



# Reimagining Open Data during Disaster Response: Applying a Feminist Lens to Three Open Data Projects in Post-Earthquake Nepal

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Open Data has become a prominent ideal in humanitarian information work and is increasingly promoted for crisis situations to increase effectiveness, accountability, and empower citizens. However, like all socio-technical systems, open data platforms for disasters make implicit and explicit assumptions about data, data users, disasters, and the context of use. In this paper, we turn to feminist theory to examine three open data projects rolled out in the aftermath of the 2015 earthquake in Nepal. We used the seven principles of Data Feminism introduced by D'Ignazio and Klein to design an evaluative framework for the three projects. We use this framework to highlight and link the socio-political nature of both disasters and open data platforms. In our results, we highlight significant gaps in how these projects made labor (in)visible, engaged with affective aspects of disaster, addressed context, and challenged power. We argue that these gaps are reflective of dominant practices in open data for disasters and serve as opportunities for designers and crisis informatics researchers to reimagine the potential of such projects. We propose four ways of doing so based on feminist principles and values.

CCS Concepts: • **Human-centered computing** → *Empirical studies in HCI*.

Additional Key Words and Phrases: Open data, Disaster response, Feminism

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## 1 INTRODUCTION

Open data movements prioritize availability and access, re-use and redistribution, and universal participation in data-driven projects [59]. These ideals have generated considerable enthusiasm and governments and humanitarian organizations consistently promote the use of open data in disaster response. However, a growing number of researchers caution that open data platforms are not necessarily valuable in and of themselves [29, 80]. While open data can be a useful tool in disseminating information, access to previously unavailable information is not, by itself, sufficient to improving disaster management [72]. In some cases, uncritical use of disaster data can reinforce social inequalities [41, 77] or dominate public narratives and drive disaster response activities, displacing other ways of knowing about disaster or aspects that don't easily lend themselves to measurement [50, 69]. As open data and data driven response become an expected part of humanitarian aid, it is necessary to examine the assumptions, representations, and exclusions in

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these projects. In this paper, we use a feminist framework to evaluate these projects. By doing so, we are able to connect the social and political character of both data and disasters and offer practical recommendations to open data advocates and crisis informatics researchers for rethinking the design and use of these platforms.

In spring 2015, two large earthquakes and more than three hundred aftershocks struck Nepal and caused widespread destruction. As is common in disasters, vulnerable and marginalized communities, in this case mostly in rural areas, were severely impacted [27]. The impacts of the earthquake were made worse by Nepal's lack of infrastructure, readiness, and response capacity [53]. The response and recovery program was led by the government and international aid organizations but faced considerable challenges due to the remote locations of affected areas, social inequality, and governance issues [67]. In many cases, the gaps in formal response were filled by informal and community-based efforts, including the various open data and civic technology projects launched by the burgeoning tech and data enthusiasts [53]. These tech and data projects often sought to use information to improve the targeting of disaster assistance and empower citizens to seek accountability from the government.

This paper evaluates three such open data projects launched in the aftermath of the 2015 earthquake in Nepal: Rahat Payo [12, 13], a survey to understand aid distribution; Earthquake Response Transparency Portal [21], a financial portal to track aid money; and Housing Recovery and Reconstruction Platform [34], the open government portal to disseminate reconstruction updates. Two of the projects - Rahat Payo and Earthquake Response Transparency Portals were led by volunteers from Nepal's community of data activists [53]. All three projects sought to collect and publicize different kinds of data from the reconstruction process to inform disaster response and recovery activities while ensuring transparency and building citizen trust. We chose them for evaluation because they each received international attention and praise as examples of successful open data projects launched in the aftermath of the Nepal earthquake.

Our evaluation of these data platforms is grounded in feminist studies of technology. Specifically, we use the seven principles of Data Feminism as introduced by D'Ignazio and Klein as a framework for evaluation [18]. Data Feminism uses intersectional feminist principles and provides strategies for data practitioners to understand and examine how data projects and structural power intersect [18]. This perspective aligns with our research goals for several reasons. First, feminism has a long history of questioning objectivity of knowledge production, valuing reflexivity, and analyzing and critiquing power structures [5]. Applying a feminist lens to open data projects offers a means of examining the people, practices, and priorities of open data projects during disasters and how they engage with broader social factors surrounding disaster vulnerability and impacts. Second, it allows us to examine how knowledge is produced, (in)visibility of labor, implicit and explicit assumptions that are embedded, and the ways power imbalances can manifest in open data projects.

We begin this paper by discussing the role of open data in disaster response and the relevant literature in feminist HCI and feminist technology studies. We then provide background on the 2015 earthquake in Nepal and the three sites chosen for this study. In the Methods section, we describe our approach to using the principles of Data Feminism to develop a framework for evaluating the three open data projects. As our findings, we draw on this framework to describe how the three sites addressed questions of labor, the affective aspects of disaster, the role of data constituents, temporality, and power. Building on these results, we offer a series of recommendations for how feminist thought can reimagine open data projects. This paper thus contributes - a practical guidance for open data projects used in disaster response and recovery; and an example of how the principles of data feminism can be used to both critique existing sociotechnical systems as well as offer alternatives.

## 2 RELATED WORK

### 2.1 Open Data and Disaster Response

Open data has become an important ideal and set of practices in humanitarian information work. Open data is generally defined as “data that can be freely used, re-used and redistributed by anyone - subject only, at most, to the requirement to attribute and share-alike” [60]. Advocates argue that free and open access to data about disaster impacts, human needs, and humanitarian operations and funding can help to distribute resources effectively to areas of most need, avoid duplication, detect failures, and improve transparency [49, 61]. These ideas have been taken up by the humanitarian community in major international disaster responses such as the 2010 Haiti earthquake [70], 2013 Typhoon Haiyan in the Philippines [82], and, as we discuss here, the 2015 Nepal earthquake. Major aid institutions such as the World Bank and United Nations Office for Coordination of Humanitarian Affairs (UNOCHA) have undertaken their own open data programs related to disaster [16, 78], and international networks of civic technologists such as the Humanitarian OpenStreetMap Team (HOT), CrisisMappers, and the Standby Task Force have recruited tens of thousands of volunteers to gather, clean, organize, and distribute open data during disasters [11].

Beyond disaster response, the idea of open data has gained traction globally among governments and international development organizations. The World Bank and the Organization for Economic Co-operation and Development (OECD) encourage the use of open data in their projects citing improved government accountability, transparency, responsiveness, and citizen participation as benefits [40]. Dozens of governments have created portals to release information and engage with citizens [22]. International institutions and non-governmental organizations have also supported the open data movement by providing technical assistance, creating data exchange standards, and requiring public release of data as a condition for receiving funds. Advocates also argue that open data can support innovation and economic growth, allowing companies to provide new analyses or services using data that had been previously locked away [39]. In developing countries, where corruption and lack of trust in institutions can be more prevalent, open data advocates and evangelists have promoted open data portals to make governments and institutions more transparent in their operations and keep them accountable to the public [28].

In the field of HCI, crisis informatics research has examined the role of open data in emergency response from a number of perspectives. Following early experiments in the 2000’s, the sector has seen a rapid growth in open data ecosystems, as humanitarian aid agencies have greatly expanded the amount of data they share during disasters. This has led to the creation of new information management workflows that anticipate the availability of open data from certain sources, such as the Humanitarian Data Exchange or the OpenStreetMap project [62]. Civic technology organizations, like the Humanitarian OpenStreetMap Team or the Standby Task Force have played a major role in this process, and developed their own strategies and internal processes for gathering, organizing, and sharing open data in support of formal humanitarian efforts [58, 73]. Despite this evolution and in line with our arguments here, other research has, shown that open data is, by itself, insufficient and that data creators and providers need to take into account a wider range of factors to ensure their work supports effective and equitable disaster management [72].

Drawing this work together, we find that disasters such as the 2015 earthquake in Nepal provide an opportunity to evaluate the approach and aspirations of the wider open data movement. Humanitarian relief is a data intensive, time critical, and potentially life-saving activity. We can think of few settings in which open access to information would be as potentially impactful. Indeed, the three open data projects included here aspired to enable a more efficient and effective recovery by using data to publicize reconstruction efforts, flow of aid money, and impact on victims. These projects were led by Nepal’s community of data activists and received praise from open data advocates

and national and international media [53]. We argue, therefore, that the majority of the issues we identify in this paper are revelatory of oversights and limitations of the broader open data movement, rather than weaknesses of these particular projects that could be corrected through incremental adjustments to their design or implementation.

