

Opportunities and Challenges in Connecting Care Recipients to the Community Health Feedback Loop

Fabian Okeke[†], Lucas Nene^Φ, Anne Muthee^Ψ, Stephen Odindo^Ω

Dianna Kane^Ψ, Isaac Holeman^Ψ, Nicola Dell^{†Δ}

[†]Cornell Tech, ^ΦIndependent Consultant, ^ΨMedic Mobile, ^ΩLiving Goods, ^ΔThe Jacobs Institute
[fno2@cornell.edu; lucas@designhealth.info; joy@medicmobile.org; sodindo@livinggoods.org;
dianna@medicmobile.org; isaac@medicmobile.org; nixdell@cornell.edu]

ABSTRACT

This paper explores the design space of feedback systems that connect care recipients to the community health feedback loop. While related work in this vein has often emphasized gathering feedback for the sake of transparency alone, our study emphasizes opportunities to integrate the collection and use of feedback in ways that may improve the quality or equity of routine health services. We conducted a qualitative study using semi-structured interviews and focus groups with 23 participants in Kenya. Our field study makes current feedback practices visible; and reveals barriers faced by beneficiaries, community health workers, and their supervisors. Our findings identify relevant socio-technical complexities, and we outline concrete opportunities to design feedback systems that support and augment current practices. These contributions to the ICTD literature hold potential to inform the design of feedback systems that engage underserved populations in a systematic and equitable manner.

KEYWORDS

HCI4D; ICTD; mHealth; beneficiary feedback; QA

ACM Reference Format:

Fabian Okeke[†], Lucas Nene^Φ, Anne Muthee^Ψ, Stephen Odindo^Ω, Dianna Kane^Ψ, Isaac Holeman^Ψ, Nicola Dell^{†Δ}. 2019. Opportunities and Challenges in Connecting Care Recipients to the Community Health Feedback Loop. In *Proceedings of THE TENTH INTERNATIONAL CONFERENCE ON INFORMATION AND COMMUNICATION TECHNOLOGIES AND DEVELOPMENT (ICTD '19)*. 11 pages. <https://doi.org/10.1145/3287098.3287111>

1 INTRODUCTION

From poor quality services, to absenteeism, disrespectful behavior, and outright abuse, the human cost of neglecting patient experiences is remarkably high. One recent study at a referral hospital in Tanzania found that a full 70% of women who received maternity services reported experiencing at least one form of disrespect or

abuse at the hands of a health worker [29]. In places where health-care providers are overworked, underpaid and poorly supported, such matters are not individual so much as institutional failings. Sustainable Development Goal 16 calls for more transparent, accountable and participatory institutions, and there is growing awareness that these are pressing concerns for low and middle-income country (LMIC) health systems. A recent scoping review of research and practitioner activity documented a clear uptick in the use of digital tools to promote transparency, accountability, equity and good governance in LMIC health services [16]. The interventions reviewed range widely, from dialog with government to the use of social media for naming and shaming, and many share a common theme: *feedback from ordinary people* about their experiences in receiving healthcare.

Digital feedback systems have become commonplace in resource-rich contexts, particularly with the growth of the sharing economy. Important HCI studies have explored how platforms such as eBay, Airbnb and Uber use feedback systems to build trust and establish reputations [14, 18, 22, 23]. On these platforms, providers with high positive feedback are considered more trustworthy and accrue more monetary benefits than their counterparts with lower ratings and reviews [14, 23]. While these platforms have a growing user base in the urban areas of many LMIC, there is a real lack of design research that explores how similar systems might be used to improve humanitarian or public services such as health care.

In LMIC, recent efforts to construct digital feedback systems can be understood in the context of citizen movements that, for decades, have worked to increase transparency, accountability, good governance, and effectiveness in health sector institutions. Recent uses of digital technology for these ends have shown some promise, for example as means of gathering citizen reports of drug stock-outs [16] or fielding beneficiary compliments and complaints via text message [3]. A recognized shortcoming in this work is a tendency to focus on gathering information to promote transparency, while neglecting the difficult work of *using feedback* to improve the quality or equity of services. This is not for lack of functioning feedback systems, *per se*. For example, a recent study showed that providing personalized performance feedback to community health workers improved their self-reflection and increased their average number of client visits by over 20% [9, 10]. Rather, the gap has to do with a failure to connect people who receive care to the *full feedback loops* that already exist within the health sector.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

ICTD '19, January 4–7, 2019, Ahmedabad, India

© 2019 Association for Computing Machinery.

