

Engaging Solidarity in Data Collection Practices for Community Health

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Researchers and practitioners engaged in global health are increasingly turning to data-driven approaches. However, the institutionalized roles and responsibilities—as well as motivations and workflows—of those involved in data collection are not well understood. To attain a deeper understanding of the practices of frontline health workers engaged in data collection, we conducted fieldwork in underserved contexts of Delhi, India. In particular, we interviewed these workers and observed their interactions with 200 households. Our analysis takes a postcolonial feminist perspective to examine how these frontline health workers navigate the multiple demands placed on them by their families, society, local residents, and health organizations. We also discuss how they practice *feminist solidarity*, and distill lessons for improved data collection across global health initiatives.

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

Additional Key Words and Phrases: Healthcare; postcolonialism; feminism; India; qualitative; HCI4D

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1 INTRODUCTION

A growing number of researchers are actively engaging with healthcare infrastructures across the world in order to design, develop, deploy, and evaluate technology interventions for improved health outcomes. This includes interventions in both the Global South and North, which have focused on healthcare provision and uptake in underserved communities, targeting improved maternal and child health, among other global health topics [60]. Many if not most of these interventions are deeply invested in *data gathering*, motivated widely by the paucity of healthcare data on underserved contexts across the world, particularly those in the “third world” [31].

Several of these data collection tools and processes engage frontline health workers [20, 46, 56, 61]. However, the institutionalized roles and responsibilities and actual workflows and motivations of those involved in data collection and information dissemination are less well understood. To develop this understanding, we conducted fieldwork in an under-resourced locale in Delhi (India) in February 2018. We conducted interviews with 17 ASHAs (short for Accredited Social Health Activists). We also partnered with five of these ASHAs and observed their interactions and data collection practices with 200 households. Our findings revealed that imposed data collection processes overlooked the challenges that the ASHAs faced as they collected data, surfacing longstanding inequities in the

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healthcare infrastructure. This led us to consider a feminist approach to data collection, that might aid towards the design of tools and processes that engage the perspectives of those involved in collecting data.

In Computer-Supported Cooperative Work (CSCW) and Human-Computer Interaction (HCI) research, feminist perspectives to understanding and engaging in technology design are fast gaining ground (e.g., [36, 37, 44]). These works draw on research contributions around theoretical frameworks and methodologies proposing feminist perspectives, with a sensitivity to constructions of race, gender, and class [4, 69]. However, notions of feminism as defined in the Global North may not always account for the situated experiences of women and other marginalized groups in the Global South, where a history of colonization results in different and differently valid ideas of feminism. Surfacing and advocating for these overlooked perspectives forms the focus of *postcolonial* and *third world feminism*, where there has been a rich history of research by activists, theorists, and academics, aiming to counter predominantly white imperialist narratives in feminist literature [52]. In HCI, such perspectives have particularly come to the fore in domains such as health and safety, where women are often worst affected, and routinely placed in positions of lesser power [27, 36, 44]. We draw on this literature as we uncover the struggles that ASHAs face in navigating a patriarchal society and healthcare system. Our analysis is particularly shaped by women's studies scholar, Chandra Mohanty, who argues, "*cross-cultural feminist work must be attentive to the micropolitics of context, subjectivity, and struggle, as well as to the macropolitics of global economic and political systems and processes*" [53].

Our research contributes a postcolonial feminist understanding of the practices and workflows of the ASHAs who participated in our research. We first highlight the struggles ASHAs face in balancing the demands placed on them by their families, health organizations, and local populations. Next, we discuss how *feminist solidarity* [52] is currently enacted by the ASHAs, as they practice advocacy for underserved groups within and across their under-resourced communities. Finally, we consider how this solidarity might be supported, leveraged, and extended to forge bonds among various groups based on differences and common struggles. We also discuss how taking a postcolonial feminist perspective while focusing on vulnerable groups (marginalized communities and delegitimized, overlooked, and overworked ASHAs, in our case) can inform work situated in western as well as diverse "third world" contexts.

2 RELATED WORK

We add to a growing body of research on data-driven perspectives in healthcare, particularly research situated in the Global South, by presenting the perspectives of those involved in the data collection. We engage with literature on work practices and labors of care and maintenance to highlight the ASHAs' workplace processes and behaviors. Our main contribution is to expand current conceptualizations of postcolonial and feminist HCI, and share how data practices reflect and foster *feminist solidarity*.

There has been much work in CSCW on the design, development, deployment, and evaluation of technology for supporting workflows and collaborative processes in health settings [24]. This includes research in the Global North and South on tools for decision-making, data collection, and social support [9, 19, 57, 71]. CSCW has also examined various actors involved in collaborative health environments, with research on the perspectives of family members and caregivers [49, 70], informal information-sharing practices in clinical environments [17], and the impact of health information on patients and caregivers [39]. More recently, there has been a move towards data-driven approaches such as for personalized healthcare provision [64] and to improve collaboration between patients and health providers [71]. We contribute towards scholarship in this area by examining the motivation and workflows of those involved in data collection. Such investigations

have formed the focus of the emerging field of critical data studies [32]. This includes unpacking data assemblages—“*all of the technological, political, social and economic apparatuses and elements that constitutes and frames the generation, circulation, and deployment of data*” [40]. We align ourselves ideologically with this space to offer a critical feminist perspective on data collection workflows at a healthcare setting in the Global South.

In data-driven health research situated in the Global South, most efforts have been directed towards supporting the surveying and healthcare provision activities of frontline health workers. These workers are considered critical in covering the last mile in healthcare delivery and have been widely engaged in many research projects [20, 46, 56, 65, 77]. Researchers have extensively studied their mobile phone use and media-sharing practices to inform the design of information dissemination interventions [46, 56, 65]. Recent work in this area has considered the use of mobile devices for digitizing data collection and improving the efficiency of current processes [20, 21] and the affordances and constraints of paper and mobile surveys [61]. However, this research fails to take a critical approach to examine and/or question the nature of the data collected and data collection processes, which are often dictated by organizational partners. We address this gap by rendering visible the work practices and labor [12] carried out by ASHAs during data collection, analyzing their professional and social undertakings with various actors through the lens of postcolonial feminism.

Understanding the intricacies of workplace behavior has long been a strong focus at CSCW [7, 11–13]. In our analysis, we follow Button’s recommendation that work practices be examined in the context of contingencies that unfold over the working day [12]. We also pay attention to the physical, emotional, and temporal labor that the ASHAs’ roles demand [66]. This includes extending care in the form of social and emotional support to residents, their own families, and other ASHAs, much like the practices of professional caregivers that have been outlined in feminist-ethics literature [55]. As in prior work, we find that workers invest effort into maintaining relationships with communities, beyond what is expected [34, 37]. The work practices of ASHAs that emerged from our data conveyed the struggles they faced while operating in a patriarchal society and healthcare system, and led us to engage with postcolonial feminism.

Postcolonial perspectives are recent entrants to the larger HCI community. In their description of *postcolonial computing*, Irani et al. emphasized the need for “*discourse centered on the questions of power, authority, legitimacy, participation, and intelligibility in the contexts of cultural encounter, particularly in the context of contemporary globalization*” [33]. Since then, there have been multiple efforts to add depth and nuance to this concept [6, 10, 74]. Researchers have studied the unique experiences of people accessing technology and infrastructure in postcolonial environments and highlighted that these challenge traditional notions of mobility [3], innovation [35], and market practices in HCI [14].

Among work that straddles postcolonial and feminist HCI, Ahmed et al.’s ethnographic and design study on women’s safety in Bangladesh surfaces the sociocultural factors that shape women’s mobilities and perceptions around sexual harassment [2]. Similarly, Karusala et al. study safety concerns among women in different locations in India [36]. There has also been much feminist and activist research situated in the Global North, such as on collective storytelling to help women cope with experiences of harassment [23] and the design of breast pumps using feedback from mothers [22]. Much of this work draws on Bardzell’s framework for feminist HCI [4, 22, 23, 38].