## 2.2 Data Feminism and Feminist HCI

In this research, we draw on feminist theory as a way to examine the assumptions and oversights of open data projects and propose alternative ways forward. Dominant narratives of the open data movement assume data platforms as a neutral and objective public good ignoring other social and cultural factors that influence the uptake and use of data. Feminist standpoint theory [32] offers a useful corrective by considering all knowledge as constructed, socially situated and partial. Feminist technoscience scholars have exposed how dominant narratives in science and technology are shaped by patriarchal and capitalist systems [31, 81], and how feminist modes of knowledge production lead to different types of knowledge [30, 31]. Thus, feminist epistemology prioritizes plurality of perspectives and calls for producing knowledge from the margins. Feminist scholars such as Patricia Hill Collins have also theorized how knowledge production is tied to systems of power and oppression at both individual and structural levels [14]. More recently, critical data scholars have highlighted the constructed nature of data [26], extractive nature of data collection [41, 77], and have called for a critical, power-sensitive, and a culturally situated examination of assumptions and practices of data [10, 45, 48]. In the case of disaster data and response, a feminist lens can highlight historical and social practices that exacerbate unequal impact which are often overlooked in the favor of short-term response to the immediate crisis.

Beyond the critique of data practices and knowledge production, feminist HCI offers alternative ways for designing socio-technical systems such as open data projects. For example, Shaowen Bardzell calls for interactive systems that are imbued with feminist commitments of agency, fulfillment, identity, equity, empowerment, diversity, and social justice [5]. This agenda builds on Suchman's research which challenged assumptions behind universalist designs and pointed out the situated nature of human actions [76]. Researchers have harnessed feminist traditions to critique dominant paradigms of design and knowledge production [15, 66], build solidarity with grassroots and transnational communities [25, 37, 46], and advocate for culturally situated, responsible, and justice-oriented socio-technical systems [4, 15, 25]. Prior work has drawn on feminist care ethics to explore the relationship and motivations between technology designers and users in underserved communities in different contexts such as caregiving [44], education [43], data collection [54] and crisis informatics [20, 38].

In our work, we turn to the seven feminist principles for data practitioners listed in Table 1. These principles were introduced by D'Ignazio and Klein in Data Feminism [18] as a way of formalizing and operationalizing the rich body of feminist theory and scholarship. They invite users to attend to multiple perspectives, the situated contexts, and labor that goes into data projects. The authors also highlight the distinction between open and accessible data and ask data practitioners to be mindful of the assumptions, material conditions, and contexts that were included and excluded in data projects. [18]. Data Feminism thus formalizes feminist theory and critique into specific actions and examples that data practitioners can take during the various stages of a data science project. Prior work has shown the potential of using Data Feminist principles for more equitable data for COVID-19 response [19] and textile design [47]. Our work translates these principles and examples into a novel evaluation framework to examine the specific ways open data projects embody and eschew feminist values and propose ways to incorporate feminist thought into existing disaster related open data practices.

### 3 BACKGROUND

Two large earthquakes struck Nepal on April 25 and May 12, 2015, and were followed by more than three hundred aftershocks. At 7.8 and 7.3 on Richter scale respectively, they were the largest magnitude earthquakes to hit Nepal in more than eighty years [27]. The destruction was widespread and impacted many villages. While the country had prepared for a major earthquake in the capital city, the earthquake was largely a rural disaster, and the difficulty in accessing remote villages complicated the immediate response and recovery [69]. It is estimated that the lives of eight million people, almost one-third of the population of Nepal, were impacted [27]. The earthquake disproportionately impacted the vulnerable and marginalized groups in the country: women, children, and marginalized castes such as Dalits, Tamangs, and Janajatis [9].

The response and recovery program was led by the government and international aid organizations but faced considerable challenges due to lack of domestic infrastructure capacity, political and bureaucratic burdens, corruption, inequality, and governance issues [67]. In 2017, two years after the earthquake, barely 5 percent of the destroyed houses had been rebuilt and only 12 percent of the pledged aid funding had been distributed by the government [1]. This trend has continued, the National Reconstruction Authority (NRA), the organization in charge of reconstruction and recovery work, did not complete all of the planned reconstruction and distribution of aid within the estimated 5 years. The NRA was officially dissolved in December 23, 2021 and its responsibilities handed over to the Department of Urban Development and Building Construction and National Disaster Risk Reduction and Management Authority (NDRRMA). These bodies are still distributing resources to earthquake victims as of June 30, 2022 [24]. Though some studies have found that the aid was for the most part evenly distributed [9], qualitative reports show that the needs of marginalized groups including lower caste Dalits, women, and remote rural communities are likely underrepresented in the official datasets [56, 69].

As is common in disasters, the earthquake and its aftermath also created an environment for civic engagement. Volunteers and civil society organizations participated extensively and stepped in to fill the gaps that domestic and international responders left during initial rescue and response [69]. In the weeks after the earthquake, open data activists started many initiatives ranging from immediate recovery needs, such as coordinating rescue efforts, to long term accountability projects, such as fiscal portals that track distribution of aid money [53]. These projects often sought to publicize data and encourage citizen engagement [53]. The work received international acclaim and media attention, including headlines such as "How a bunch of tech geeks helped save Nepal's earthquake victims" [23] and "Nepal's Aid System Is Broken. So These Lifesavers Hacked It" [74]. The growing importance of efforts such as these within the broader humanitarian aid system [56, 71] positions them important sites of enquiry for crisis informatics research and design.

### 4 OVERVIEW OF OPEN DATA PROJECTS

#### 4.1 Rahat Payo?

"Rahat Payo?", which means "Did you get relief?" in Nepali, was an initiative by Code for Nepal to gather data on earthquake survivor's receipt of relief following the 2015 earthquakes. The project was launched by a small group of volunteers and aimed to conduct ground surveys in the most hit areas to highlight the existing gaps in distribution, relief, and recovery processes [12]. In the first phase, the team surveyed 776 people across five critically affected districts in August 2015, four months after the earthquake [12]. The team conducted another survey in December 2015, focused solely on the village of Barpak, the epicenter of the first earthquake [13]. Social media feeds and the blog posts show that the team also ran an online survey targeting all of Nepal at

the time, but the data or the results from those surveys are not available. The project documents indicate that the team planned a long-term nation-wide project with a social media campaign based on the results (personal communications). Unfortunately, the team was unable to complete the project as planned. The project wound down after the second survey due to a lack of resources and funding. For both the phases, the team shared their results through blog posts and their Facebook and Twitter accounts as shown in the screenshots in Figure 1. The raw data from the survey was released as a spreadsheet. It is unclear if the findings were picked up by the national media or organizations working on disaster response.

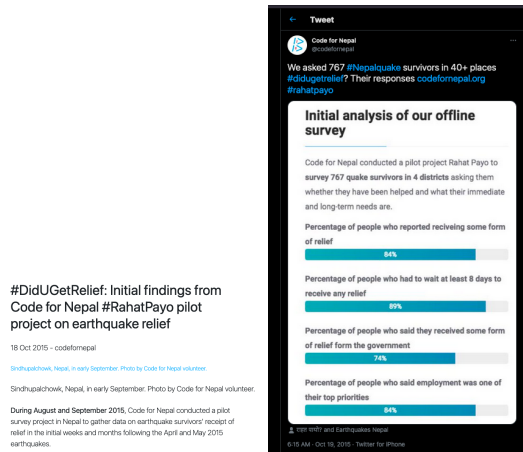


Fig. 1. Left: Screenshot of the Rahat Payo blogpost in Code for Nepal's website. [Source.](#) Right: Screenshot of twitter post with the survey results. [Source.](#)

## 4.2 Earthquake Response Transparency Portal

The Earthquake Response Transparency Portal (ERTP) was launched by Open Nepal and Young Innovations, two technology organizations who were active and had been advocating for open data in Nepal before the earthquake. The portal was designed to track national and international financial flows and the use of these funds for the relief and reconstruction activities in Nepal [21]. The portal contains two types of data on funds: transaction data from private, government, non-profit, and international aid organizations, and project data on the use of funds by the involved organizations. The group scraped, cleaned, and standardized fund related data from the United Nations Office for Coordination of Humanitarian Affairs Financial Tracking Services data, as well as publicly available press releases from donor agencies [53]. Figure 2 shows screenshots of the projects and the transactions page.