ACM ISBN 978-1-4503-6122-4/19/01...\$15.00

<https://doi.org/10.1145/3287098.3287111>

This study documents the first phase of an ongoing human-centered design project, focused on beneficiary feedback systems in community health. Specifically, we sought to document the existing feedback practices of beneficiaries, community health workers (CHWs), and their supervisors, to inform the design of a system that would support the gathering and use of feedback to improve the quality and equity of services. To this end, we conducted a qualitative study, consisting of semi-structured interviews and focus groups with 23 participants: five beneficiaries, seven CHWs, and 11 supervisors. Throughout our paper, we use the term “*beneficiary*” and “*care-recipients*” interchangeably to refer to community members who receive health care services in a government and NGO-supported community health program in Kenya.

Our findings revealed three primary feedback channels: direct phone calls to households, informal CHW reports to supervisors, and public chance encounters between supervisors and beneficiaries. These feedback channels are used to collect both positive and negative feedback about CHWs and the services delivered by the health system as a whole. However, reporting negative feedback can be a fraught experience. Our analysis considers the groups of people and kinds of feedback that the status quo neglects, and reveals how organizational policies can affect the kinds of beneficiary feedback received.

To our knowledge, this is the first empirical study of existing feedback practices in an LMIC community health program, undertaken to inform the design of beneficiary feedback systems. Our findings elucidate relevant socio-technical complexities, and we offer concrete design suggestions to inform future work. Taken together, these contributions suggest a path forward for system designers interested in supporting the integrated gathering and use of feedback from the entire range of stakeholders in the feedback loop—from care recipients to supervisors—with the aim of improving the quality and equity of community health services.

2 RELATED WORK

2.1 Feedback in Resource-Rich Contexts

The impact of feedback has been extensively studied in resource-rich contexts, particularly, in shared economy such as eBay, Airbnb and Uber [14, 18, 22, 23]. These online platforms allow users to publicly share their opinions about past experiences using ratings and written reviews that create a reputation environment for building trust between participants and service providers [34]. This provides benefits for both the users and service providers: users can build on feedback provided by others to form expectations of trustworthiness when choosing a service; while high reputation providers are considered more trustworthy and can accrue increased financial benefits compared to low reputation sellers [14, 23]. Beyond the sharing economy, recent research has explored how feedback systems can engage people who use the services of care organizations in resource-rich settings [11, 12]. While undoubtedly relevant, two major contextual differences limit the confidence with which we might generalize these findings and design approaches to our current project. The first has to do with institutional arrangements and routine practices that differ between e.g., online shopping and delivering public health services. The second has to do with broader

socio-cultural dynamics that may shape and constrain the possibilities for feedback in its various forms.

2.2 Feedback in LMIC Services

For decades, citizen movements in LMIC have advocated for increased transparency, accountability, participation, good governance and effectiveness in the major public and private institutions that serve them [19]. More recently, ICTD researchers have begun to explore how digital technologies are playing a role in these efforts. For example, grievance redressal systems have been deployed as part of government accountability and transparency initiatives used to collect citizen responses through telecenters [27], web portals [24, 28] and IVR systems [5, 32]. Specifically concerning health institutions in LMIC, a recent review identified a range of interventions and organized them into four categories related to: 1) gathering citizen feedback; 2) visualizing governance problems; 3) mobilizing for change; and 4) addressing fraud or corruption through automation and auditing [16]. Some of these projects have reached a large scale; for example, UNICEF’s community empowerment platform U-Report boasts over five million users worldwide [35]. The maternal health messaging service MomConnect in South Africa has registered over half a million women and had gathered over 4,000 compliments and 690 complaints as of 2016 [3]. A repeatedly recognized shortcoming in this work is a tendency to focus on gathering information to promote transparency, while neglecting or experiencing significant challenges in the work of *using feedback* to improve the quality or equity of services [3, 16]. For example, the Bophelo Haesoa pilot study in Lesotho undertook an extensive, participatory design process that explored new ways for nurses to use apps and organize skits to gather community feedback, but the paper pays relatively little attention to the use of feedback in improving the health system [26]. This is rather ironic, because functioning feedback systems that use data to improve health worker performance are now widespread, and some of them are already supported by digital tools.

