

Tracking Disaster Response and Relief Efforts Following the 2015 Nepal Earthquake

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Abstract—It has been more than one year after the April 2015 Nepal Earthquake. Various kinds of support and aid flooded into the affected region, from within the entire country and from international community, with extensive media coverage and billion of dollars raised in support of relief/recover efforts. This paper presents analysis of various datasets related to this disaster, including a GDELT dataset, showing the rise and fall of people’s attention to this event. In addition, financial transaction flows reveal a lot about sources of funds and donations, flow of funds among various organizations or sources, and how these funds and donations have been spent or utilized for relief and recovery efforts. Available data based on surveys from citizens in affected areas along with the reconstruction dataset help capture and explain the efforts that the international and local organizations and governments have put on the post-earthquake relief, and its effectiveness.

Keywords—disaster management, disaster response, disaster relief, news media tracking

I. INTRODUCTION

The massive Nepal earthquake that occurred on April 25th, 2015, has caused severe damage to Nepalese villages and housing construction, while incurring a huge human tragedy. There was significant support from the global community as well as immediate aid and assistance from both international and local entities. However, with rapidly decreasing attention to the relief and recovery efforts because of the distractions from geopolitical activities related to the release of the constitution and the blockade of the border on the south of Nepal, supervision and reconstruction efforts slacked off in few months [1]. Although there was huge support from many countries and international as well as local organizations, and the border crisis has been long over now, recovery has been very slow. There are many datasets available from a range of sources that have recorded various aspects of this disaster and its fallout since after the earthquake. In this work-in-progress paper, we present a snapshot of the post-earthquake response and relief activities from various datasets.

In this study, we first analyze news reports available to assess public reactions towards the earthquake, showing how people’s attention surged high and then rapidly declined. Then we analyze the data related to funds and donations collected for supporting relief and recovery efforts around the world by various organizations. We also analyze how the Nepalese government dealt with the earthquake. Our analysis is based on various categories of aid along different time periods. Lastly, we compare several datasets to synthesize a more complete

picture of the relief and recovery efforts from different sectors, and also assess the current status of the recovery efforts based on reports from the citizens’ survey [2].

II. DATA COLLECTIONS

A. GDELT Dataset

The goal of the Global Database of Events, Languages and Tones project, or in short the GDELT project [10], is to monitor and share global media news about events around the world to the public. The dataset is machine-coded by the Textual Analysis By Augmented Replacement Instructions (TABARI) system and receives daily updates from thousands of news articles. It collects and stores the type, people, countries and other 57 features of the events. Especially, it tries to capture the prevailing tone in the news reports that reflect emotion and intensity of feelings in the language used; this feature helps explore a new aspect of digital analysis. The GDELT event database includes 250 million entries with each entry capturing two actors and the action performed by one actor to the other. The attributes of the two actors (i.e. Name, Country, Type, etc.) and the category of actions (i.e. Provide aids, Appeal, etc.) enable us to analyze the interactions among the international and domestic actors.

B. Open Nepal

Open Nepal [9] is a platform for sharing data related to Nepal. The flow of funds and donations at both local and international levels after the April 2015 Nepal earthquake and its aftershocks¹ have been recorded as a transaction dataset that captures economic aid provided to local Nepalese organizations.

Also, months after the Nepal earthquake, six rounds of surveys [2] were conducted by the Mobile Citizen Helpdesks [4] in earthquake affected areas to track public opinion about earthquake relief and reconstruction efforts. It shows how the disaster recovery efforts progressed over time based on citizen feedback that indicates citizens’ biggest perceived problems, concerns, needs, satisfaction, etc.

C. Humanitarian Data Exchange (HDX)

In order to track the progress of the recovery from the Nepal earthquake, we use the Housing Recovery and

¹<http://earthquake.opennepal.net/transaction>

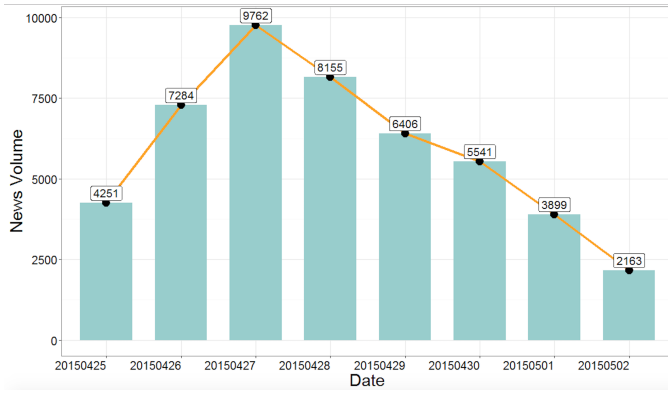


Figure 1: Daily news coverage level

Reconstruction Platform Who’s Doing What Where (HRRP 4W) [8] dataset that recorded housing reconstruction activities. It receives in timely manner information about the affected districts and involved organizations, and the current progress. The progress information indicates the current stage of the efforts such as: planning, ongoing, or completed stage.