This open data project was inspired by the lessons from the Haiti earthquake response and was designed to address the irregularities that often plague international aid and donor ecosystems [53]. The founders considered data intermediaries such as journalists to be their primary audience. Hence the team worked with journalists during launch to provide training in data journalism so that the members of the media could make better use of the platform [53]. Along with journalists, the founding team also wanted government policymakers and donor agencies to use the platform to investigate resources, maintain accountability, reduce duplicate work, and plan in an efficient manner [53]. The portal has been partially successful in its objectives - journalists used the available data in their write-ups in both national and international media [52, 75]. However, the team was



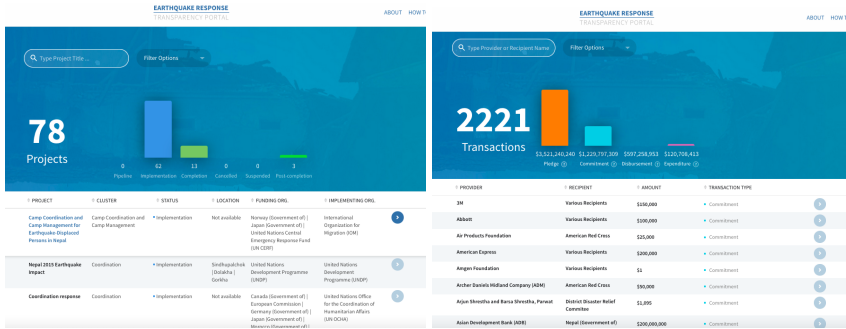


Fig. 2. Screenshots of the projects and transaction dashboard from the ETP website Source.

unable to collaborate with government policymakers or donor agencies. As a result, most of the funds listed in the platform are pledges or commitments, and there is very little information regarding the use of funds.

### 4.3 Housing Recovery and Reconstruction Platform

The Housing Recovery and Reconstruction Platform (HRRP) is the open government platform to support the coordination of post-earthquake housing reconstruction. HRRP provides coordination support services for the National Reconstruction Authority, other relevant government authorities, and partner organisations [34]. The platform website contains maps and infographics of affected districts, interactive dashboards showing reconstruction activities and partners, policies and technical standards, and damage assessment reports as shown in Figure 3. The website also contains the HRRP dataset submitted by partner organizations who have worked to support housing recovery and reconstruction sectors in the fourteen most affected districts in Nepal. The data in the portal is set up by Humanitarian Data Exchange, an open platform managed by the United Nations Office for the Coordination of Humanitarian Activities [34]. The portal has been mostly used by national and international non-profit organizations working in sustainable disaster response. Our research was unable to identify examples where communities who were displaced or are waiting for recovery assistance from the government used the data or the portal.

## 5 RESEARCH METHODS

This study is based on a structured evaluation of the three open data platforms using publicly available documents, the web platform, and downloadable data. Each of the projects was launched after the 2015 earthquake with the intention of enabling citizens to access important information about the earthquake response. While there were dozens of open projects active at the time, these specific projects were chosen to represent a common goal of ensuring accountability, and a variety of scale, scope, and contributor makeup. Rahat Payo was a project by a small volunteer team which conducted small-scale surveys on the ground. ETP was led by two technology organizations and attempted to track reported financial transactions throughout the country. HRRP is a national scale project led by the government in collaboration with large international humanitarian organizations and is the platform to publicize data related to all post-earthquake recovery efforts. In addition, the websites of all three projects were still operational at the time of our research (January-August 2021) and provided enough information about the project that we could credibly assess them.

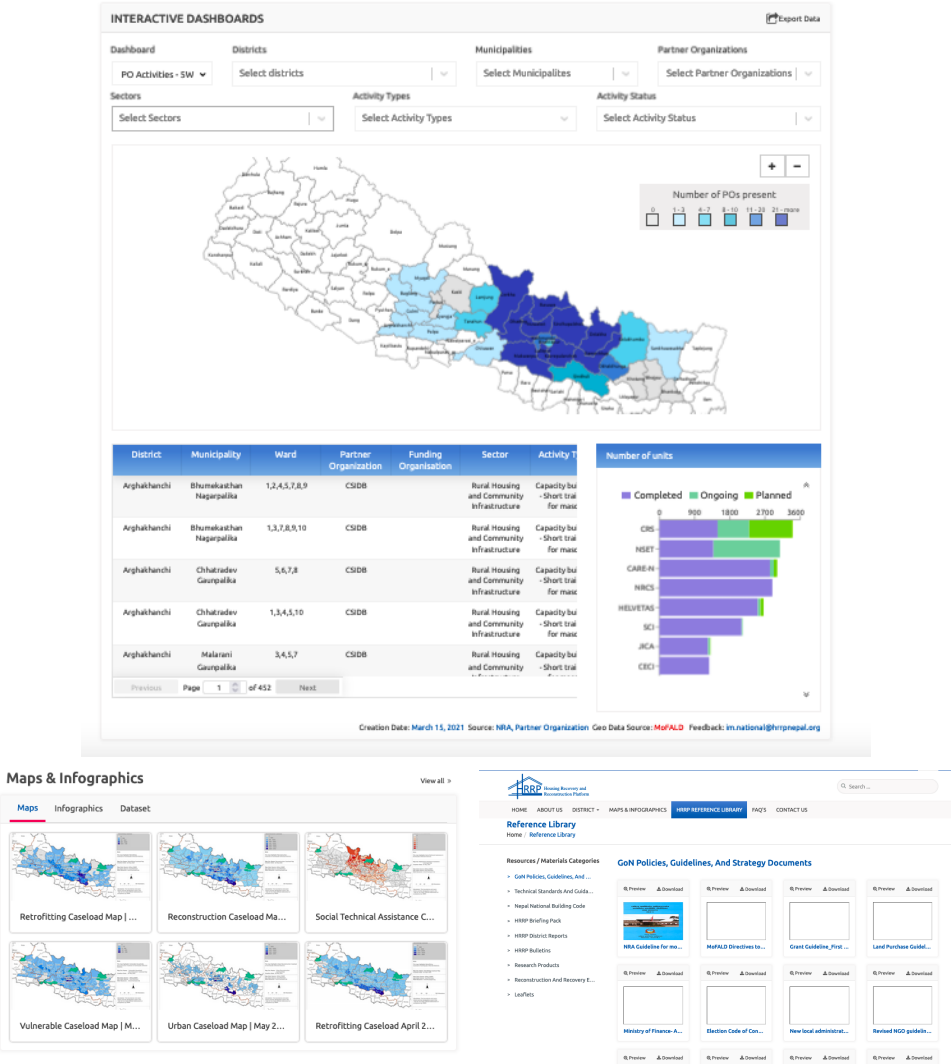


Fig. 3. Screenshots from the HRRP platform. Top: Interactive dashboard showing details about the reconstruction project. Bottom left: Maps and infographics page showing different types of maps. Bottom right: Reference library in the website with government manuals and instructions.[Source](#).

To develop our analysis framework, we drew on the seven principles of Data Feminism by D’Ignazio and Klein [18], which offer a practical and accessible means of organizing an extraordinarily diverse and wide-ranging set of feminist theory. Drawing from the examples and concepts presented in the book, the first author developed 4-5 guiding questions for each principle. The final set of questions listed in Table 1 were selected after a series of discussion between the authors regarding how these questions map to the selected projects as well as other open data platforms being used in disaster contexts. The authors answered these questions using publicly available information from the websites themselves as well as media reports. For each site, the authors wrote short summary answers for each question and listed examples from the website, downloadable



dataset, and public reports. To ensure accuracy, our summaries were reviewed by representatives from Rahat Payo and ERTTP teams. While we unfortunately could not connect with the HRRP team, the second author had personal knowledge of some aspects of this project through prior field research in Nepal [69, 71].