In her summary and agenda for feminism in HCI, Bardzell focuses on a central commitment to issues of agency, fulfillment, identity, equity, empowerment, and social justice [4]. Though Bardzell’s characterization of feminist HCI stresses the need for alternative approaches to works situated in “developing” contexts that incorporate qualities such as pluralism, advocacy, and participation, it does not outline how the larger history of globalization and colonization plays a

role [4]. In their work on rural Bangladeshi women, Sultana et al. concur with Bardzell and state that they experienced a conflict between integrating feminist HCI ideals with HCI for Development (HCI4D) research [73]. We contribute to a nuanced understanding of this conflict by emphasizing that current conceptualizations of feminist HCI are inadequate to capture the perspectives and experiences of women and marginalized communities across many parts of the Global South. Despite an increasingly diverse outlook, much feminist work in HCI has primarily focused on a western capitalist notion of feminism, where women's advancement along the corporate ladder is a key interest (though sometimes left implicit). Such notions may not always apply to contexts in the Global South, where different *and valid* ideas of feminism may be appropriate, as Mohanty stresses [53]. Western feminist ideals may embody generalizations and presumptions regarding "developing" contexts, ignoring existing intersections with class, color, and race *within* these contexts. To highlight these intersections, we draw on the rich history of postcolonial and third world feminism, focusing on how women and marginalized groups exercise agency even within their supposedly oppressive environments [5, 52, 54]. In solidarity with feminists and activists working among marginalized populations globally, we use the term *third world* to highlight the history of colonialism and the effect of globalization in these populations, not just in the Global South but also among underserved communities in the Global North [53, 54].

We follow Mohanty's recommendation that an "*experiential and analytic anchor in the lives of marginalized communities of women provides the most inclusive paradigm for thinking about social justice*" [53]. This is particularly relevant in the healthcare sector where knowledge is intimately tied to power [15]. Our analysis focuses on ASHAs and their interactions with marginalized communities, their struggles, the various roles and responsibilities they assume, and power dynamics with various actors. In pursuing this work, we also respond to calls for greater attention to intersectionality in HCI research [26, 72], such as Schlesinger et al.'s emphasis on the need for this research to account for complex identities [69], and Wong-Villacres et al.'s stress on factoring in various "*processes of differentiation and systems of domination*" in designing for intersections [76].

3 METHODOLOGY

We conducted fieldwork in the predominantly Muslim, Jogabai region of South-East Delhi in February 2018. This area is occupied by illegal settlements with poor infrastructure and has been identified by Delhi's health authorities to be at high risk of disease [67]. We used qualitative methods to obtain a deeper, situated understanding of ASHAs' workflows and data collection practices. This study was approved by the Institutional Review Board at the Georgia Institute of Technology, Atlanta (USA).

We conducted interviews with 17 ASHAs working in Jogabai and the neighboring Batla House and Khizarabad areas. These ASHAs were from lower-middle income groups, with annual household income between INR 2 lakhs to 12 lakhs (approx. USD 3.1k to USD 18K) [18]. They did not belong to their primary target communities, which were marginalized and low-income groups, where annual household incomes were below INR 2 lakhs [18]. Almost all ASHAs had been on the job for the last four years; one had worked for two years. The five ASHAs from Khizarabad were Hindu, the remaining were all Muslim. From the interviews, we learned that Khizarabad, a predominantly Hindu region, was considered by the ASHAs to be relatively higher on the socioeconomic scale and had few slum communities. Many of the ASHAs were migrants, some of whom had moved to Delhi after marriage. All the ASHAs reported at the same local primary health care center in Batla House. We also accompanied five of these 17 ASHAs during their house visits, observing their surveying activities at 200 households (which we will henceforth refer to in terms of residents, survey respondents, or simply respondents). ASHAs were recruited through referrals; after an initial introduction to two ASHAs by the local clinics, we recruited the other 15 using snowball sampling

Participant	Age Group	Region of Operation	Participation
1	50-55	Jogabai	Interview and Survey
2	30-35	Jogabai	Interview and Survey
3	20-25	Jogabai	Interview and Survey
4	45-50	Jogabai	Interview and Survey
5	20-25	Jogabai	Interview and Survey
6	30-35	Batla House	Interview
7	25-30	Batla House	Interview
8	20-25	Batla House	Interview
9	25-30	Batla House	Interview
10	25-30	Batla House	Interview
11	30-35	Batla House	Interview
12	50-55	Batla House	Interview
13	55-60	Khizarabad	Interview
14	25-30	Khizarabad	Interview
15	30-35	Khizarabad	Interview
16	30-35	Khizarabad	Interview
17	25-30	Khizarabad	Interview

Table 1. Demographic Information of ASHA Participants

[28]. Demographic information regarding the ASHAs and residents in our study is presented in Tables 1 and 2.

Some interviews with the 17 ASHAs took place one-on-one, while others took place in groups. There can be challenges in soliciting the views of all participants in group interviews, as Kumar documents in her work with rural Indian women [43], and we found ours to be similarly cordial and generative. All interview sessions were 45-60 minutes long and led by the first author, who identifies as female. Questions in these interviews focused on the everyday responsibilities of the ASHAs, details and challenges around data collection practices, their current use of technology (e.g., if they owned a smartphone or used social media), how they motivated communities to adopt new health practices, and common medical complaints they encountered on a day-to-day basis.

The surveying activities of the ASHAs that we observed were mandated by the primary healthcare center (generally referred to as the “dispensary”). We recorded our observations on the interactions that took place between the ASHAs and survey participants and transcribed the conversations in the form of extensive handwritten field notes. The household visits took place on eight days in the month of February, and included anywhere between 10 and 50 households in a day. Each day of fieldwork meant approximately four hours, adding up to a total of around 30 hours. We paid close attention to the approaches taken to obtain data, the conversations between ASHAs and residents, and attitudes towards data collection on both ends. Interactions between the ASHAs and residents

Total	200 survey respondents
Gender	Female: 183, Male: 17
Region	Jogabai R-block: 143 Jogabai S-block: 57
Highest education in the household	Completed college: 5 Completed 12th grade: 17 Completed 10th grade: 48 Completed 8th grade: 59 No schooling/Below 8th grade: 71
Household size	Min: 2, Max: 14, Average: 5.1
Age (years)	18-25: 31 26-35: 52 36-45: 63 46-55: 42 55-65: 12
Annual household income	Below 2 lakhs: 168 2-5 lakhs: 32
Primary language	Hindi/Urdu: 148 Assamese: 17 Bengali: 35

Table 2. Demographic Information of Survey Respondents

took 3-15 minutes; the length depended largely on whether there were health complications, and the level of engagement and cooperation of the respondent.

All interactions and data collection took place in Hindi. Interview and observation data was collected in the form of field notes, audio recordings, and photographs. All data was recorded only after the consent of ASHAs and respondents, and was later anonymized. Names used in the writing of this paper are pseudonyms. Observations, interviews, and focus group discussions were conducted by the first author who has lived in this region for over a year and has previously conducted ethnographic research on healthcare access in the slums of Delhi. During this prior engagement, we uncovered a gap between healthcare provision by frontline health workers both as directed and enacted, and the healthcare needs of local communities. We wished to further investigate the struggles that ASHAs faced in meeting the needs and expectations of local communities and the government, from their perspective. We add a note at the end of our findings reflecting on how our presence may have affected the data we collected.

