational Density of ARC Joiners Before and After Disaster**

<b>Relations</b>	<b>Ties</b>	
	<b>Before</b>	<b>After</b>
<b>&gt;1 relation</b>	0.21	0.26
<b>&gt;2 relations</b>	0.09	0.11
<b>&gt;3 relations</b>	0.04	0.05
<b>&gt;4 relations</b>	0.02	0.02

The density for the entire network of ARC Joiners after the disaster is 1.48 compared to the network of ARC Joiners before the disaster of 1.41 (including the ARC Cause in the

calculation of density). Unlike the density referenced previously on the proportion of ties present in a dichotomized matrix at a specific cut point (of relational ties), the density referenced here indicates the average number of common organizational affiliations in each 100 X 100 matrix of sampled ARC Joiners.

#### 4.7 Facebook Network Structure: Relational Ties of Facebook Causes

Contrary to the networks of the ARC Joiners, there were more relational ties, i.e., linkage between pairs of Facebook Causes before the disaster compared to after the disaster according to Table 3. For the Facebook Causes with more than one ARC Joiner in common, there were 3,348 ties (i.e., 1,674 dyads or pairs of causes with ties between them) before the disaster compared to 2,344 ties (i.e., 1,172 dyads). Given that the network of Facebook Causes (excluding the ARC Cause) before the disaster was slightly smaller than the network after the disaster (625 vs. 664), this could increase the chances of connection between pairs of causes for the network before the disaster since the sampled ARC Joiners had a smaller pool of causes to share. There were also consistently more linkages before the disaster for Facebook Causes with zero to three ARC Joiners in common after the disaster. Moreover, only two out of all the Facebook Causes before the disaster had no relational tie to other causes compared to the three isolates after the disaster. The minimal number of isolates for Facebook Causes can indicate most of these causes are connected to each other one way or another.

**Table 3: Relational Ties of Facebook Causes Before and After Disaster<sup>2</sup>**

Relations	Ties	
	Before	After
Isolates	2	3
>0 relation	38,420	31,964
>1 relations	3,348	2,344
>2 relations	682	594
>3 relations	228	206

#### 4.8 Facebook Network Structure: Relational Density of Facebook Causes

The most dense relation in the two samples is among the Facebook Causes before the disaster. There is smaller difference for the density of the networks with Facebook Causes before the disaster at each of the four levels of relations detailed in Table 4 compared to the causes after the disaster. The density of the Facebook Causes with more than one sampled ARC Joiner in common before the disaster is 0.0085 ( $1,665/195,000 = 0.0085$ ) compared to 0.0053 ( $1,172/220,116 = 0.0053$ ) for ARC Joiners sampled after the disaster. This indicates that 1% of all possible ties are present for the network of causes before the disaster compared to less than 1% for the network of causes after the disaster. The gap of the density between the two samples becomes less significant for the networks of Facebook Causes with more than two or three Facebook Causes in common.

<sup>2</sup> The ARC Cause was excluded from the calculation of the relational ties of Facebook Causes.

**Table 4: Relational Density of Facebook Causes Before and After Disaster<sup>3</sup>**

<b>Relations</b>	<b>Ties</b>	
	<b>Before</b>	<b>After</b>
<b>&gt;0 relation</b>	0.0985	0.0726
<b>&gt;1 relations</b>	0.0085	0.0053
<b>&gt;2 relations</b>	0.0017	0.0014
<b>&gt;3 relations</b>	0.0005	0.0005

The density for the entire network of Facebook Causes before the disaster is 0.1159 compared to the network of Facebook Causes after the disaster is 0.0858 – this indicates the overall network of Facebook Causes before the disaster is more connected which can potentially be more influential in recruitment dependent on how active their members may be. Again, the density referenced here indicates the average number of common ARC Joiners in each 625 X 625 or 664 X 664 matrixes of Facebook Causes that ARC Joiners belonged to.

## 5. Conclusions

In order to fill the gap of research on the relational ties and density of the disaster communities organized through the social networks online, the analyses from this research presented empirical evidence of unique differences of the Facebook members joining the ARC Cause (an online platform for disaster community) before and after the Haiti earthquake disaster. The results from this research are not directly comparable to the research findings from McAdam et al. on social movement analysis or Hurlbert et al. on utilizing networks for social resource provision in the context of a disaster, but they do provide insights into the predictors of successful recruitment to social movements, specifically disaster relief efforts, based on network composition and structure.