The authors collaboratively reviewed each of our summaries and discussed patterns that emerged as well as our own experience with post-earthquake response in Nepal. These patterns reflected some common assumptions about neutrality of data, who counts as data stakeholders, and what counts as important labor. Our analysis also showed several recurring patterns in regards to how the projects incorporated, or did not incorporate, local context, emotional impacts of disaster, and structural inequalities in Nepali society. Based on the review and discussion, the authors categorized the observed limitations into themes that we report in Section 6. Some of these themes map directly to the principles listed in Data Feminism such as Making Labor visible (DF7), Embodying Emotion (DF3), and Challenge power (DF2). The other two are more cross-cutting. Including Data Constituents incorporates the principles of elevating embodiment (DF3), rethinking hierarchies (DF4), embracing pluralism (DF5), considering context (DF6), and making labor visible (DF7). Similarly, Considering Data Platforms as Dynamic Objects includes the principles of considering context (DF6), rethinking binaries and hierarchies (DF4), and embracing pluralism (DF5).

#### *Author Positionality*

The first author is a PhD student in North America with an interest in the socio-political nature of data and technology infrastructures in developing countries. She is a Nepali citizen who was abroad during the 2015 earthquake and remotely engaged in mutual aid organized by volunteer groups and family members. She is also active within the open data community in Nepal and has worked with Code for Nepal in the past, though not on the project described. The second author is an HCI and crisis informatics scholar. Based in North America, they have conducted research in Nepal since 2011, including several publications related to open data and information systems in the aftermath of the 2015 earthquake [69, 71].

## **6 FINDINGS**

### **6.1 Making Labor Visible**

The seventh principle of Data Feminism asks us to recognize that data science is the work of many hands and to make this labor visible [18]. Feminist practice of citation and examination of hidden labor are reflective practices, aimed at unsettling gendered views of work, ensuring ownership, and ensuring a plurality of perspectives are included [2]. The projects in our case studies, like all open data projects, were possible because of many different kinds of technical and non-technical labor including initial conception of the project, collection and processing of data, site design and maintenance, and outreach and support to users. We evaluated these sites according to which steps of the project and whose work were credited in the site's "About" pages, headers and footers, and other relevant locations. These forms of credit make implicit statements about priorities and value systems in these projects. In addition to noting what was credited, we also evaluated what other work was involved for this project to be online and publicly accessible and whose work might have been ignored?

Of the three, HRRP had the most detailed attribution in their website. The website had an "About us" page listing the structure of the team, areas of focus, and partner organizations. A screenshot of the National Team page from the About Us section is shown in Figure 4. These pages list the names of senior officers, partner organizations, and advisory group but do not have much information about the labor that went into various stages of data life cycle including data collection, cleaning, and publishing. The data dashboard had fields for data source, geo data source, and the creation

Table 1. Evaluation Framework using Principles of Data Feminism

	Data Feminism Principles	Evaluation Questions
<b>DF1.</b>	Examine power	<ul style="list-style-type: none"> <li>• Do the projects consider power structures? Along which axis in the matrix of domination?</li> <li>• Do the projects acknowledge whose priorities they focus on whose priorities are overlooked?</li> <li>• Were the datasets published with a purpose and clear use case in mind?</li> </ul>
<b>DF2.</b>	Challenge power	<ul style="list-style-type: none"> <li>• Do the projects push back against existing and unequal power structures?</li> <li>• Do the projects collect missing data?</li> <li>• Do the projects demonstrate inequitable outcomes across groups?</li> <li>• Do the projects empower newcomers to the data project?</li> <li>• Do the projects have an imaginary (ideal end goal) that points towards co-liberation ?</li> </ul>
<b>DF3.</b>	Elevate emotion and embodiment	<ul style="list-style-type: none"> <li>• Do the projects try for universal objectivity?</li> <li>• Do the projects center different perspectives including emotional?</li> <li>• Do the projects convey uncertainty and its sources?</li> <li>• Do the projects recognize who and what the project might exclude?</li> </ul>
<b>DF4.</b>	Rethink binaries and hierarchies	<ul style="list-style-type: none"> <li>• Do the projects acknowledge what/who may not be counted as the project is structured ?</li> <li>• Do the projects consider/acknowledge limitations of chosen categories around data collection?</li> <li>• Do the projects count unnecessary information that might perpetuate harm?</li> </ul>
<b>DF5.</b>	Embrace pluralism	<ul style="list-style-type: none"> <li>• Do the projects consider a plurality of voices and experiences at all stages of the data project?</li> <li>• Do the projects consider ways perspectives might disappear or be added during data cleaning and processing?</li> <li>• Do the projects value local and indigenous ways of knowing vs impose a centralized view?</li> <li>• Do data constituents have a say in how data is processed/used/disseminated?</li> </ul>
<b>DF6.</b>	Consider Context	<ul style="list-style-type: none"> <li>• Do the projects acknowledge social, cultural, historical, institutional, and material conditions under which the data was produced?</li> <li>• Are there instructions for using the data for stated use cases? Are there limitations on use of datasets?</li> <li>• Is metadata available? What metadata is available?</li> <li>• Do the projects acknowledge conflict of interests?</li> </ul>
<b>DF7.</b>	Make Labor Visible	<ul style="list-style-type: none"> <li>• Do the projects have attributions for each stage of the data process?</li> <li>• Do the projects credit emotional and care work?</li> <li>• Do the projects acknowledge who did the work and who might be pushed out?</li> </ul>

date but these fields always had the same values. The data source was always listed as “Source: NRA, Partner Organization, Geo Data Source: [MoFALD](#) (referring to the Government of Nepal Ministry of Federal Affairs and General Administration)”. The Geo Data Source linked leads to the homepage of the HRRP platform itself.

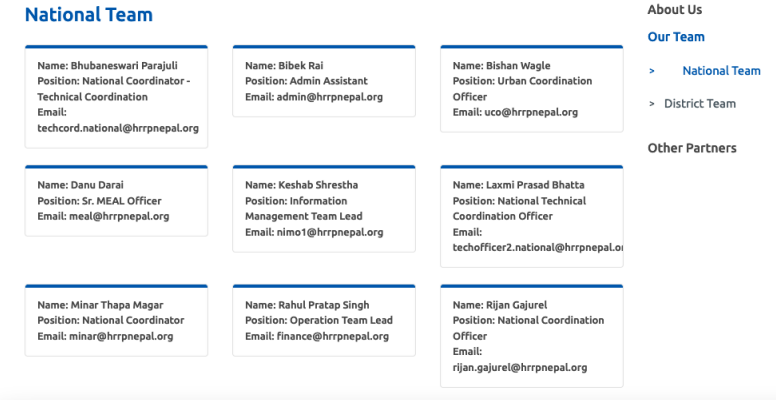


Fig. 4. National Team page in the HRRP platform. [Source](#).

The other two projects Rahat Payo and ERTF were led by open data advocate organizations and primarily developed by volunteers. Both platforms acknowledge the parent organizations supporting the project - Code for Nepal for Rahat Payo and Young Innovation for ERTF but provide minimal information about the team members or the labor involved in different stages of the data lifecycle. In Rahat Payo blog posts, the work done by the volunteer surveyors is acknowledged as - “Over the span of 14 days, eight volunteers went to at least 40 locations to find out whether earthquake survivors had been helped” [12].

ERTF website provides information about the primary and secondary sources the data is aggregated from (as shown in [Figure 5](#)). Adding more details about the people and the processes involved in the data collection would help highlight the emotional labor as well as add more context about the projects. For example, communities might feel more comfortable sharing their experiences with someone they share identities, or have other factors in common with. In addition, field data collection during disasters such as earthquakes is difficult, challenging, and emotional. The data collectors have to observe sites of destruction and interact with marginalized and affected communities. This requires emotional labor on the part of the surveyors that the sites discussed in order to value such labor as well as help data users understand and interpret its results.

Finally, the projects could also have explicitly acknowledged the work that went into the design of the data platform or the technical mechanisms by which data would be made available, e.g. CSV download, API, or searchable database. Each of these platform designs are different and a result of specific choices by their designers. The invisibility of the work and people involved in these decisions makes it impossible to know how these decisions took shape, and whose perspectives and labor were included.