All data was translated from Hindi to English by the first author, and shared with other authors. This was collectively analyzed using the inductive process outlined by Merriam [48]. We conducted several rounds of open coding, focusing on findings relating to the practices, motivations, and constraints of the ASHAs. Generated codes were shared and discussed by all authors after each iteration of coding. The first round of coding closely followed the text. The next round of coding was more high-level and resulted in codes such as “*disagreements with Anganwadi workers*”, “*organizing strikes*”, and “*family responsibilities*”. Subsequent rounds of coding combined several codes to surface larger themes such as “*conflict between various responsibilities*” and “*questionable reliability of data*”. The themes that emerged foregrounded the struggles and agencies of the ASHAs, leading us to engage with the lens of postcolonial and third world feminism. We found that Mohanty’s work dealt with exactly the tensions that surfaced through our data [52]—exercising agency and navigating a patriarchal society and healthcare system, exhibiting *solidarity* with various groups, and challenging existing power structures and traditional roles.

As we engage with the data through a feminist lens, we recognize that we, as authors, shape how the findings are framed and presented. We share our backgrounds to situate our partial perspectives [4, 29]. All authors are women of Indian origin, and have lived and conducted research in Delhi, India, and worked with frontline health workers in rural and urban India for a total of eight years. As “third world women” located now in privileged academic settings of the Global North, and having conducted extensive research in the South, we are sensitive to the struggles at the intersections of race, class, and gender in our work, but we recognize that they are not *our* struggles. Through this work, however, we hope to shed light on and bring more careful attention to healthcare challenges and opportunities in the Global South, particularly targeting the lives of marginalized women. We also recognize that the data we present in the following section could potentially be analyzed through other lenses. Using a feminist lens, however, allows us to uncover the struggles that underlie data collection from a social justice perspective.

4 FINDINGS

Our findings focus on the perspectives of the ASHAs—their roles, experiences, and motivations. We first look at their work practices, examining their data collection activities and their interactions with residents that led to data. We then outline the roles and responsibilities of the ASHAs and how they balance these out. Finally, we unpack the ASHAs’ relationships and power dynamics with various actors involved in data collection. Throughout, we bring attention to the struggles they face in the course of their work and the solidarity they display with various groups.

4.1 Data Collection

During the ASHAs' data collection, what stood out was the lack of accurate and complete reporting by respondents, incompatible language literacies, and how the exercise served as a stimulus for discussion. We describe each of these below.

House visits formed a major part of the labor performed by ASHAs and data collection was generally conducted during these visits. As one ASHA (P3) said, *"This is our work—conducting surveys."* During the interviews, ASHAs frequently used the term *"fieldwork"* to refer to their house visits and we also use this term to describe their activities. From our interviews, we learned that it was mandatory for ASHAs to collect demographic data routinely in their areas for the local dispensaries. This data included names, ages, and occupations of household members, household density, and information about pregnancies and newborns. In addition, ASHAs collected data on infrastructure such as water conditions, sanitation facilities, and housing conditions when required. They were also expected to record medical conditions and risk factors for disease (such as poor sanitation) though these were not incentivized and were identified by them to *"take more time to record."* As a result, they shared that this *"more important"* data was overlooked by them in favor of data that they were paid to collect. This brings into question the completeness of the data collected.

ASHAs collected data on a monthly basis in record books provided, and submitted completed surveys to the dispensary. The surveys were designed by state-level health organizations with representatives from the World Health Organization (WHO) and other global health actors. The collected data was recorded into the digital Health Management Information System (HMIS) used by supervisors, program coordinators, and other health personnel at the district, state, and national levels to inform healthcare policy [50]. The prevalence of the practices we observed across ASHAs and communities may indicate that the data and data processes fulfilled the expectations and purposes of supervisors at the dispensary level. These expectations may or may not align with those of WHO, and the district and state-level personnel. We do not have data on the expectations and data processes within the dispensary and at the district and state levels, though WHO has published metrics for data quality [59]. These include accuracy, timeliness, reliability, completeness, and integrity of data collectors [16]. These are the expectations we refer to below. Our intent is not for data quality to be compromised, but to emphasize how it might be better ensured while (and by) recognizing the perspective of ASHAs.

4.1.1 Approximate Data. The difficulties faced by the ASHAs during data collection often resulted in guesswork and estimations (temporal labor) that raise concerns regarding the reliability and accuracy of data collected, as well as the ethics of current procedures.

ASHAs frequently faced situations where survey respondents were unable to offer the data they needed to record. For instance, in illegal and informal settlements such as slums, often no official address is assigned. Further, many survey respondents (mostly women) did not know their home address. In such situations, the ASHAs either looked for power meters set up by the government to see if they indicated an address or estimated the address based on the last one recorded. Such approximations could result in mistakes, as P1 discovered: *"My addresses have become mixed up. No problem. It's not like we are using this data to prepare any important documents."* This suggests that she cared less about accuracy and more about getting the job done, perhaps also because the value of her effort was unclear to her. In addition to seeking physical cues, ASHAs made approximations by asking survey respondents related questions. Residents often did not know their family members' exact ages resulting in ASHAs estimating based on several prompts such as when the couple had been married, how many children they had, and what grades their children were in. We found that the reliance on such processes resulted in ASHAs making estimations even when data was available. In one such case, P4 told a respondent who had offered to ask her husband his age, *"What*

is there to ask? You said your age is 25, I put down his as 30.” Such processes indicate that the data ASHAs collected was not necessarily precise and involved estimations and approximations, often driven by the absence of readily available data and a desire to complete surveys on time.

Respondents also sometimes appeared to be uncomfortable divulging information requested by ASHAs, perhaps due to embarrassment or social norms. They hence provided vague and non-committal responses, even when they knew the response to a question. For instance, while recording education levels, ASHAs frequently received responses such as, “*Hmm... maybe 8th or 10th?*” or “*Not much*”. Nebulous responses were translated by the ASHAs to mean no education or below 8th-grade education. We found similar hesitation from residents while recording annual household incomes. As P2 said, “*No one tells us their salary. They just give excuses. That’s why I’ve stopped asking. Instead, we ask what the husband does.*” However, P13-P17 did not face this issue while working in a relatively higher socioeconomic area. This indicates that not only could data collected be inaccurate, its accuracy could be biased in favor of socioeconomically higher households. The above processes also raise privacy concerns.

ASHAs were also quick to question residents’ responses that sounded unlikely. One respondent initially claimed that she had no medical problems, but on further prodding from the ASHA (P2), divulged that she had leukorrhea [75] and was embarrassed to talk about sexual health. In another such incident, the ASHA (P3) responded, “*What, no problems! Your eyes are cloudy and you look weak. I have put you down as anemic.*” In our interviews, ASHAs shared that in underserved communities in particular, people had been living with ailments for so long that they did not realize there was a problem. Hence, ASHAs sometimes went against a resident’s self-assessment, leveraging their past experience and medical expertise. Though such incidents demonstrate the power that ASHAs held in these interactions, these activities arose from a desire to provide “good” care which prior literature has argued goes beyond patient choice [55]. When ASHAs were confident about certain answers due to past experience, they would not consult the resident at all, as P3 justified:

ASHA (P3): “*Do you buy water?*”

Bushra: “*Yes, of course. Everyone in this building knows that that the tap water is unsafe.*”

ASHA (P3): “*Yeah, that’s why I generally don’t ask this question.*”

The above approximations made by ASHAs not only impact data quality, but also raise ethical questions around norms and practices that may be prevalent. Without this data, the survey would have been considered incomplete by the dispensary and ASHAs hence felt compelled to provide some data. ASHAs often collected data in ways that challenged its validity, making approximations as needed and without always consulting the respondents. It often appeared that they were confident in making these approximations; their focus remained less on accuracy and more on getting their job done (or achieving timeliness), we found. This is not to imply that they were cutting corners, but that there was a gap between what authorities may have *expected from the data* they wanted in terms of quality and what the ASHAs felt was reasonable to provide, *given ground realities*.

4.1.2 Linguistic Differences and Varying Literacies. We found that varying language literacies of the ASHAs frequently shaped the nature and quality of data collection. Given the urban setting and a large migrant population, a number of languages and dialects were in use. The varying health literacies [58] of the ASHAs and survey respondents also affected data collection.