III. ANALYSIS

A. Public Response in News Media

1) *News Coverage*: Both media and organizations reacted very quickly to the Nepal earthquakes. Figure 1 shows the news coverage of the earthquakes in the media. We see that there was a sudden surge especially on April 27th. The news coverage then quickly faded over the next 72 hours. Figure 1 suggests that people’s attention increased sharply right after the disaster but after three days, it faded away.

2) *Event Types of Daily Actions*: Using the news volume data, we attempted to capture how different organizations or other actors participated in the earthquake response and relief efforts within the first 8 days. These are determined based on the “Actor” field in the GDELT dataset. The event types and volumes have been plotted in Figure 2. The figure shows the daily proportions of event types indicated by colors. The types of events include “appeal,” “express intent to cooperate,” “engage in material cooperation,” “yield,” “fight,” etc. From the figure we can see that three of the 19 event types dominate in the barchart: dark green, red, and light blue, corresponding to eventcodes 1, 4 and 7, respectively. in GDELT dataset. The three types of events are further described below.

Eventcode 1 refers to public statements made about the event, mostly by the government. Eventcode 4 refers to diplomatic events such as visits or hosting visitors, or discussions over the telephone. In the beginning, most of the events were about public statements made and diplomatic conversations, and after four days, the proportions of these events declined. Eventcode 7 refers to the addition of aid, which mostly occurred within 72 hours after the earthquake. The frequency of this type of events decreased at a slower rate than those of the other two types of events, indicating the importance of aid after a disaster.