## 6.2 Including Data Constituents

A feminist approach to data encourages data practitioners to be mindful of the assumptions that are embedded in data and who gets to have a say in how the data is constructed and used [18]. Data Feminism calls us to “count within our own communities, with consideration, and care, (we can

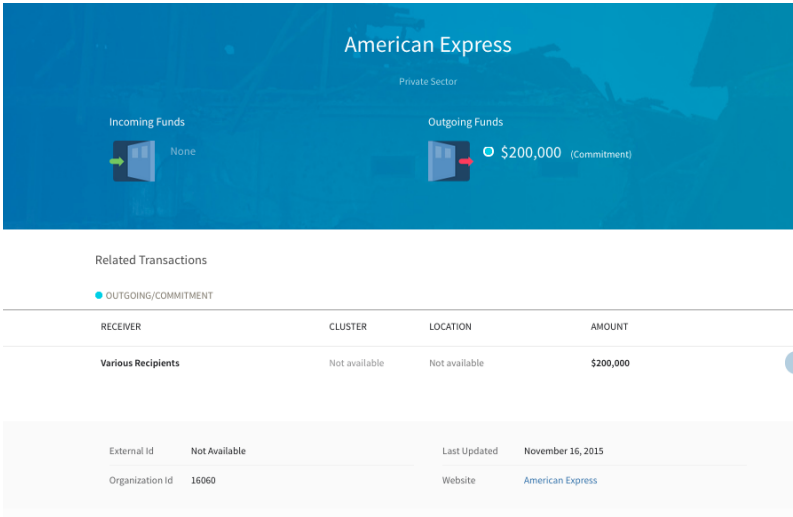


Fig. 5. Expanded transaction data entry in ERT platform. The bottom half shows the last updated date and the data source. [Source](#).

work) to rebalance the unequal distributions of power” [18]. In the case of disaster data, ensuring that the data constituents, the people whose lived experiences it describes, play an active role in the project helps to ascertain that their needs and interests are served during aid and rebuilding. In our case studies, the three projects had different data constituents: Rahat Payo collected data directly from earthquake affected people; ERTP collected the financial transaction data of organizations providing humanitarian aid; and HRRP consists of data about both. According to our research, data constituents did not directly participate in the design or implementation of any of three projects, but were nonetheless involved in several ways.

An important step in including data constituents is the process of informed consent. Informed consent is a cornerstone of humanitarian accountability and ensures respect for human dignity and self-autonomy [33]. While not sufficient by itself, being able to know what data is being collected and for what purpose, and meaningfully agree or disagree to being a part of the dataset allows constituents to have a say in the information being collected and narratives being built from their experiences. Of the three projects, Rahat Payo had a documented process for getting verbal consent. In-person surveyors were provided with a standard consent script in Nepali and English languages for getting consent. As seen below, this script lets the participant know what is needed from them and allows them to meaningfully opt out. However, it does not sufficiently inform how this data might be used, and how it could benefit the respondent.

“Hello/Namaste

My name is \_\_\_\_\_. We are here to get to know how you have been doing since the earthquake. This is for a data collection project. I have a few questions. it will not take very long, just 5 - 10 minutes of your time. It’s simple: I’ll ask you a question, and then provide you with 2-3 possible answers, and you would just have to pick the one that best applies to your situation. Your participation is optional.You can choose not to do the survey. Also, we will not use or reveal your identity to anyone.The information you gave will be used to create and analyze data and improve the recovery process.

By taking this survey, you have been of great help. Thank you so much.” (personal communications)

ERTP and HRRP do not have any information regarding the consent process in their website. The ERTP team were aggregating publicly released information about financial transactions and assumed implicit consent. The team had a feedback form where organizations could dispute/comment on transactions recorded if they found the information misleading.

Beyond the consent process, all three projects could further include voices of data constituents in how the data was collected, shared, or used. For example, in their initial plans, the Rahat Payo team planned to iterate and improve the design of their survey between different phases of the project. Community input could have helped refine survey topics or wording of the individual questions. ERTP had a submission form and link where organizations (data constituents) could provide or modify their financial transaction data. This form could have been more accessible if the data could have been shared in other ways in addition to the provided format. The platform did not include free text boxes or other means for organizations to provide nuanced detail (if applicable) of the project or the transaction. In addition, this ability to give feedback could have been highlighted in the platform design by including indicators for modified data entries in the dashboard. The feedback form would also have been more successful in capturing data constituent’s voices by gathering feedback on how data should be shared or used. HRRP did not have any direct mechanisms for data constituents to reach out or provide feedback.

### 6.3 Embodying Emotion

The third principle in Data Feminism calls for elevating and embodying emotion asking one to “value multiple forms of knowledge, including the knowledge that comes from people as living, feeling, bodies in the world” [18]. Rebalancing emotion and reason in data projects will allow us to honor context, architect attention, and take action to defy stereotypes [18]. Though disasters and their aftermath are highly charged events, disaster response and recovery consistently struggle to account for emotion and affect in their planning [6]. The earthquake and aftershocks caused widespread trauma, fear, and uncertainty [7, 42]. A study from three affected districts showed that “one out of three adults experienced symptoms of depression and distressing levels of anger, one out of five engaged in hazardous drinking, and one out of ten had suicidal thoughts” [42]. We evaluated each of the data projects on whether they attempted to capture social/emotional aspects of disasters in the data categories or the visualization in the platforms.

The Rahat Payo survey asked questions about the aid received and future plans, but did not include questions about emotional or psycho-social aspects of damage/recovery. The survey prioritized yes/no and multiple choice questions that could be easily analyzed and grouped into quantitative summaries. The survey could have provided a space for sharing individual experiences about the participants’ experience with damage, recovery, and aid, along with the information on whether aid was received or not. Similarly, ERTP and HRRP data focused on either monetary aid or material aid that could otherwise be quantified as such. Though the ERTP team does acknowledge some limitations that come from this approach in their Data Dos and Don’ts as shown in Figure 6, they do not grapple with the value judgement implicit in only valuing monetary aid. Rural villages in Nepal tend to be rich in social capital and many households were rebuilt using help from their friends and family [56]. Communities also took part in collective repair, rebuilding, and mourning [69]. ERTP overlook these mutual aid efforts and collective acts of rebuilding.

In addition, the data on each of the sites is typically presented a dry and context-less manner, which serves to reinforce naive beliefs of data as neutral and objective while downplaying situated views, emotions, and perspectives [18]. All three sites continue to replicate existing practices of

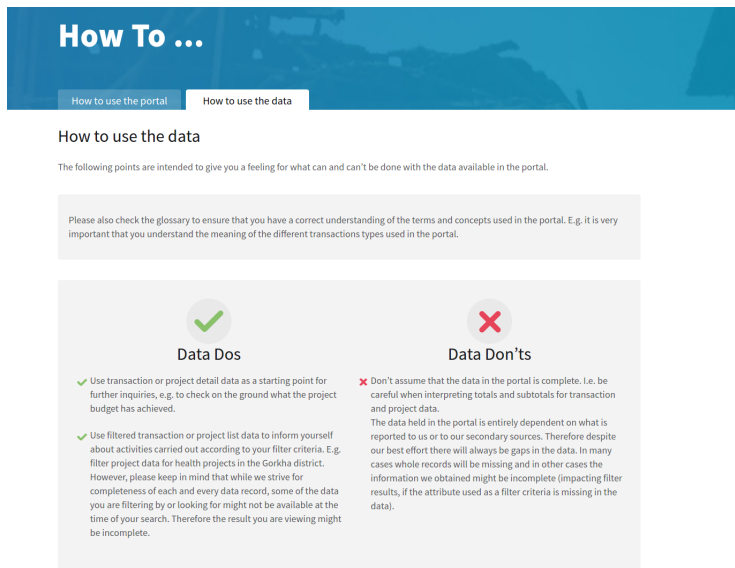


Fig. 6. Screenshots of Data Dos and Dont's from the ERTTP website. [Source](#).