We found that although the surveys and responses were in Hindi (spoken across Delhi), responses were often transliterated into the Roman script, possibly because ASHAs wished to improve their English, as previously uncovered by Karusala et al [38]. The tension between using Hindi versus English is evident in P4’s statement: “*The last woman mentioned that her husband cuts hair. That means he is a nai. What is it in English, is it barber? How do I spell that?*” Also, some ASHAs preferred

to record data in Hindi while others preferred English. These differing preferences presented a challenge when ASHAs paired up for site visits.

We visited several Assamese and Bengali households with the ASHAs where the women did not understand or speak Hindi. These were vulnerable groups—they had little political influence, lived in the most marginalized slums near the polluted Yamuna river, and were at high risk of disease [8]. Communicating effectively with these groups was critical but most ASHAs did not understand or speak their language. To overcome the language barrier, ASHAs relied on community members who understood Hindi. P1 hoped to improve communication with these communities by *“teaching myself some Bengali using Google translate.”* However, mistranslation could affect data accuracy. Additionally, ASHAs found the translation labor to be emotionally draining, which could affect data completeness: *“I will come here another day. I cannot deal with these responses right now.”* (P1)

Misunderstandings between ASHAs and residents were common when a medical condition or terminology was unfamiliar. For example, the term “diabetes” was better known by residents as “sugar”. Similarly, leukorrhea was known as “safed pani” which translates to “white water” [42]. Some survey respondents were also unfamiliar with certain medical conditions, which resulted in ASHAs explaining the condition to them to determine if they had it. Also, since English was not the ASHAs’ native language, there were several spelling variations when they noted down medical conditions that were not spelled out on the survey. This further affected data quality. Hindi being a phonetic language did not have the problem. ASHAs also shared their practices to improve their health literacies: *“I read up on medical conditions online... I also get information from ma’am [supervisor] during the monthly meetings and via phone calls.”* (P11)

Language barriers and poor health literacies thus affected data accuracy and completeness. We also saw that ASHAs expended cognitive labor in the translation of data on-the-ground to data needed. To make translation easier, ASHAs made an effort to improve their literacies, such as by using English more often, using Google Translate, reaching out to supervisors, and looking up health information online. These findings further emphasize the need for a better understanding of these challenges among the authorities, a reconfiguration of the forms that ASHAs must use to record data, and acknowledgement (versus indifference) of potential errors present in the data.

4.1.3 Data Collection as Stimulus for Discussion. Data collection helped stimulate conversations on widely varying topics including the government, prevalent medical conditions, healthy practices, and cultural norms.

Many residents associated frontline health workers with other government health services. They often asked questions such as *“Will there be a health camp anytime soon?”* and *“Will we get medicines for these medical conditions?”* In communities less familiar with survey practices such as migrant populations and people who had recently relocated to the region, there was curiosity about data collection and its purpose. ASHAs generally found themselves unable to answer such questions and often responded saying, *“This data will go to the government. But we cannot guarantee anything.”* Some residents were positive about data collection, such as one woman who had recently moved to Delhi: *“If the government is checking coverage then that is very good... There were no vaccinations in my village.”* However, many slum communities were disillusioned, asking:

“What will the government do with this information? They won’t do anything. They would give us money if they wanted to help. They only come here when they want votes.”

We found that just asking questions about medical concerns would lead to conversations between the ASHAs and the respondent. Though expected by the government, delivering medical advice was not incentivized and reflects the care volunteered by ASHAs. When residents mentioned the medical problems they were facing, ASHAs would try to understand what the underlying cause might be, instructing them how to treat the cause. If beyond their expertise, ASHAs suggested

visiting the free local dispensary or a government hospital for serious ailments. We also found that ASHAs frequently gave unsolicited health advice that residents either ignored or agreed to practice:

“There is a bad odor coming from here... if you keep the door closed 24 hours then this is what will happen. Keep the door open and close the gate, and let the bad gas escape. It is not healthy for the child, it is not good for anyone.” (P4)

Questions about health behaviors in the household often resulted in discussions around prevalent practices. For instance, chewing tobacco (and *paan*) was a common practice in the context we studied. The ASHAs often berated those doing so and showed them government signs in the area to warn against the use of tobacco. Many survey respondents volunteered opinions on what more could be done to deal with such behaviors. Multiple women told ASHAs, *“These boards and posters saying that tobacco chewing is unhealthy will do nothing. Until the government bans tobacco shops here, or taxes them heavily, nothing will happen.”* Data collection tools could thus stimulate discussions on health and political topics. A more conscious consideration of this potential while designing tools could motivate outcomes beyond data collection. However, we found that the motivation and interest of community members strongly shaped the ASHAs’ engagement. Not unexpectedly, respondents who were more conversational were more likely to receive guidance.

4.2 Balancing Roles and Responsibilities

The ASHAs found themselves juggling multiple responsibilities—towards their families, supervisors, the dispensary, local communities, and themselves. There were often conflicts between these roles, further complicated by prevalent social and cultural norms, as we discuss below.

4.2.1 Family Commitments. A recurrent theme during our field work was the interweaving of family life with the work of ASHAs. Unlike most professions, the ASHAs had no fixed hours and there was just a minimum work requirement. While this allowed for great flexibility, which multiple ASHAs saw as motivation for taking on the work, it also highlighted their primary commitment to their families over their role as ASHAs. We learned that ASHAs frequently started later in the day than they expected to, their mobility dictated by household responsibilities. One ASHA (P1) had a four-month-old and had to manage her schedule accordingly. Another (P5) was away for a few weeks for a wedding. In this period, her work was conducted by P1. As P7 added:

“We don’t work on Sundays because our husbands are at home. And while they are there, they will want some special food or will ask about what we’re doing... It’s easier to do all the household work then and go for work during the week when they are not around.” (P7)

Cultural norms and expectations from family members also played a role in determining work schedules. P8 said, *“I generally leave for work in the morning... daughters-in-law are not supposed to go outside the home.”* Though family members sometimes disapproved of the ASHAs’ work, they also lent a helping hand when needed, not without possible repercussions:

“I get my mother-in-law to look after my young child when I leave. I don’t think she’s too happy about that but she can’t say no. But you wonder what they [in-laws] think, they probably think I am not doing a good job with taking care of the home.” (P1)

The interweaving of family life with work was desirable to the ASHAs, as was flexibility in schedules. However, tasks scheduled by the dispensary (discussed next) could affect flexibility and unexpected and unscheduled tasks allocated could cut into family time.

4.2.2 Demands of High-Level Actors. The ASHAs were expected to fulfill certain responsibilities as part of their job. They were provided monetary compensation for many of the tasks and the incentive structure in place drove the efforts of the ASHAs. They received a base salary of INR 1,000

(USD 15) per month only after conducting surveys with at least 70 households. Beyond that amount, they received compensation based on the activities conducted such as vaccinations, antenatal care visits, postnatal care visits, and provision of contraceptives.

The higher-level actors that the ASHAs had to report to included Auxiliary Nurse Midwives (ANMs), the dispensary, and WHO representatives. The ANMs did not belong to the communities they provided services to and were responsible for administering vaccines and coordinating with ASHAs in multiple areas. P5 stated that, *“The ANM is doing a lot. As it is, she travels here from so far away.”* The ANM’s primary concern was that *all* children were vaccinated and accounted for. Monthly vaccination drives were organized to vaccinate the children that the ASHAs had managed to round up. Bringing the parents and children to the site was the responsibility of the ASHAs and was overseen by the ANMs. However, we found that the ASHAs found it difficult to meet the expectations of the ANMs. A common lament we heard from almost every ASHA was: *“Children always get missed during every vaccination cycle. Even for polio.”*

The local dispensary was the point of coordination for all the ASHAs in an area. This is where they were expected to submit data monthly, obtain contraceptives and nutrition supplements, and attend monthly group training sessions. In addition to paid activities and scheduled drives, ASHAs were also expected to help with unpaid and unscheduled activities such as polio drives and disease outbreaks like measles. According to P7, during outbreaks, they surveyed 400-500 households in a week or two, searching for cases of measles. Despite their efforts, because of the frequent travels of migrant populations, many cases would emerge later and the onus was on the ASHAs for detecting them on time. Interviews with ASHAs from different, though neighboring, regions also indicated that the demands of the job varied greatly with the demographics of the population. Even within a region, some ASHAs faced more difficulties than others. ASHAs working in more conservative societies, poorly lit and unsafe areas, and among marginalized populations, had restricted mobility and faced more resistance to the adoption of health services from communities.