One study in India showed that providing automated, personalized performance feedback to community health workers improved their self-reflection and increased their average number of client visits by over 20% [9, 10]. Another RCT in Mali showed that using personalized analytics dashboards during face-to-face supervision of CHWs increased CHW activity by an average of 40 house visits per month, without compromising the quality or speed of care [37]. Yet these large scale and effective performance management systems typically do not systematically incorporate feedback from beneficiaries. Recognizing this shortcoming, we began our study with a particular interest in connecting people who receive care to the feedback systems that already exist within the health sector. Before considering how we approached this matter empirically, we would like to review one more body of related work that informed our exploration of feedback practices.

2.3 Socio-Cultural Challenges with Feedback

Collecting critical feedback from communities in low-resource contexts is often challenging due to social and cultural differences between researchers and their participants [1, 15, 17, 20]. Particularly when users in underserved communities are asked to provide

feedback about artifacts, they are often biased because they worry that critical feedback could negatively impact their relationships with organizations that support key services [1, 15]. Dell et al. [8] demonstrated that participants in India were 2.5 times more likely to choose a technological artifact that they believed was developed by a researcher, even when the alternative was identical. While often discussed as a methodological concern in ICT4D research, response bias could surface as a design challenge in any attempt to construct feedback systems in these settings.

To mitigate response bias, ICTD researchers have applied social proofing, a psychological construct, to surface critical feedback that may be relevant for improving an ongoing project. For example, letting users believe that others in their neighborhoods provided critical feedback may encourage them to act similarly [36]. Other techniques include spending more time with participants in the hope that they eventually will become comfortable enough to provide critical feedback [13], adopting dramatic storylines in user studies [6], and role playing with skits [25]. While broadly relevant to research methods, some of these strategies are more amenable than others to inform the design of routine feedback systems. In light of this work, one of the goals of our study was to identify which strategies seemed most relevant and to imagine the specific ways that they might be used in system design efforts.

3 METHODOLOGY

3.1 Research Context

Our IRB-approved qualitative research took place in Kenya, a district in Kenya. At our research site, frontline workers were referred to as “Community Health Volunteer (CHV)” but throughout this paper, we use “Community Health Worker (CHW)” as it is more familiar in the ICTD literature. We worked with two organizations: Living Goods, a non-profit organization that supports networks of ‘Avon-like’ entrepreneurs to sell essential household commodities and address child health, nutrition, and family planning needs door to door; and Medic Mobile, a non-profit tech company that designs and implements open source software for health workers in hard to reach communities. Both organizations work in partnership with the Kenya Ministry of Health. Since 2014, Living Goods has partnered with Medic Mobile to co-design a digital health system to support their CHWs and supervisors. The system includes the Smart Health mobile app for CHWs (all CHWs are equipped with Android smartphones), a supervisor mobile app, and a web dashboard for supervisors to monitor CHW performance (see Figure 1). Source code and more information about this system are available on Github¹. Our study built on this collaboration and began as part of an ongoing human-centered design project, focused on beneficiary feedback and led by Medic Mobile’s design team.

Our research context featured two types of supervisors: MoH supervisors from the government and Living Goods supervisors. All CHWs are employed by the Ministry of Health and partner organizations like Living Goods can recruit a subset of CHWs to receive additional training and provide additional services (e.g. doorstep treatment of pediatric malaria) that are beyond the scope of other government CHWs. As such, the CHWs we recruited from

23 Participants	Beneficiaries (5), CHWs (7), Supervisors (11)
Age	Beneficiaries: Min (20), Max (60), Avg (32) CHW: Min (29), Max (51), Avg (40) Supervisors: Min (23), Max (37), Avg (28)
Gender	Beneficiaries: Female (5) CHW: Female (3), Male (4) Supervisors: Female (6), Male (5)
Education	Beneficiaries: form two - secondary school CHW: primary - secondary school Supervisors: diploma - masters
Occupation	Beneficiaries: farming (5) CHW: 1 - 18 yrs experience Supervisor: 11 months - 4 yrs experience
Phone	Beneficiaries: feature phone (5) CHW: feature phone (4), smartphone (3) Supervisor: smartphones (11)

Table 1: Participant demographic characteristics.