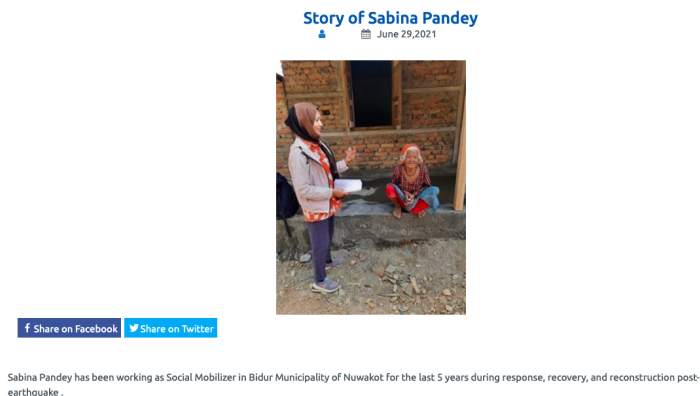


Fig. 7. A story from the HRRP website. The text consists of all the information provided in the story. [Source](#).

displaying quantitative data over qualitative data that could contextualize the lived experiences of affected communities and resource providers. In the website, the data is available as summary statistics in Rahat Payo, tables in ERTTP and tables and minimalist maps and bar-charts in HRRP. The HRRP site did make some effort to acknowledge the emotional aspects of disaster and reconstruction with a page highlighting the stories of relief-workers and the aid-receivers. However, as [Figure 7](#) shows, these stories were relatively short and lacking in detail. Thus, the story page reads like curated success stories to promote the government's relief effort. The stories could have been contextualized with other data available in the website to showcase the affective facets of a disaster.



#### 6.4 Data Platform as Dynamic Objects

Data Feminism asserts that the social, cultural, and material context behind data is essential to understand its functional limitations and associated ethical obligations [18]. These contexts include the specific people, places, times, and the specific purpose the data was collected for. Furthermore, this relationship between data and context continues to evolve even after the data is initially produced, as the world and the social and political structures around it changes. This is especially true for the three open data sites in this study, as the needs of the communities for different kinds of support changed as post-earthquake Nepal moved from immediate response to longer-term recovery work and beyond [8]. Platforms that are sustained over time without updating their data, or adapting their contents to shifting needs of the communities they serve therefore risk going stale. In the case of open data, there is an added risk of such stale data being widely distributed and used for decision-making in rapidly-changing post-disaster settings. We evaluated the data platforms on whether they were designed for feedback from data users and whether they adapted to the changing needs and context of earthquake-affected communities.

Even though the post-earthquake reconstruction and socio-technical assistance programs were still ongoing at the time of our research, only the government-funded HRPP was actively maintained. The HRPP data and dashboard was updated twice each month, and a bulletin with summarized reconstruction updates, information on upcoming meetings, and new documents was also released weekly.

ERTP was launched immediately after the earthquake and was actively monitored until 2018 (personal communications). The current version available online is the second version and was launched in May 2016, just over a year after the earthquake. This version added features to track the use of the funds along with the transaction details released in the first version. There does not appear to be any more changes to the portal after the launch of the second version. The most recent data is also from late 2016.

Of the three sites, Rahat Payo was maintained for the shortest period of time. It was launched in August 2015 and shared the final update through a blog post in February 2016. The project ran in two phases. For each phase, the team collected their data, conducted analysis to get summary statistics, and shared the results and corresponding csvs in a blog post. They also shared the data and blog posts via social media. The provided documents indicate that the team planned to run more phases and modify their survey based on feedback but they were unable to take the project to completion (personal communications). Currently, the data from in-person surveys is still available and can be downloaded. The online survey and the data from it are not available.

Creating stronger relationships between open data sites, potential users, and data stakeholders could also have helped the projects adapt to changing contexts and needs. Of the three projects, only Rahat Payo did not have any direct mechanism in the platform for the data users or the public to engage directly with the project team. In their posts, the team requested feedback via social media "using hashtags #didugetrelief & #rahatpayo." [12, 13]. Unfortunately, due to the passage of time, we could not find information regarding social media engagement with these hashtag and were unable to evaluate how well the request was heeded. ERTP and HRPP sites provided email addresses for data users or the public to send feedback to in addition to feedback forms on their website, but it is unclear if or how the feedback was utilized, as we were unable to identify any examples of public feedback being taken into account in the platform. ERTP also shared the launch of the site and their reasoning in a series of blog posts with a call for discussion, though there were no comments in any of the blog posts. As volunteer driven projects, Rahat Payo and ERTP also had links that encouraged viewers to join the project and help support the project.

## 6.5 Challenging Power

Data Feminism asks data practitioners to examine power structures in society and use data to expose oppression and demonstrate inequitable outcomes [18]. Data, as partial and abstract representations of the world, inevitably prioritizes some perspectives, and in doing so can reinforce and exacerbate existing imbalances in power and influence [41]. The three sites we studied each have a stated goal of ensuring government accountability to affected communities. Two of them - Rahat Payo and Earthquake Response Transparency Portal also state a goal of ensuring equitable distribution of aid by making their data public. These three platforms have successfully made data available publicly that previously would have been only accessible to the government, official responders, donors, and experts. Rahat Payo collected data from the ground from earthquake victims in the early days of the earthquake. Earthquake Response Transparency Portal aggregated all published aid pledges and disbursement in a standard format easily accessible. HRRP is a central platform with public information about reconstruction projects from the government and its partners.

Despite the potential benefits of increased accessibility to data, data feminism notes that the ability to challenge power through a data project depends, in part, on who is able to use the data. Key factors that limited the accessibility of these sites were language and access to the internet. The three sites and the downloadable data were designed and released in English language. However, according to 2011 census, only 0.3% of the population of Nepal is fluent in English [84]. The majority, 78% of the population, speak Nepali [84]. Of the three only HRRP had a Nepali option, but even then the Nepali version of the site did not load during our examination. None of the platforms supported any of the more than 100 other languages spoken in Nepal. Accessing the websites also required reliable access to the internet. While the data from all three sites could be downloaded and accessed or shared offline, the information and context surrounding the data were only available on the website. According to a report from 2020, only about 71% of the population, mostly in urban areas, had internet access and of them 55% of population accessed mobile internet [64]. ERT and Rahat Payo were accessible easily on both computers and mobile devices. HRRP required significant bandwidth to load and during our tests, the visualization dashboard and infographics from HRRP did not load on mobile devices.

In addition to technology and language barriers, the three sites have varying levels of instruction and contextual information to enable people without strong understanding of technology or data to make use of the tools they offer. Of the three, ERT made it the easiest for newcomers to download and work with data. They had a clear how-to and do's and don'ts for the data as shown in Figure 6 and a definition of data types as shown in Figure 8. During the release and early days of the project, the ERT team worked closely with data-intermediaries such as journalists to ensure that they were using the data correctly and were aware of uncertainties.

The other two projects did not cater to the needs of less experienced users. The Rahat Payo team shared the survey data as an open spreadsheet without any context or detailed information about methodology and processing steps. In its current form, the spreadsheet is a useful evidence for their findings, but cannot be easily used as a data source by other data users. HRRP had the most data but was also the most complicated to navigate around and understand what the dataset represented. The data could be downloaded as a spreadsheet, but without any context on categorization or column headings. Even in the online dashboard, the tables and the charts were lacking titles, units, and context to completely understand the information being presented. No documentation detailing the schema, methodology, or description of the data collection process could be found. The website did have a FAQ page as shown in Figure 9 but it contained questions about the aid distribution process rather than the data platform. We requested information regarding using the data via the feedback form but are yet to hear back. Based on the available context, it appears that even

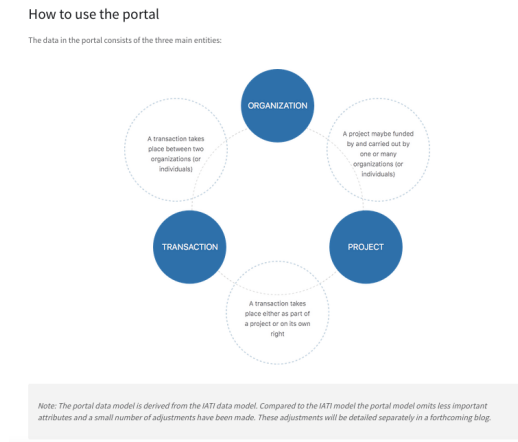


Fig. 8. Screenshot of the data model from the ETRP website. [Source](#).

though the data was made open source, the platform designers did not consider if this data could be accessed without institutional knowledge about government processes.