Thus, the demands of high-level actors did not consider ground realities and the varying difficulties of the ASHAs’ tasks depending on their area. There is a need for equitable distribution of data collection tasks based on the region of operation. The unpaid and non-scheduled tasks allocated by the dispensary could also conflict with the ASHAs’ primary commitment to their families.

4.2.3 Commitment to Local Communities and Marginalized Women. The ASHAs also had a sense of responsibility towards and exhibited *solidarity* with marginalized communities, particularly women. Though the “activist” aspect of their position was not clearly defined by the government, as also pointed out in prior research [68], it was evident from their activities.

We observed that the ASHAs spent more time counseling women who belonged to lower socio-economic groups and conservative homes where women found their mobility restricted. They were often denied entry into the more affluent households in the area but did not mind, and their attitude reflects a primary commitment to underserved communities: *“Doesn’t matter, these people won’t open the door. Here, we just do surveys quickly. They vaccinate their children in private hospitals anyway.”* In contrast, at households that were located in slums or lower socio-economic areas, the ASHAs protested if they were turned away or received non-cooperative responses. They also spent additional time advising low-income residents to take better care of their health and vaccinate their children. For instance, when P1 was greeted with a closed door in a high-risk area, she did not leave right away. Instead, she knocked and loudly stated, *“Oh, open the door! I want to talk to you about vaccinations. I am the ASHA worker of your area.”* This extra effort resulted in a conversation with the woman about immunizations with the door closed and an exchange of contact details. We also found that survey questions relating to demographic information sometimes revealed the young age of women at marriage and during pregnancy, eliciting concern from the ASHAs who

counseled the women to educate their children and not perpetuate the patriarchy. Thus, we see that ASHAs expended significant effort to cover the last mile in healthcare despite little recognition of their efforts. This indicates a solidarity with marginalized women, which may have surfaced from a recognition of similar struggles against a patriarchal society.

The ASHAs were also sensitive to cultural norms and tried to navigate social barriers in a patriarchal society. For instance, they often lowered their voice while talking about sexual and maternal health. This demonstrates solidarity with other women and an understanding of their concerns while discussing taboo topics, likely a result of personal experience. In one case, P3 asked a resident, *“Do you have any ladies’ problem? Like leukorrhea? Your son-in-law was present earlier that’s why we didn’t ask then. Not that they understand this stuff anyway.”* According to the ASHAs, many female residents in their target communities were tied to traditional gender roles that mandated that they take care of the *“kitchen, cleaning, and clothes”*. This restricted their mobility as many women were unable to find time to visit the immunization drives. The ASHAs tried to convince them to attend by providing practical solutions: *“It will take five minutes, just wear a burka on top and come out quickly when we call. Don’t worry about what you’re wearing or anything.”*

In certain cases, the ASHAs found themselves unable to bypass social taboos and economic constraints. One resident had a miscarriage while carrying a heavy machine, but stated pragmatically to P4, *“Who will do all this work if I don’t do it? We are poor and have no choice.”* Another woman who the ASHAs berated for not bringing her children to the vaccination drives shared, *“My mother-in-law and my husband don’t want to get the children vaccinated. Otherwise, I would have come.”* The efforts of ASHAs to understand the struggles faced by local residents further points towards their solidarity for marginalized communities and empathy for the challenges they faced. However, in the absence of adequate support from the government, solidarity was not enough. Perhaps because of such experiences, ASHAs were realistic about their ability to help. When one resident asked how recording medical conditions was going to help solve them, P2 responded, *“I will not give you any false promises. If it was in my hands then I would solve all your problems.”*

ASHAs were thus solidly committed to the needs of local communities and went beyond the demands of high-level actors to demonstrate solidarity and play the (unpaid) role of social activists. However, though they shaped their data collection and healthcare provision activities based on the needs of marginalized groups, patriarchal and socioeconomic constraints obstructed their efforts.

4.2.4 Responsibilities to Themselves. The ASHAs had certain aspirations and expectations from themselves and their job, reflecting a solidarity with their own interests. A common theme that emerged during the interviews was that many ASHAs had joined in order to gain more *“independence”*. However, their job did not reach their expectations in terms of the workload, monetary compensation, and other support provided. In fact, it was so unsatisfactory that P5 shared, *“There used to be two more ASHAs operating in this area. But they left after a few months because the work was too demanding and paid so little, and did not pay on time.”*

During the interviews, safety emerged to be a major concern and was declared to be the *“biggest threat to our [the ASHAs’] work”*. This sentiment was echoed by other ASHAs such as P15:

“... an ASHA worker was gang raped in Muzaffarnagar [close to Delhi]. She committed suicide... We are putting our lives at risk everyday when we go out to work. But the government does not account for all this and pays so poorly. We are of little value.” (P15)

We also found that many ASHAs made concerted efforts to improve their digital literacies. During this research, P4 learned how to use WhatsApp while P12 set up WiFi in her home after having used mobile data for a year. These evolving literacies were sometimes tied to aspirations of being able to engage with other ASHAs on social media [38]. Lack of confidence in digital abilities could also impact self-efficacy in other ways. P4 told us that she was *“... the most informed of the ASHAs—the*

ANM told me that I was great in all ways... except in my poor digital abilities.” As in past research [44], we found that intermediaries—children and younger ASHAs—played a key role in helping older ASHAs develop an online presence, particularly on social media such as WhatsApp. By the end of the study, P4 had developed more confidence in her digital abilities: “My daughter helped me set up WhatsApp and showed me how to use the speech-to-text feature. Before, I was uncomfortable typing in English but now I can do that.” Some of the younger ASHAs also aspired to transition to a better paying job by improving their digital skills, such as P1:

“Two of us have been familiarizing ourselves with using mobile phones because we know that is where the new job opportunities are. If we train ourselves, then we might get a better paying job in something like data entry... Some of the older ASHAs don’t get that the world is changing. The government is also talking about giving us tablets and if that happens then we will be able to adapt quickly.” (P1)

We see that ASHAs had aspirations and responsibilities for themselves, such as wanting to improve their digital literacies, keeping themselves safe, and transitioning to better paying jobs. Safety concerns resulted in them coordinating work with other ASHAs which could further constrain work schedules. Though the ASHAs valued the independence that their roles afforded, their job did not meet their expectations in terms of monetary compensation, workload, and support or support their aspirations, which could impact motivation for assigned tasks in the longer term.

4.3 Power Dynamics at Various Levels

ASHAs were expected to interact with local communities and high-level actors. Before we discuss the power dynamics evident in these interactions, we situate the ASHAs and their roles in the health infrastructure we studied, with the goal of exposing these power structures to further scrutiny.

The healthcare infrastructure in Delhi (and many parts of India) is highly hierarchal. Government hospitals occupy the top of the hierarchy and provide affordable specialized care. On the next lower tier, Primary Healthcare Centers (also known as dispensaries) provide free medicines and consultation for non-critical medical complaints. Program coordinators at the district and sub-district level work with WHO representatives and other health organizations to oversee community health initiatives based out of the dispensaries. ANMs report to these dispensaries and are primarily responsible for conducting immunization drives. ASHAs and Anganwadi Workers (AWWs) form the bottom of the hierarchy, conducting outreach to communities in their assigned areas and covering the last mile in healthcare delivery. ASHAs and AWWs worked under the supervision of the ANMs and frequently interfaced for delivering these services. ASHAs also link between dispensaries and the surrounding communities—obtaining resources for distribution, motivating community members to access dispensary services, and depositing completed surveys.