Living Goods reported separately to both MoH supervisors and their Living Goods supervisors. As a sustainability strategy, Living Goods did not provide free medications to beneficiaries and did not pay CHWs a regular stipend because CHWs could earn commissions from selling health products to beneficiaries. The dual aim of this strategy is for fully active CHWs to earn more in commissions than they would with a flat salary and asking beneficiaries to pay a nominal fee for drugs delivered to the household often costs less than patients would pay for transportation to a health clinic where medicines are provided free-of-charge.

3.2 Participant Characteristics

We recruited 23 participants (nine Living Goods supervisors, two MoH supervisors, seven CHWs, and five beneficiaries) through Living Goods’ office in Kenya. A supervisor at the branch reached out to Living Goods and MoH supervisors, CHWs, and beneficiaries to invite them to participate in the study. Interested people then came forward and we did spontaneous interviews with them over one week with about two to four people daily. Participants were not compensated.

As shown in Table 1, beneficiaries were all female, ranged in age from 20 to 60 years (average = 32 years), had a minimum education level of form two, had farming as their occupation, and used feature phones. CHWs included three females and four males, ranged in age from 29 to 51 years (average = 40 years), had a minimum education level of primary school, with one to 18 years of experience as CHWs, used feature phones (4), and smartphones (3). Supervisors included six females and five males, ranged in age from 23 to 37 years (average = 28 years), earned a diploma as a minimum level of education, had eleven months to four years of experience as supervisors, and all had smartphones. Living Goods supervisors also had laptops available in their offices.

3.3 Qualitative Methods

We conducted eight focus groups with 20 participants in groups of two to four people: three groups of Living Goods supervisors, one group of MoH supervisors, two groups of CHWs, and two groups of

¹See <https://github.com/medic>

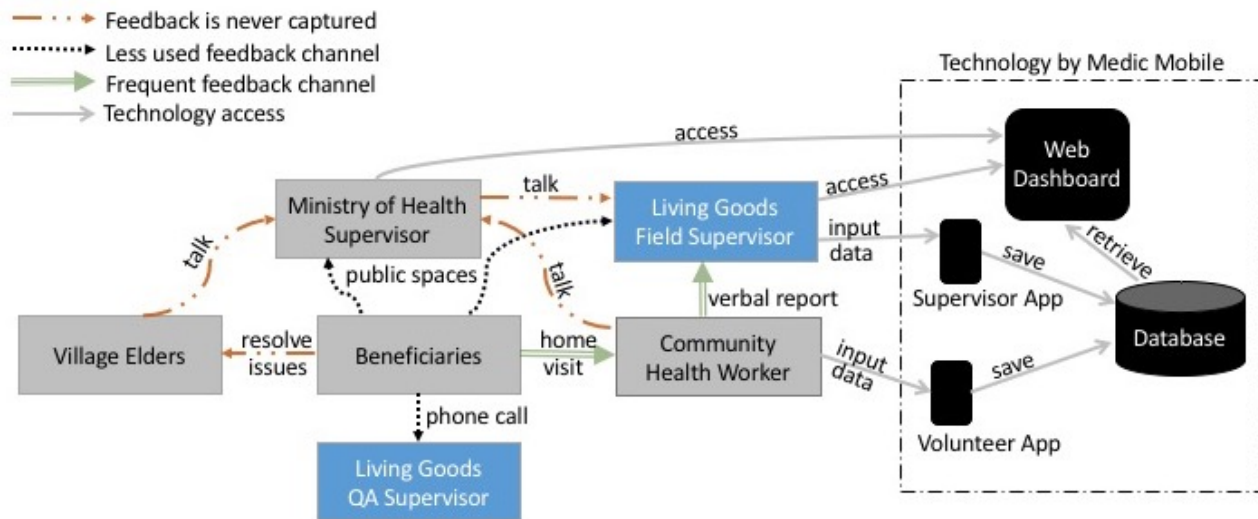


Figure 1: Summary of how beneficiary feedback is shared across diverse stakeholders. The blue-colored boxes are employees of Living Goods. Field supervisors directly interact with Community Health Workers (CHWs) while Quality Assurance (QA) supervisors call beneficiaries to verify that CHWs did household visits. The technology supporting feedback flow consists of mobile applications, a web dashboard, and a backend database.

beneficiaries. We also did three semi-structured interviews: the first one with a female beneficiary in her sixties (45 minutes), and the others with Living Goods supervisors (30 minutes and two hours).