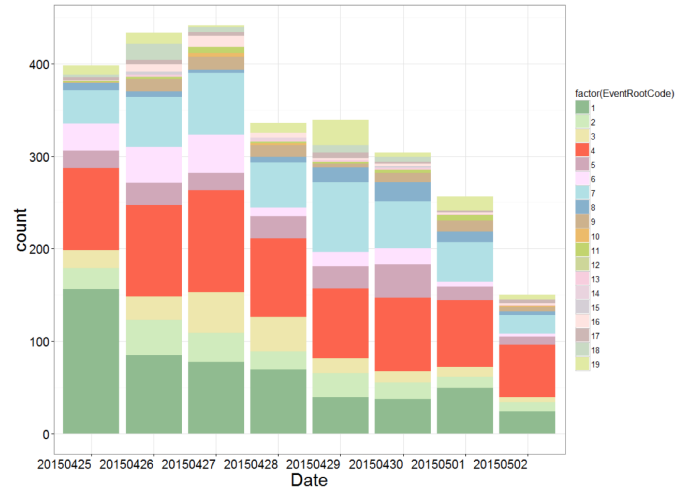


Figure 2: Interactions among local actors within Nepal

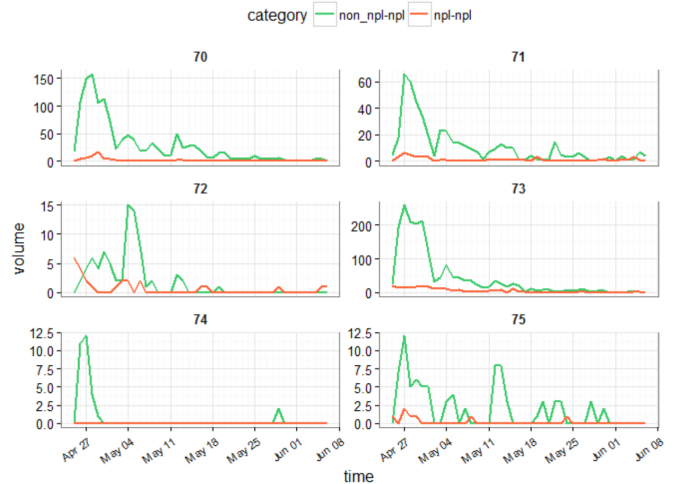


Figure 3: International and national support trends over time for each eventcode

B. International and Domestic Support

1) *Daily Records of International and Domestic Aid based on the GDELT Dataset*: Governments and various organizations were engaged in dispatching rescue workers and delivering relief supplies immediately after the earthquake. GDELT dataset shows five types of aid, including “general aid” (70), “economic aid” (71), “military aid” (72), “humanitarian aid” (73), “from military and peacekeeping groups” (74), and “Grant asylum” (75). Figure 3 shows the change of both international and national aid in quantity over time for each category. We denote by *non_npl-npl* the international aid, and by *npl-npl* the aid from/within Nepal.

Figure 3 shows the biggest spikes on April 27, except for the military category. For the military aid (72), the spike appears on May 4. It indicates a slight delay in the arrival of military aid compared to that of others; this may be because of the issues related to airport management and use [5]. Most of the aid was provided by the international community, including several countries and international organizations, suggesting global attention to the disaster. We see that on April 25, the

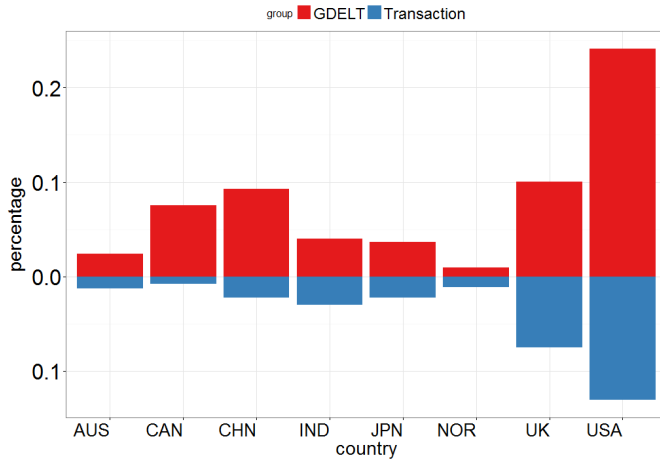


Figure 4: Comparison of donation records from GDELT and Open Nepal datasets.

red line is above the green line – this indicates that before the arrival of the external military aid, news media attention was on Nepal’s military units involved in the rescue efforts. A small spike on May 12 corresponds to the second significant earthquake of magnitude 7.3 that occurred on May 12.

Note that international economic aid and humanitarian aid make up a large proportion of the total aid received. So we take a closer look at the economic aid by analyzing the related data.

2) *Comparison of Donation Records from GDELT and Open Nepal:* We compare the GDELT dataset with the transaction dataset in terms of the economic aid to Nepal. In the GDELT dataset, economic aid code is 71; we extracted these records and then grouped the records by country. Here we select eight main countries, namely, Australia (AUS), Canada (CAN), China (CHN), India (IND), Japan (JPN), Norway (NOR), United Kingdom (UK) and United States (USA); We calculated each country’s proportion of contribution among all the economic aid events. Similarly, in the transaction dataset, we group the country records. Figure 4 show the comparison of economic aid from each country based on the two datasets. The upper red bars represent the country proportion derived from GDELT data and the blue bars represent the proportion from the transaction data.

From Figure 4, we see that United States and United Kingdom are the two of the main providers of economic aid, and are also the major donors; these two countries also appeared in most of the news reports. The figure shows that the GDELT dataset is consistent with the transaction dataset. This suggests that the top donor countries also dominated the news media attention. However, the data indicate that some countries like China and Canada appeared more in news reporting but their donations were comparatively smaller. A possible explanation found in data is that these countries pledged to contribute initially but have not completed their pledges.

3) *Monthly Changes of Targeted Sectors for Donations:* In the transaction dataset, each funding entry also specifies the sector the funds would be used for, enabling us to track the use of the funds during reconstruction. We plot the top

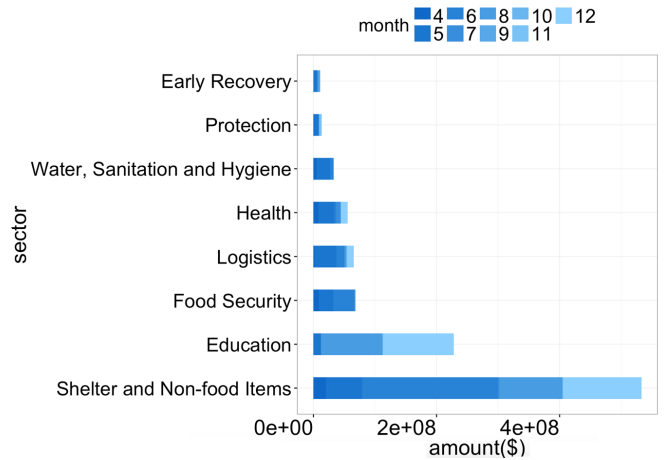


Figure 5: Donation amounts received by Nepalese organizations for use in various sectors.