4.3.1 Conflict with ANMs and Anganwadi workers. The ASHAs were expected to report to the ANMs and work closely with them. However, their relationship and comfort levels with them varied. The ASHAs perceptions around the relationship were succinctly summarized by P12, “Some ANMs are nice and some aren’t.” From interviews, we learned that the ASHAs believed that the ANMs were only concerned with getting children vaccinated on time and administering medication in case of a disease outbreak, like a measles outbreak that took place around the time we conducted the study. ANMs were also paid more than the ASHAs and, according to the ASHAs, for less laborious work:

“The ANMs are sitting and making money from our fieldwork. We are the ones who do the hard work of rounding up people and getting them to the vaccination site. But they get money for it. They don’t care how we get people to come, just that we do.” (P16)

We also found that the relationship between the ASHAs and Anganwadi workers (AWWs) was strained. In Delhi, Anganwadi workers are expected to provide education, nutritious food, and care to young children and pregnant mothers. Though AWWs were expected to coordinate with ASHAs, the ASHAs shared that they found themselves conducting unpaid work such as administering polio drops that technically fell under the purview of the AWWs. In contrast to the ASHAs' physical labor that involved visiting households and conducting surveys, AWWs worked from an office and had fixed working hours. We share a conversation snippet from our interview with P1 below:

“The Anganwadi [AWW] says yes to everything but doesn't do any work. She did not inform anyone in my lane about the vaccination drive even though she said she had. And even I got comfortable because she said she did. And now my lane is left out.” (P1)

Much of the conflict with the ANMs and AWWs appeared to stem from frustration over their poor pay that was not commensurate with the work performed. ASHAs saw their role as being more involved and labor intensive than that of ANMs and AWWs, both of which have a fixed salary. This was exacerbated by the fact that AWWs, who they saw as peers, had recently seen a hike in their salary after multiple strikes and demonstrations [62]. These conflicts resulted in poor collaboration and could further impact motivation for assigned tasks.

4.3.2 Dissatisfaction with the Government. The dispensary directed ASHAs based on the instructions provided by the state government. To the ASHAs, it thus represented the power of the Delhi government. Our interviews indicated that a major point of contention between the dispensary (and government) and the ASHAs was the poor pay and flawed incentive structure which considered outcomes and not the effort involved. For instance, ASHAs received incentives only on completing all the required antenatal care visits. However, many pregnant women left to deliver in their village resulting in *“all our [their] efforts going to waste”*. A report from P11 is shared below.

“The government thinks that we don't do any work because they only see who got vaccinated finally. And here were doing a hundred rounds to each home... In the jhuggis, they don't listen no matter how much I tell them to come.” (P11)

To account for their effort, the ASHAs suggested that the government use GPS tracking. As P8 said, *“If this gets implemented, then that would be best.”* ASHAs also found themselves excluded from data processes beyond collection and had little understanding of what happened with the data they collected. P14 shared, *“I don't know what they do with the data we collect. If God is benevolent, then they [the government] will do something useful.”* The ASHAs also believed that they and their work was undervalued. P10 shared that not only had she not been paid in months, the ASHAs received no benefits such as a pension or medical insurance. The mounting frustration of the ASHAs resulted in opinions such as the one below, which demonstrates a commitment towards their own concerns:

“We are not afraid. We are not worried about putting these things out in the open. If we do not open our mouth, then no one will listen to our concerns.” (P8)

Such experiences and perceptions resulted in many ASHAs (both the ones we interviewed and around Delhi) organizing into unions and conducting strikes and demonstrations [63]. This demonstrates their solidarity with each other which emerged from their common struggles. However, such actions could face backlash from the government, as experienced by P1 who was not paid for two months after going on strike. Many ASHAs were also disillusioned with the government and their approach to healthcare provision such as these two ASHAs:

“We will give the measles medicine like the dispensary wants us to. But, it is the garbage all around that is the real danger.” (P3)

“I saw a post about a child drinking dirty water on Facebook. It said, share this so many times that it reaches Modi ji [Prime Minister of India]. I liked it. But even if it does reach him, it makes no difference. And here we [ASHAs] are working so hard, but no result.” (P1)

Though there was dissatisfaction with the government for these reasons, ASHAs believed that some WHO representatives were sympathetic to their concerns. For instance, P1 shared that one representative said that he would instruct the ANM to come more often to her area and personally visit certain households because many residents refused to vaccinate their children. WHO representatives were also more transparent about workflows. For instance, after administering a vaccine incorrectly, P1 was told that vaccination schedules were not decided arbitrarily. For each region in India, WHO provided the schedule based on the data they had for that population.

To summarize, low pay from the government and exclusion from data processes led to perceptions among the ASHAs that their work was not valued, doing little to discourage problematic data collection. This could be addressed through greater transparency on the government’s part, as demonstrated by WHO representatives.

4.3.3 Relationships Between the ASHAs. The relationship between the ASHAs went beyond a working relationship; they interacted with each other regularly both offline (tea breaks together after conducting fieldwork) and online (on social media such as WhatsApp and Facebook). Their network functioned as a support system; being from similar cultural and socioeconomic backgrounds, ASHAs could easily empathize and practice solidarity with each other. They counseled each other on dealing with personal concerns such as conflicts with family members that might arise because of their work. They also helped each other fill the gaps in their medical knowledge, check their work, and resolve work concerns, as P4 described:

“Because I know all the vaccination dates and medical conditions so well, the other ASHAs come to me when they need advice. They call me baji [older sister]. . . The other day, Sheeba was going to give the vaccine to a child at the wrong date and I stopped her. Later she told me—Thank you baji, because of you I did not make that mistake.” (P4)

This solidarity between the ASHAs extended beyond their region to include other ASHAs they met during monthly group meetings. ASHAs in Delhi had unionized to petition the state government for a salary hike and other benefits. As shared by P2, *“There is a group of ASHAs who have formed a union, they even have a WhatsApp group. They meet every month and plan strikes and such. Let’s see what happens. . .”* We learned that dates and venues for demonstrations and strikes were planned using WhatsApp. However, to be successful, this required unified support from all ASHAs. Though the ASHAs unanimously supported these efforts, they were hesitant to participate:

“Strikes only work if we all work together. If only one or two of us participate, we get penalized. I’ve asked all the ASHAs to participate so many times, but everyone is scared. . . I took part in a strike once and was humiliated by the ANM.” (P3)

Though the ASHAs supported each other, there were also tensions between them because of differing working style and approach. For instance, according to P4 who often paired up with P1: *“Even though this is Nikhat’s area, most people know and like me better because I talk to them nicely and ask them about their families and themselves. Nikhat is a bit too argumentative sometimes.”* Many ASHAs also echoed the concern that some ASHAs completed surveys from home and recorded old data. P1 justified her concern saying:

“If you make below 7000 [approx. USD 106] and more than 10000 rupees [approx. USD 151], checking is conducted in your area by WHO representatives. But these ASHAs who make 7000 to 9000 [approx. USD 136] rupees per month escape checking. . . . In my four years as

ASHA, I have made 10000 rupees only one month, that too after I went to every household for surveys, immunized all the children, and completed all my other responsibilities.” (P1)

We also found that the ASHAs were cautious while interacting with other ASHAs of different backgrounds, such as religious beliefs. P4 shared, *“We are having some of the Hindu ASHAs at my home next week for a group meeting and we want to make sure that the home is well put together and that we are courteous. We don’t want to leave them with a bad impression of Muslims.”*

Thus, ASHAs displayed solidarity with each other which emerged from their shared struggles. To deal with conflicts, they shared their problems and solutions to personal and work matters, and organized meetings and strikes. However, there were also tensions that arose between ASHAs from differences in working styles, work ethics, and cultural and religious backgrounds. The practice of copying over old data from past surveys in particular, not only challenged the validity of data but resulted in resentment against the unfairness of the system by ASHAs who believed in integrity.