We tailored our questions to the kinds of participants we interacted with. The discussions involving supervisors focused on their current feedback collection practices, the kinds of feedback they received, how it is used, the protocols they used when beneficiaries were directly called, and the challenges they encountered in the feedback process. With CHWs, we discussed their routines during household visits, how they collected feedback and shared with their supervisors, how frequently it was received, tensions related to cultural dynamics, and how Living Goods' policies affect them.

For beneficiaries, we inquired about the services they received, what they discussed with CHWs, how they dealt with issues, and the reasons behind their approach to resolving issues. Interviews were conducted by two members of the research team in both English and Kiswahili, with one co-author serving as a translator. In total, our data set consisted of 12 hours of focus groups and 3.25 hours of interviews.

3.4 Data Analysis

We audio-recorded and transcribed our interviews and focus groups. We then performed thematic analysis [33] on the transcripts and our field notes, beginning with a close reading of the transcripts and allowing codes to emerge from the data. Multiple passes through the data resulted in 26 distinct codes (e.g., *feedback in public*, *beneficiary conflict*, and *overpriced medications*). We clustered related codes into high-level themes (e.g., *chance encounters*, *feedback improves services*, and *sustainability model*) and organized them in a codebook. After multiple discussions and iteratively refining the codes and themes, the research team arrived at a final set of themes that comprehensively represented the data.

4 FINDINGS

Our findings reveal a deeper understanding of the environment in which feedback occurs. We uncover ongoing practices of how feedback is collected, the kinds of feedback collected, how feedback is used, and the socio-technical factors that impact feedback systems.

4.1 How is Feedback Currently Collected?

We begin our exploration of beneficiary feedback systems by examining how feedback is currently collected. Our data reveals three main ways in which Living Goods currently gathers feedback from beneficiaries: direct phone calls to households, indirect CHW reports that are sometimes shared with supervisors, and chance encounters in public places. We discuss each of these in turn.

4.1.1 Direct Phone Calls to Households. A number of supervisors ($n=4$) on the Quality Assurance and Control team explained how they place direct phone calls to households as a formal way to collect feedback from beneficiaries (see Figure 1). These phone calls primarily help supervisors confirm if CHWs truly visited households as recorded on the CHW app. One supervisor described:

“Every quarter, we randomize at least 30 visits or 30 registrations by a CHW per branch and then we have backend calls to the clients... We have a screening pool that we go through to see whether the services that [health workers] said were offered were actually offered, whether it’s a true service, what [care recipients] thought of the quality of the service... and any other feedback they might have for us.” (P12, Female, QA Supervisor)

When supervisors call households, they follow an open script where they introduce themselves, assure confidentiality of the discussion, and ask if beneficiaries know any Living Goods CHWs. At

the end of the call they ask for a 1-10 Likert scale rating of the services beneficiaries received and rationale for their rating. Although these direct-to-household phone calls are the most formal method of collecting beneficiary feedback, our data shows that this results in a range of challenges.

One major challenge is the small number of beneficiaries reached by the process. Beneficiaries eligible to receive calls are limited to those that provided phone numbers (roughly 65% of beneficiaries), and then by those who were visited by a CHW in the last quarter. Then, of these filtered lists, only 30 beneficiaries are chosen to receive calls. This is because the process of making individual calls to beneficiaries is time consuming and resource intensive. Supervisors explained that it was common for beneficiaries to discuss non-health related issues on these calls and, to remain courteous, supervisors listened to whatever the beneficiaries wanted to discuss. Although this may build rapport between Living Goods and the community, it is not an efficient way of collecting feedback. It is also common for phone calls to not be answered. The small number of beneficiaries reached is problematic for several reasons. From an organizational perspective, Living Goods may not receive sufficient information to be able to evaluate their services and products. In addition, the poorest households are less likely to own phones; the fact that they are excluded from this process makes the feedback system less equitable.