#### Questions And Answers Document

The Frequently Asked Questions (FAQs) compiled in this document have been submitted through partners and communities across the earthquake affected areas. Additional questions for inclusion can be shared via [info@hrrpnepal.org](mailto:info@hrrpnepal.org) or through the relevant HRRP District Coordination Team. The responses provided have been gathered from relevant Government of Nepal (GoN) bodies, and have been formally and informally sourced. The information provided is not official, but is correct at time of publication and will be regularly updated as required. The HRRP 'Briefing Pack' compiles many of the source documents referred to in the FAQs.

- 1 Scarcity of water is making house construction difficult. When and how will this problem be solved? पानीको अभावका कारण हामीले घर पुननिर्माण गर्न सकिरहेका छैनौं । यो समस्या कहिले र कसरी हल हुनेछ ?  
  
You can contact your Village WASH Coordination Committee (V WASH CC), District WASH Coordination Committee (D WASH CC), and / or the Department of Water Supply and Sanitation (DWSS) for support with this issue. You can contact the District Lead Support Agency (DLSA) focal point and [HRRP district coordination team](#) for general advice / information on planned water supply programmes in your area. तपाईंले गाउँ खानेपानी तथा सरसफाई समिति, जिल्ला खानेपानी तथा सरसफाई समिति वा खानेपानी तथा सरसफाई विभागमा यस विषयलाई उठाउन सक्नु हुन्छ । तपाईंले जिल्ला स्तरीय प्रमुख सहायता निकाय र [एचआरआरपी जिल्ला समन्वय टोली](#) सँग पनि सम्पर्क गर्न सक्नुहुन्छ । उहाँहरूले तपाईंलाई सामान्य जानकारी बाहेक तपाईंको क्षेत्रमा संचालन हुन लागेका खानेपानी आपूर्ति कार्यक्रम सम्बन्धी जानकारी दिन सक्नेछन् ।
- 2 Is it mandatory to install solar panels as part of the third tranche? के तेश्रो किस्ताबाट सोलार जडान गर्नु अनिवार्य छ?
- 3 Are there standards / guidelines available for the construction / repair of toilets? शौचालय निर्माण वा मर्मतसम्भार गर्न कुनै मापदण्ड छ ?
- 4 Is there a grant available for household WASH, or is this included in the 300,000 NPRs housing grant? के खानेपानी तथा सरसफाई WASH को लागि कुनै छुट्टै अनुदान उपलब्ध छ वा अबासीय अनुदानको ३ लाख रूपैयाँ त्यसलाई समेटिएको छ ?

Fig. 9. Screenshot of FAQ page in HRRP. [Source](#).

Disaster scholars have shown that disasters disproportionately affect marginalized and vulnerable communities while resource distribution during disaster response is often received by more

privileged groups [83]. This was reflected in the post-earthquake reconstruction processes in Nepal as well. The earthquake was largely a rural disaster and the difficulty in accessing remote villages complicated the immediate response and recovery [69]. Studies have also shown a disproportionate impact of the earthquake on the vulnerable and marginalized groups in the country: women, children, and marginalized castes such as Dalits, Tamangs, and Janajatis [9]. Had the sites disaggregated their datasets by those categories they could have highlighted whether or not the reconstruction process successfully met the needs of the most impacted. For example, the Rahat Payo survey did not have any questions on the caste or socio-economic condition of their respondents. In rural Nepal, caste based discrimination is still a primary form of social stratification. Caste helps determine different forms of power that individuals can mobilize to access resources [9]. This power differential was relevant in determining access to financial and skill-based relief programs after the earthquake - later studies have shown that marginalized castes and ethnic groups fared worse [9, 56]. Mutual relief efforts from mutual aid networks and grassroots effects which served the specific needs of their communities and potentially act as corrective to such structural power differentials. For example, immediately after the earthquake grassroots women led the supply of urgently needed food aid and feminine health kits, including special supplies for pregnant women and nursing mothers [65]. All three projects could have challenged power structures more directly through the inclusion of such efforts in their data.

## 7 DISCUSSION

It is perhaps unsurprising that the three open data projects we reviewed did not fare especially well according our evaluation framework, which was developed based on the principles of data feminism. These projects, along with the open data movement more broadly, are not generally designed with feminist principles in mind. However, we argue that the misalignments between the two approaches present opportunities for expanding the vision of open data projects used in disaster beyond current practice. Thus our evaluation framework, and the data feminist principles more broadly, offer a generative potential to reimagine the goals and design processes of open data projects in disasters. Drawing together the results of our evaluation, we propose four possible paths forward for open data projects inspired by the principles of data feminism. These paths, and the framework that inspired them, can support future crisis informatics research and design of humanitarian data projects.

### 7.1 Open Data as Infrastructural Care

First, open data projects and platforms in disaster settings can be thought of as infrastructures of care. In ethnographic work with the Venezuelan diaspora, Dye explores the notion of infrastructural care, where management of resources, relationships, and infrastructures using digital platforms can be a form of caring for others during crises [20]. This lens "highlights the messiness of human infrastructural action, which requires continual tending, and how such actions are deeply relational in that they are motivated by, rely on, and impact human relationships" [20]. Volunteer driven open data projects such as Rahat Payo and ERTF may play a similar role, though often not recognized as such. The three projects in our study were initiated out of concern for impacted communities and desire to support their recovery from the earthquakes. Through their efforts to gather and release data that would have otherwise be unavailable, they sought to influence the broader humanitarian response in ways that would make it more inclusive, efficient, transparent, and accountable.

However, these values, which are central to the open data movement, may conflict, or come into tension with, ethics of care [55]. Focusing open data efforts solely on gathering and releasing datasets that can be easily used may serve to invisibilize the very care and labor that goes into creating data and making it accessible. As a result, we may end up with platforms that risk increasing

the gap between digital elites and vulnerable communities. In this vein, open data projects have been criticized for making data available but not accessible [29]. In their focus on designing data distribution platforms, they have often neglected the digital infrastructure, hardware and software tools, financial and/or educational resources, and technical skills required for effective use and analysis of data [18, 29, 80]. Indeed, this was the case for the three sites we studied. Each of the projects we investigated could have made more effort to care about data intermediaries, data users, and the broader public to understand user needs, their context of use, and constraints. Of the three sites, only one had instructions and context about data categorization for users, and all three were comparably more accessible to the less impacted urban and middle class citizens instead of affected remote populations as they required internet connection and fluency with English [56].

Such challenges may be avoided if open data designers approached their projects through the lens of infrastructural care, rather than let it be an implicit motivation. Bellacasa states that “transforming things into a matter of care is a way of relating to them, being affected by them, and modifying their potential to affect others” [17]. An open data project created to enable infrastructural care may do so in a number of ways. For example, open data platforms built with care for their contributors would provide acknowledgement and incentives for physical, digital, and emotional labor that goes into creating and curating, as well as using, disaster data. Data platforms can show care to the data users by carefully documenting and including context that is needed to use the dataset in an informed fashion. Such platforms would also be more accessible and inclusive to newcomers to the projects as well as individuals who may not have an extensive data background. Open data designers can also imbue care into the platform itself by building long-term plans for acquiring the infrastructure and resources for long-term use and maintenance of the platform beyond its creation. In doing all this, open data platforms built with care would also care for the affected communities and their needs.

But as Murphy cautions, simply associating care with positive feeling and political goods can risk maintaining historical hegemonic structures [57]. While care builds relationality, it can also risk becoming “paternalistic, misguided, or harmful” when the caregivers are at a distance from those receiving care [38]. A way to counter such risks is by explicitly acknowledging the power hierarchies embedded in these platforms and adopting a grassroots culture of technology [25] i.e. carefully attending to varied experiences between project participants and creating space for relationships and decision-making by communities who may be impacted by the distribution or use of disaster data.

## 7.2 Open Data for Participatory Knowledge Making

With their universal goals of accessibility, representation, and accountability, open data projects can be an important tool for contesting dominant forms of knowledge and creating counter narratives. Applying a feminist lens to open data platforms allows us to see beyond the objective framing of data and ask questions about the forms of knowledge and power that the data represents. Critically, it suggests that those who are represented in the data be a part of the processes surrounding its collection, governance, and use. Indeed, all data takes a position. Despite persistent myths about the supposed neutrality or objectivity of data, the scientists, engineers, and others who produce disaster data are always making decisions about what data to collect, the categories and standards used to delimit it, and how to analyze or visualize it to their chosen audiences [26]. Our research suggests that involving disaster-impacted communities in the design of open data sites may help to ensure that such decisions incorporate their perspectives.