4.3.4 Conflict with Local Communities. As mentioned earlier, the ASHAs extended care to their local communities in multiple ways—based on and beyond the incentive structure. However, there was power held and exercised by both the ASHAs and the local communities in these interactions. Lack of cooperation from residents could negatively impact data collection activities and ASHAs, but the exercising of power by ASHAs could further distance local communities.

We found that the ASHAs efforts were not always welcomed by residents, in fact, it posed a nuisance to many of them. As declared by one male resident, *“This is your work, but we get disturbed by it. You come again every few days.”* Cooperation of residents also varied depending on the service, which the ASHAs put down to varying awareness about their importance. P3 stated, *“With polio we are told that we would be reported for not coming. But then for vaccines, people say that it is our choice to administer or not.”* Refusals to cooperate with ASHAs not only meant that care could not be extended, but also resulted in ASHAs losing out on the chance to fulfill requirements for incentives, particularly in the case of pregnancies. Residents were thus in a position of power to affect ASHAs’ incomes. We also found that many residents were not willing to visit the dispensary and instead asked ASHAs to provide medicines and administer vaccines at home. Such lack of cooperation resulted in ASHAs’ pointing out to residents their responsibility in accessing health services:

“In the last four years, I’ve come here so many times. And not once you told me when you were pregnant. You know that I am your ASHA worker. You don’t give your phone number either, you give me your husband’s. When I call, he is at work and just says that he doesn’t want anything and cuts the call. Even you should have some responsibility.” (P5)

During household visits, we observed that many residents considered ASHAs to be an authoritative voice on health matters thus placing them in a position of power. Having worked for years, the ASHAs were highly familiar with many communities and were a recognized face in their areas. Even then, they found it difficult to remember each of the 400-500 households under their purview and as a result, often forgot which households had children who needed to be vaccinated. Many households were also not accounted for during data collection because residents were working during the day. Additionally, in the region we studied, residents often traveled every few months to their native village. This resulted in confrontations between residents and ASHAs when residents thought ASHAs had not visited their home:

Sadiya: *“You haven’t come to this flat in the last year, I was going to complain.”*
 ASHA (P3): *“Do that if you wish! I will also tell them that you aren’t cooperating. You think you would be the first one to do that? I did come by, you can ask your neighbors... Half the time residents don’t even open the door for us.”*

Residents had the power to potentially hurt an ASHA's reputation, both with the dispensary and other residents. However, ASHAs too held and exercised power. They berated residents or threatened them with consequences for not cooperating with immunizations and antenatal care visits. For instance, P3 told a resident, "*We will record that you didn't get your children immunized. Change yourself, the whole world has changed. You are destroying your children's futures, what else!*" In another case, a resident was unaware that she was entitled to free LPG from the government and also possibly uninformed of the dangers of inhaling the smoke from burning wood. P4 commented sarcastically, "*Cook on the wood and save the government more money.*" In such cases, the ASHAs could make residents uncomfortable. As shared by one resident, "*My wife doesn't know the way to the vaccination site. She told me that she got scared the last time you told her to go and she went.*" Such incidents could have the opposite effect, deterring residents from seeking care in the future.

5 DISCUSSION

Active feminist discourses in current HCI research tend to adopt a western capitalist approach to feminism, which focuses on women's advancement along the corporate ladder, as Mohanty discusses [53]. This perspective has also captured public consciousness with the recent emergence of accounts of gender inequality and sexual abuse in the workplace, including (and particularly) in computing and technology [1, 41]. While these are inarguably concerns that need addressing, such a perspective overlooks other diverse mechanisms by which patriarchal capitalist systems exert power. We highlighted how top-down government processes in the health sector valued numbers and data over quality of these numbers and data. Their survey tool was designed to meet *their* top-down data requirements, overlooking the values and experiences of individuals and communities affected by their processes and how they could be legitimized and prioritized. The goal of our research was to expand conceptualizations of the struggles of marginalized women by focusing on experiences of ASHAs we studied, also expanding notions of feminism. Drawing inspiration from Mohanty's scholarship [52], we explore what an agenda for fostering *solidarity through design* might look like, in the context of our ASHAs' data collection practices.

5.1 Feminist Solidarities

Mohanty describes feminist solidarity as the "*mutuality, accountability, and the recognition of common interests as the basis for relationships among diverse communities*" [52]. Through our analysis of the workflows of ASHAs in an underserved setting in Delhi, we saw that solidarity meant working with other ASHAs despite differences, advocating for a lower socioeconomic group with less power, and honoring their own aspirations against societal expectations. In contrast to deficit-based approaches that are routine in ICTD scholarship, and drawing on Karusala et al.'s introduction of *assets-based approaches* to CSCW [37, 47], we recognize as an *asset* the ASHAs' solidarities—with other ASHAs, target communities, and themselves—across physical, social, and economic boundaries. This was a recurrent theme in our data, and we unpack how this asset manifested in various ways, even as ASHAs operated in a deeply oppressive patriarchal society and at the lowest rung of the power hierarchy in the public healthcare system. Expressions of solidarity were particularly evident in the ASHAs' interactions with marginalized women and communities where they went beyond expectations—negotiating, motivating, and at times, arguing with residents to gain access into their households to be able to provide healthcare and effect behavioral change—despite little recognition by the incentive system of the physical and emotional labor involved. Below we examine these diverse solidarities forged out of acts of resistance; uncovering them allows us to make recommendations that are better rooted in 'lived work' than workplace processes alone [12].

5.1.1 Solidarity with other ASHAs. We found that solidarity between ASHAs was forged from their common struggles at home and work. Being from similar cultural and socioeconomic backgrounds, ASHAs were able to relate to each other and formed a strong support network. They met both formally and informally as coworkers and friends, offline and online. The ASHAs displayed empathy towards each other and frequently shared advice regarding common struggles and conflicts such as dealing with family demands, appeasing family members who disapproved of their work, and addressing safety concerns by working together. They also learned from each other, offering reinforcement and helping each other fulfill their work responsibilities as ASHAs. The solidarity of ASHAs also extended to include other ASHAs in the city. This allowed them to assume greater political power by organizing into unions on the basis of common concerns and demands from the state government. This was one of the strongest indications of their solidarity with ASHAs from other areas and disparate backgrounds. However, tensions between ASHAs across religious boundaries indicated that there were gaps to be filled.

5.1.2 Solidarity with Local Communities. The ASHAs felt a clear sense of responsibility towards local communities, particularly women and marginalized populations. This solidarity may have emerged from a recognition of similar struggles against patriarchal systems. Both marginalized communities and ASHAs expressed the desire for greater support and recognition from the government, and pointed out the suppression of women's aspirations and mobilities in a patriarchal society. The data collection tool and process also overlooked both the concerns of the communities providing data (such as privacy, lack of trust, language barriers, and poor health literacy) and the difficulties faced by the ASHAs in collecting data (such as the need for approximations, data translation, conflict with other commitments, and power differentials). Though their roles as social activists were not well-defined and incentivized, ASHAs spent more time counseling residents in low socioeconomic neighborhoods and advocating for healthy behaviors in these communities. Even when turned away, they negotiated and contested with residents, demonstrating alignment with Mol's collaborative 'logic of care' over patient choice [55]. This care was reflected in repeated efforts to improve health despite resistance, sensitivity towards sociocultural norms around sexual health, and practical suggestions for navigating patriarchal barriers that curbed women's mobility. Thus, they pushed the boundaries of the patriarchal social and health structures in multiple ways to enable more women and marginalized communities to access health services. We also found that there was potential for greater empathy and recognition of residents' struggles, from the ASHAs.