8 active sectors that received more funds in the period from April 25 to December 28, 2015. We denote by light blue the month of December, 2015, which is around 7 months after the earthquake. And we denote by dark blue the month of April, 2015. From Figure 5, we can see that more than 0.5 billion US dollars was collected for building shelters and non-food items. Long and short term shelters have been indicated as one of the biggest problems or concerns by the citizens in the affected areas.

Based on how the Nepalese government and organizations distribute funds, they gave priority to settling down the victims with relief supplies, medical aid after the earthquake. As schools play a vital role in helping earthquake affected children, teaching them how to stay safe and healthy, the Nepalese government put a significant effort in minimizing disruption in education [7].

4) *Donation Progress for Different Organizations:* Four transaction types are listed in the transaction dataset. They are: pledge², disbursement³, commitment⁴ and expenditure⁵ [3]. From both GDELT and Open datasets, we see that many countries and organizations committed economic aid after the occurrence of the earthquake. However, what has been received appears to be much less than what was pledged. We show the 10 most active donation entries, and plot donation amounts in pledged, disbursement and commitment for different international actors in Figure 6. We find that some donors have not completed their pledges. Asian Development Bank (ADB) is also an active actor in GDELT dataset. The amount it pledged is far more than it has given. World Food Programme (WFP) donated directly without making a pledge. Some donors seem to have delayed to donate due to corruption and political instability issues [6]. For Nepal earthquake, the three billion

²Pledge: a pledge is a non-binding announcement of an intended contribution or allocation by the donor.

³Disbursement: disbursement are funds that are placed at the disposal of a recipient organization. In order to avoid double-counting only the disbursements of primary providers are aggregated in the summary section.

⁴Commitment: a commitment is the creation of a contractual obligation regarding funding between the donor and appealing organization/recipient.

⁵Expenditure: expenditures are outgoing funds that are spent on goods services within projects.