The open data sites we reviewed in this research relied on official datasets from government institutions, emergency responders, and large humanitarian organizations to objectively share the story of recovery and reconstruction. Even when they created their own data, such as the

survey in Rahat Payo, they designed it to be quantitative and match official reporting formats. As a result, the datasets prioritized material and monetarily quantifiable relief efforts to the more non-tangible social and emotional mutual aid efforts. The datasets also failed to disaggregate the collected data along prevailing axes of marginalization such as gender, caste, and class. Thus, they were ineffective in examining disparate impact. Despite their goals of inclusivity and objectivity, these projects ended up creating data platforms with partial information that replicate dominant views of disasters, help maintain existing power hierarchies, and might even under-prioritize the needs and impact on the most affected and marginalized communities.

An alternative approach, suggested by our analysis, would be to consider open data projects as opportunities for co-creating platforms and their datasets together with the affected communities. Here we echo Rosner's feminist concept of designing with alliances, where collective experiences evoke different understanding of disasters and ways of responding that can address long-term needs and structural vulnerabilities of the community [66]. Liboiron describes such a project during Hurricane Sandy where a participatory data collection effort led by grassroots organizations reframed the impact of hurricane to beyond a single weather-based event [50]. They highlighted the impact of structural inequalities such as "poverty, lack of affordable housing, precarious and low employment, and unequal access to healthcare and education" on exacerbating the impact of hurricane [50]. Open data projects can replicate a similar process to create datasets that highlight ongoing needs of communities during and beyond the disaster.

Although not a disaster related project, Anti-Eviction Mapping project (AEMP) serves as another example of co-creating open data projects. AEMP works with many tenant-focused grassroots organization to create datasets and narratives that connect eviction with to power structures of racial capitalism, technocapitalism, and political economy, and create tools for resistance and direct action to prevent evictions [3]. They also create resources that is needed for tenants and housing justice. Through co-creation of datasets, AEMP and their counter-mapping strategies have continuously evolved as the particularities of people, places, and eviction processes have evolved. In this way, co-creating open data projects with grassroots communities helps include multiple forms of knowledge, mitigate some of the risks associated with paternalistic forms of care, and make data platforms more dynamic and able to respond to changing needs and context after disasters.

### 7.3 Open Data for Community Building

Open data projects can not only be platforms for contesting knowledge but also a means for building collective power and solidarity across social, professional and cultural boundaries. Such interaction should spill outside virtual data platforms to the real-world for the feminist goals of solidarity and collective power. In this, we build upon Peer and Di Salvo's formulation of open data workshops as boundary objects and propose that open data platforms can themselves act as boundary objects [63]. Datasets during disasters are both created and used by different stakeholders such as governments, donor organizations, grassroots volunteers, and affected communities. Instead of solely creating dashboards for data that is universally accessible and meets the needs of all these diverse groups, open data projects launched in the wake of disasters could be a platform where aid workers, data practitioners, and affected members could engage with and build relationships with each other. This would require the sites to move beyond frictionless portals and instead integrate methods and spaces for social interactions such as workshops, meetings, or communication.

Such a reformulation of open data project helps introduce relationships between data creators and data constituents that we observed was missing during our evaluation. Each of the projects we investigated could have made more effort to bring together data intermediaries, data users, and the broader public to understand user needs, their context of use, and constraints. Although the projects created feedback forms, blog posts, and social media hashtags for engaging with data



users and the general public, they weren't often used and were unable to replace more direct or synchronous social interaction that characterized previous forms of data sharing. Indeed, prior research on open data projects in the aftermath of the Nepal earthquake found that designers struggled to gain useful feedback on who was using their information and for what purposes [71].

While not an open data project per se, Turkopticon acts as an example of such a platform. The project was conceived and created through the interaction between tech designers and mechanical Turk workers to best fit the worker's needs and existing workflows [35, 36]. The goal of the platform itself is to allow for Turk workers to form communities to counter power imbalance between the platform and individual workers. And lastly, the platform helps continue this blending of social worlds through ongoing collaboration in upgrade and maintenance of the site [35, 36]. Thus, designing a data platform with mechanisms for community building can also help with ensuring its continued use, relevance, and longevity.

#### 7.4 Open Data as Advocacy for Social Justice

The goal of open data movement has always been to influence material changes in the world. The three projects we evaluated in this study attempted to do so by collecting and distributing previously unavailable aid distribution data. However, in keeping with current practice in the field, the open data advocates and designers who built these projects focused their time and resources on making data available in a reusable format, and with the implicit assumption that members of the public or other data intermediaries would then use this data to advance their goals. The three projects in this study wanted to use their data to hold government and humanitarian agencies accountable. However, they focused on technical solutions and ignored the harder task of contextualizing and using the dataset. D'Ignazio and Klein caution us that accountability as a concept itself is inadequate to address structural inequalities [18]. Concepts like accountability, transparency and fairness assume that the problem lies in individuals or the technical process and in doing so ignore the broader power differentials and work required for dismantling them.

A feminist lens allows us to move from accountability to justice. The incorporation of justice into the practices surround the collection, sharing, and the use of data is a growing area of research in HCI and CSCW; scholars and activists have called for information justice [41], data justice [77], and design justice [15]. These calls highlight the historical and structural causes of contemporary inequities and argue that fundamental changes are needed in order to redress them. In addition to justice, D'Ignazio and Klein include co-liberation as an integral part of any justice oriented data work. Echoing our calls for participation of impacted communities in open data projects, D'Ignazio and Klein state that data for co-liberation "deliberately pairs quantitative analyses with inclusive civic processes, resulting in locally informed, ground-truthed insights that derive from many perspectives" [18].

In the case of disaster justice, advocacy for justice has to consider the different ways in which the distribution of victims of disaster are shaped by distribution of power and wealth prior to disasters [9]. In a given society, the factors that affect vulnerability to disaster such as where one lives, and in what kind of dwelling, access to resources and other forms of capital, are most often distributed along dominant axes of inequality and discrimination. Oftentimes, these same groups of the most vulnerable and marginalized communities are also the least likely to receive adequate aid and resources during reconstruction because their experiences and needs are also the most difficult to include in the data collection processes [41]. A justice oriented data project should therefore start with the assumption that both data and disasters are impacted by structural inequalities that are historic, ongoing, and need to be dismantled [18]. Asad proposes a way to integrate justice into design process by starting with questions of harm, collective healing, and interventions to support the healing in her framework of prefigurative design [4]. An open data project can do so

by highlighting potential harms and prejudices in traditional data sources as well as creating new datasets with communities that are targeted toward their specific recovery needs.

Open data projects could be extended into advocate platforms for justice in few different ways. As we described in the previous section, the platforms could have been designed to lend voices to impacted communities and share counter-narratives that highlight impact and harms due to social choices. The communities that are created through these platforms can advocate and publicize for policies and practices that go beyond redistribution of emergency resources, and actively mitigate vulnerabilities that also reduce future impact of disasters [51, 68, 79].

## 8 CONCLUSION

There were dozens of open data and civic technology projects launched in the wake of the Nepal earthquake, both by locals and people all over the world. Even though the formal disaster reconstruction process in Nepal has ended, the decisions made during the earthquake and the reconstruction have left a lasting impact throughout the affected areas. These open data projects and civic volunteers have opened pathways for creating and distributing information about disasters outside of traditional bureaucratic channels. Encouraging these pathways for more accessible and equitable information flow remains a worthwhile goal when future disasters strike in Nepal or anywhere else in the world. In this paper, we have used the principles of Data Feminism as a framework to evaluate existing open data projects in disaster contexts. Doing so helped us approach these projects from the perspective of feminist theory and practice. The framework also helped us identify ways to expand the ambitions of open data projects beyond ensuring universal accessibility and accountability. We hope that our framework, findings, and analysis guide open data advocates and crisis informatics researchers to draw upon lessons from feminist thought to develop a more expansive vision of open data for disasters, both in terms of what it entails and what it might accomplish.

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