5.1.3 Solidarity with the Self. In a patriarchal and conservative society, the ASHAs were women who had taken up their roles because they desired and valued independence, even at the risk of social stigma and lack of safety. Even in these roles, however, ASHAs found themselves navigating a set of demands from a different (albeit chosen) hierarchical, patriarchal system. Though the ASHAs had a number of demands and responsibilities imposed on them, they were not passive bodies, and enacted resistance towards negotiations of imposed boundaries. They managed a compromise between household responsibilities and work, recruiting family members to help as needed. To demonstrate the usefulness of their work, they contributed towards household expenses and bought gifts for family members (and themselves). Dissatisfied with the monetary compensation and support provided by the dispensary, they cared about fulfilling their responsibilities and receiving reasonable compensation, and tried to bring their needs to the attention of the government. To protest against perceived injustices, they conducted strikes and demonstrations at the risk of losing their job and salary. They also looked out for themselves by making concerted efforts to update their digital skills and potentially transitioning to better paying jobs. Thus, the ASHAs navigated their constraints and exercised their agencies, displaying a clear commitment and solidarity towards their own aspirations, although at the risk of disrupting provision of care to the communities.

5.2 Solidarity through Design

Mohanty's postcolonial feminist approach helped us focus on the "*micropolitics of context, subjectivity, and struggle and the macropolitics of political systems and processes*" [52]. We were able to demonstrate the failings of existing top-down data collection processes and a predominantly capitalist approach to healthcare provision. Focusing on the most vulnerable populations (*i.e.* ASHAs and women from marginalized communities) helped highlight the problematic nature of the data collection processes that may not have been evident if we had focused on a western context or on less marginalized groups. Lessons learned from the existing, local data infrastructures suggest room for improvement for data systems more globally, across the *two-thirds world* that Mohanty focuses on [53], which is well-versed with struggles for empowerment like those of our participants.

We also emphasize that while the ASHAs were feminist in their outlook (as evinced by the care they extended to marginalized women and communities and their efforts against patriarchal systems), it is unlikely that they would identify with and subscribe to western notions of feminism and the value they place on individual ambition. The western feminist concept of *sisterhood* that encourages embracing other groups based on Euro-American similarities, would effectively erase the experiences and concerns of such a population. Instead, we stress that "*in knowing differences and particularities, we can better see the connections and commonalities because no border or boundary is ever complete or rigidly determining*" [52]. This is the goal of solidarity which emphasizes focusing on similar but different struggles. We believe that HCI—with its increasing diversity in research, researchers, and users—can benefit from embracing solidarity in order to better forge bonds across borders and intersections [76]. We next discuss how technology design might take into account the struggles that ASHAs faced—differences between data collection expectations and ground realities, conflicting roles and responsibilities, and power dynamics at various levels—in and for solidarity.

5.2.1 Designing in Solidarity. The practices of ASHAs brought to light the limitations of the current surveying tool and processes used by the ASHAs. The data collection tool appeared to have been designed in accordance with the data needs of high-level stakeholders such as the health and government bodies, and overlooked ground realities that brought into question the reliability, validity, and completeness of the collected data. These practices were often driven by constraints ASHAs faced and their focus on obtaining data rather than bypassing their responsibilities. Ensuring the quality of data collected requires that these practices be institutionalized and accounted for in the design of data collection tools, instead of being ignored altogether. For instance, training on the use of technology could include instructions on how to deal with nebulous, non-committal responses from survey respondents. Further, allowing ASHAs to indicate the cooperation level of residents and the approximations they had to make while conducting surveys could indicate how much the data might be trusted (taking care to not have this reflect poorly on ASHAs' abilities). For digital surveys, certain kinds of data that are unlikely to change or could be updated automatically may be saved locally on their mobile phones—such as names, ages, number of household members, and housing conditions. This would enable the ASHAs to move their focus to collecting "*important*" data such as unhealthy behaviors and risk factors for disease and updating existing data to be more accurate. Since surveying could also stimulate discussions on health, questions could be designed to amplify this effect and aid ASHAs in information dissemination. Surveys could also help improve health literacies and determine where larger community interventions may be needed.

Conflicting responsibilities of the ASHAs were a challenge while conducting surveys. ASHAs were committed to their work but family responsibilities took precedence. Technology could help generate flexible and adaptable schedules for ASHAs that allowed them to complete their responsibilities in timely fashion. While the ASHAs are officially considered to be volunteers [51], much of the work they conducted was paid and comparable to government employees like ANMs

and Anganwadi workers. Outlining their roles clearly as either volunteers or employees could help ensure that the work is commensurate with the title. Also, organizations and the government can provide better care to frontline health workers by recognizing and institutionalizing pair-work, providing a hotline for reporting incidents, enabling ASHAs to share their locations, and allowing them to mark relevant areas as unsafe.

Power dynamics between various actors also affected ASHAs and their motivation to conduct quality work. Low pay was a major bone of contention with the government. Incentive structures that reward effort, perhaps determined by tracking time and GPS location—as ASHAs suggested—could help towards resolving this conflict and creating a fairer incentive structure. Greater transparency on the need and purpose of data collection could also help the ASHAs better understand the value of their work and the importance of collecting good quality data. This could be coupled with basic training on data quality and storage. Better coordination and resource and work allocation between the ASHAs, ANMs, and Anganwadi workers could go a long way towards resolving conflicts between them. Recognizing the ASHAs as a legitimate and skilled part of the healthcare workforce might help residents appreciate their work and reduce conflict. Such steps would leave the ASHAs better placed to answer questions regarding the purpose of data collection.

5.2.2 Designing for Solidarity. We now consider how technology design might help to facilitate solidarity. We observed the ASHAs operating in solidarity with themselves, other ASHAs, and local communities. To enable solidarity with *themselves*, ASHAs may be provided more opportunities for personal growth, such as opportunities to improve their digital skills and later transition to tasks that employ them, as found desirable by them. The ASHAs' solidarity with *communities* was reflected in their work as social activists. Defining their roles more carefully and rewarding such activities through recognition and monetary compensation could support and further such behaviors. Technology could also be deployed to help track such behaviors. Solidarity with *other ASHAs* could be supported through fostering existing offline and online communication. Technology could help facilitate the sharing of information relating to work and counsel on family, personal, and work-related conflicts. Additionally, regular meetings with ASHAs from varied backgrounds could help in fostering greater solidarity with other ASHAs. Additionally, *new solidarities* could be developed such as with ANMs and Anganwadi workers by facilitating sharing of perspectives.

Finally, we ask how the HCI and CSCW communities might foster solidarities by embracing difference. Recent efforts at CSCW have pushed for greater attention to social justice and intersectional perspectives [25, 26]. Similarly, past workshops and symposia at the CHI conference have been aimed at incorporating perspectives from across the world and across disciplines [30, 45]. Solidarity is a natural companion to such efforts and can help researchers in recognizing differences and common struggles across numerous types of borders and intersections. Additionally, solidarity can help in translating research across different contexts through bidirectional exchange of lessons already learned. Studying the differences between contexts can mitigate challenges with technology transfer by allowing researchers to understand how technology might be better adapted for use in other contexts and not just similar settings, using situated comparisons as recommended by Wong-Villacres et al. in their proposal for “designing for intersections” [76].

6 CONCLUSION

We conducted fieldwork to understand the roles, responsibilities, and motivations of ASHAs in an underserved setting in Delhi (India) in February 2018. We conducted interviews with seventeen ASHAs and shadowed five ASHAs to conduct participant observations, noting their interactions and data collection practices at 200 household visits. Using a postcolonial feminist lens inspired by Mohanty [53], we first documented the challenges that ASHAs faced in their day-to-day workflows

for data collection. There was a mismatch between what authorities expected from the data versus the ASHAs' ground realities, conflicting roles and responsibilities of the ASHAs, and interacting power differentials across various actors. We also examined how feminist solidarity was practiced by the ASHAs with other ASHAs, local communities, and themselves. We discussed how solidarities could be leveraged and extended through appropriate design of technology. Finally, we considered how the fields of HCI and CSCW may benefit by engaging with *solidarity through design*.

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