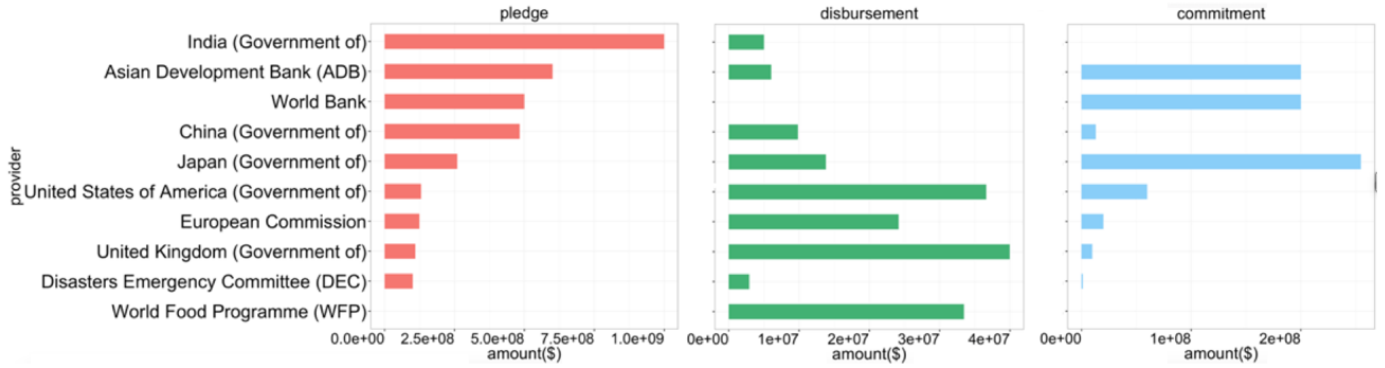


Figure 6: Transaction type over different organizations

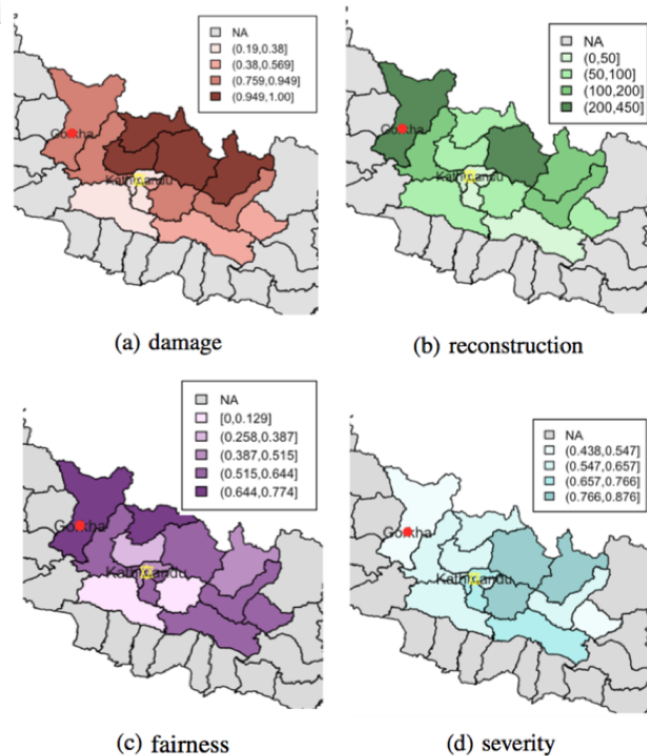


Figure 7: Comparison of reconstruction efforts and citizens' feedback

US dollars pledged in donations may cause problems for further reconstruction.

C. Relationship between People's Attitudes and Reconstruction Progress

As the Nepalese organizations and government have already received relief and funds from international donors, comparing the citizens' opinions about the response from these organizations/government can help us assess how recovery efforts have progressed. We use citizen survey data for the comparison.

Household construction is one of the most important sections for post-disaster reconstruction. It not only reflects the seriousness of suffering of the affected people, but also influences

the progress of reconstruction efforts critically. We plot how many houses got damaged by districts to indicate the damage degree as Figure 7(a). Then we count all the finished projects about housing recovery and reconstruction after the quake, grouped by districts in Figure 7(b). After that we analyze the questionnaire of the survey conducted in 14 affected districts. Based on the responses to the question "Is support provided in a fair way?", Figure 7(c) is drawn by proportion of answers related to "Mostly Yes" and "Completely Yes" by districts. Based on the responses to the question "What is your biggest problems?", we plot Figure 7(d) that counts number of answers indicating long-term or short-term shelters; this shows how urgent the housing issues could be in citizens' minds. The red point in these four figures represent the epicenter of the earthquake, and the yellow point represents the capital city, Kathmandu.

By comparing four graphs, we notice that some districts got severely destroyed, and people living there needed more help with households than expected. However, they somehow received less attention. From Figure 7(c), we notice that support did not seem to have been provided in a fair way; this may reflect the deficiency of post-disaster reconstruction management.

IV. CONCLUSION AND FUTURE WORK

This paper presents analysis based on three datasets, which respectively focuses on what has been reported in news articles around the world after the earthquake, what have been contributed by different organizations and agents, and how citizens have perceived the relief efforts.

We found that media rapidly increased their attention on disaster especially within the first 72 hours, and then their coverage quickly declined, while the international and domestic donations/support kept coming. Nepal received a lot of support and it is confirmed by the GDELT data and transactions data in Open Nepal datasets. Some donations, however, appear only as a pledge instead of disbursement. And the donation appears to have been gone to the Nepalese government for shelter support. We also analyzed the available data based on the survey of affected citizens for their feedback on the reconstruction efforts. The survey responses show that the government may not have made adequate efforts for reconstruction activities. In particular, the data suggest that the government did not distribute support in an equitable

way. Citizens' disappointment in specific earthquake affected districts can be seen in the survey data. Note that the results reported are based on the available datasets described above.

In future work, we plan to explore additional datasets capturing financial flows related to how the government has spent the money received through aid and donations. Also, we plan to look deeper into the citizens' survey, and further analyze what has been done well and what lessons can be learned from the disaster response and recovery activities. This study suggests the importance of careful monitoring and supervision of post-disaster relief efforts, and calls for new strategies of post-disaster relief management.

V. ACKNOWLEDGEMENT

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