### 5.1 Network Size Does Matter

Comparing the sampled joiners of ARC Cause before and after the Haiti earthquake disaster reveals that the average membership size of the Facebook Causes that sampled joiners belonged to after the disaster is 48% greater than before the disaster (500,700 members after the disaster compared to 337,756 members before the disaster). This finding indicates the Facebook Causes with larger membership sizes can potentially be more successful in mobilizing their resources to recruit other Facebook members to their cause. Additionally, analyzing the distribution at the incremental level reveals that the sampled joiners after the disaster also belonged to more Facebook Causes than they did before the disaster. As illustrated in Figure 2, 41% of the ARC Joiners sampled after the disaster belonged to 11 or more Facebook Causes compared to only 27% of the ARC Joiners sampled before the disaster.

This is consistent with the findings of McAdam (1986) who reported that participants of the Freedom Summer project (high cost/high risk form of activism) had a greater number of organizational affiliations than the non-participants (i.e., those accepted to the project but later withdrew). As these analyses reveal, Facebook members who joined the ARC

<sup>3</sup> The ARC Cause was excluded from the calculation of the density of Facebook Causes.

Cause (low cost/low risk form of activism) after the disaster may share similar characteristics in support of a specific cause.

### **5.2 Linkage Between Identity and Action**

The sampled joiners of ARC Cause after the disaster belonged to twice as many Facebook Causes related to disaster relief than sampled joiners before the disaster (4% of Facebook Causes related to disaster relief after the disaster compared to 2% before the disaster). Similarly, the ARC Joiners sampled after the disaster also belonged to more Facebook Causes related to philanthropy than sampled joiners before the disaster (50% of Facebook Causes related to philanthropy after the disaster compared to 45% before the disaster). For the Freedom Summer project, McAdam and Paulsen (1993) also reported the participants not only belonged to more organizations but ones such as civil rights organizations, teacher associations, etc. – the Facebook members who joined the ARC Cause after the disaster can also be compared in the same vein in linking their identity with action through salience of organizational affiliations.

### **5.3 Mobilizing Women Online for Support Provision**

Among the sampled joiners of the ARC Cause, women dominated the network after the disaster by a ratio of four to one, compared to a ratio of three to one before the disaster. The Haiti earthquake disaster “pulled” substantially more women to the social networks online for support provision, a finding that is contrary to the results of past research on differential participation in disaster communities and the results of Haines et al (1996), who reported that higher proportions of men provide support in disaster relief compared to women. It is likely that women can now leverage online social networks to provide informal support of disaster relief efforts, something that was not possible in the physical sense prior to the popularity of social networks online. In fact, Figure 6 shows the differential participation of women over men in the general population of Facebook in the U.S. (56% women compared to 44% men). The disaster pulled an even greater proportion of women into disaster relief networks, with 68% of women joining the ARC Cause before the disaster and 79% of women joining after the disaster.

### **5.4 Stronger Effect of Interpersonal Ties for Recruitment**

The sampled joiners of ARC Cause are more connected to each other after the disaster than the sampled joiners before the disaster. When analyzing the relational ties of the ARC Joiners after the disaster at the incremental level, they consistently have more relational ties from greater than one relation to greater than four relations as detailed in Table 1. However, when analyzing the relational ties of the Facebook Causes before and after the disaster, the causes before the disaster consistently have more relational ties from greater than one relation to greater than four relations as detailed in Table 3. This indicates a heightened (or more effective) recruitment through activating interpersonal ties among ARC Joiners sampled after the disaster rather than organizational ties among Facebook Causes. Since there is a slightly higher number of Facebook Causes that sampled joiners belonged to after the disaster compared to before the disaster (664 Facebook Causes after the disaster compared to 625 before the disaster), this could potentially impact the number of relational ties to consider in the calculation.

### **5.5 News Travels Faster in a Dense Network**

The sample of ARC joiners after the disaster has a greater density of relational ties at each incremental level compared to the joiners sampled before the disaster. According to Fernandez and McAdam (1988), the density of a network can predict participation, and

moreover, the density of a network can offer insights into the speed of information diffusion among its members. This suggests that ARC Joiners may be recruited faster after the disaster as a result of their participation in a denser network with more joiners connected to each other. On the other hand, the Facebook Causes of the ARC Joiners before the disaster has greater density of relational ties at each incremental level (though the differences become more minimal with the higher level of increments). This should also take into consideration the higher number of Facebook Causes in the sample after the disaster as discussed in the previous section.

This study was conducted in hopes of offering insights to emergency response organizations such as the American Red Cross on tailoring their recruitment effort of activists and expediting the mobilization of readily available resources (in particular online) for emergency assistance in a moment's notice. While the findings from this thesis research may not be directly comparable to the historical findings cited in the literature review, the differences between the two samples selected before and after the Haiti earthquake disaster are mostly consistent on recruitment factors based on number of organizational affiliations, linkage to identifiable recruitment communities, interpersonal ties and density of network. There is also unique distinction for highly differential participation of female Facebook members joining the ARC Cause compared to historical support for stronger male presence in the disaster community.

The data collected for this study can be considered more observational than self-reported (except for the gender of the ARC Joiners was self-reported from their Facebook profile). A follow-up study to further explore the motivation to participate (such as attitudinal affinity, personal relations or organizational affiliations) and other attributes (such as age, education, income, etc.) can confirm the conclusions based on the observational data. Another limitation is the data collection period of the attributes and organizational affiliations occurred after four months (April 14, 2010 to April 18, 2010) when the Facebook members first joined the ARC Cause in January, 2010. Their organizational affiliations for other Facebook Causes they may have joined after they joined the ARC Cause may differ from when they first joined the ARC Cause. Unfortunately, there was no way to differentiate the causes joined after becoming an ARC Joiner compared to before they joined the ARC since the date on which they joined is not indicated by the Causes application on Facebook.

Given the wealth of administrative data available through Facebook, future research can explore how the larger Facebook Causes may join forces in mobilizing their resources in recruiting others for disaster relief effort (i.e., bloc recruitment). Another area to explore further is how "Cause profiling" (i.e., targeting the Facebook members belonging to greater proportion of disaster relief or philanthropic causes) may be leveraged as the stronger ties in recruiting others to join their cause. This can potentially maximize the effort for disaster relief organization to mobilize their resources for recruitment in the event of a disaster. Furthermore, knowing that information can spread quicker in a more dense network, fundraising effort can also be targeted to these Facebook Causes in order to raise donations needed for disaster victims in a speedy manner. Although this research only scratched the surface of the data mining opportunities possible with observational data alone, it does reveal encouraging findings of a beneficial partnership between emergency response organizations and online social networks working towards a common cause of helping to rebuild the lives of disaster victims.

## References

- American Red Cross (2011). Social Media Grows Up – Red Cross Emergency Social Data Summit. Retrieved from <http://www.redcross.org/portal/site/en/menuitem.1a019a978f421296e81ec89e43181aa0/?vgnextoid=fa532b019666a210VgnVCM10000089f0870aRCRD>.
- American Red Cross. (2010, April 17). Facebook Causes Homepage. Retrieved from <http://www.causes.com/causes/397>
- Associated Press (2010, February 10). Haiti Raises Earthquake Toll to 230,000. The Washington Post. Retrieved from <http://www.washingtonpost.com/wp-dyn/content/article/2010/02/09/AR2010020904447.html>
- Facebook. (2010, March 5). Application Directory. Retrieved from <http://www.facebook.com/apps/directory.php>.
- Fernandez, R. & McAdam, D. (1988). Social Networks and Social Movements: Multiorganizational Fields and Recruitment to Mississippi Freedom Summer. *Sociological Forum*, 3, 357-382.
- Haines, V., Hurlbert, J., & Beggs, J. (1996). Exploring the Determinants of Support Provision: Provider Characteristics, Personal Networks, Community Contexts, and Support Following Life Events. *Journal of Health and Social Behavior*, 37, 252-264.
- Hurlbert, J., Haines, V., & Beggs, J. (2000). Core Networks and Tie Activation: What Kinds of Routine Networks Allocate Resources in Nonroutine Situations? *American Sociological Review*, 65, 598-618.