Direct-to-household phone calls may also be problematic for situations in which families share a device. In particular, it is common for a household member who is not the beneficiary to answer the call, which leads to privacy and confidentiality challenges. As one supervisor explained,

“A [teenager] gave us her father’s number during CHW registration so when the supervisor calls that number saying ‘your daughter is pregnant,’ he says ‘no, my daughter is not pregnant... yes, that is my daughter but she’s not pregnant because I don’t know [about it]... I live in Akulo and my family lives in Kisii’... you just asked the rightful owner of the phone, but he or she doesn’t know all the information.” (P5, Female, Supervisor)

Another challenge supervisors (n=3) highlighted is that, due to the fragmented nature of the healthcare ecosystem, in which CHWs may have multiple affiliations (e.g., MoH and Living Goods), many beneficiaries who receive calls may not know or have forgotten what Living Goods is. A supervisor said,

“CHWs may forget to tell clients they are Living Goods CHWs, so the Quality Control team has to give many details to clients so they recall who Living Goods is... Some clients are agitated that you got their phone number ... You are calling someone who could be having a thousand and one problems and yet you say ‘Hi I’m calling from Living Goods.’” (P21, Female, QA Supervisor)

Finally, although in-person phone calls hypothetically provide opportunities for rich conversations with beneficiaries, the Quality Assurance supervisors (n=4) explained that the team is currently primarily focused on feedback that simply confirms whether CHWs did the work that they reported—visited households, provided treatment, and sold health products.

4.1.2 CHW Informal Report to Supervisors. Although direct-to-household phone calls are the most formal feedback mechanism currently used, they were not the most common method of reporting beneficiary feedback. Instead, we discovered that informal verbal reports that CHWs discuss with their supervisors are the most prevalent beneficiary feedback reporting mechanism. All supervisors (n=11) and CHWs (n=7) described how, when CHWs meet with their supervisors to go over their performance, CHWs volunteer feedback received from beneficiaries during their household visits. As one supervisor described,

“The CHWs kind of trust us that they will tell us everything that happens in the community even things that don’t involve Living Goods.” (P2, Female, Supervisor)

However, this mode of collecting and reporting feedback is not mandatory and is not done in a systematic or structured way. Further, the process is complicated by the fragmented nature of the ecosystem. As previously described, Living Goods CHWs have (at least) two supervisors: one from the MoH and another from Living Goods. As a result, CHWs may sometimes discuss beneficiaries’ feedback with their MoH supervisor and other times with their Living Goods supervisor, but there is no systematic way of capturing the information shared. Moreover, supervisors told us that they are only interested in matters that pertain to them. For example, Living Goods supervisors only want to talk about issues that pertain to Living Goods, such as pregnant women using medications, and are not necessarily interested in matters that pertain to the MoH, such as households refusing to purchase toilets because they engage in open defecation.

In addition to lack of structure, relying on CHWs to relay beneficiaries’ feedback to supervisors clearly suffers from a number of biases, including recall bias [7], a psychological phenomenon where one inaccurately recalls past experiences. Even if a CHW wanted to share full details of the feedback received from a beneficiary, they may forget some of the details due to the time lapse between meeting with the beneficiary and their supervisor (CHWs meet with their Living Goods supervisors a few times a month).

Perhaps more importantly, relying on CHWs to report beneficiaries’ feedback may bias the process towards only collecting positive feedback, partly because beneficiaries are unlikely to report negative feedback to their CHW for fear of causing problems. As one beneficiary described,

“I will just stop seeking their service. I will not tell anyone because there is no one to tell about it. If you start bad-mouthing the CHWs, it’d bring bad reputation to Living Goods ... involving others brings about unnecessary friction ... I’d rather finish with this CHW and find another CHW ... I will go to another one to ask for the services I need but I will not tell why I am seeking out a different CHW.” (P18, Female, Beneficiary)

Although switching CHWs may enable beneficiaries to seek services from a different CHW, it does not necessarily provide them with a safe channel for providing negative feedback, since beneficiaries worry that CHWs know and will communicate with each other. One beneficiary told us,

“You might go and say something to another CHW but you don’t know their relationship with the previous

CHW you are complaining about [their services]... so it means you have started something you shouldn't have." (P17, Female, Beneficiary)

Finally, even if beneficiaries feel comfortable telling their CHWs their negative feedback, it is unlikely that the CHW will relay this information to their supervisor, especially if such feedback reflects poorly on the CHW. By contrast, CHWs are more likely to report feedback and stories that reflect positively on their work. We provide concrete examples of both positive and negative feedback later in the paper.

4.1.3 Chance Encounters and Public Events. A third method currently used to collect beneficiary feedback is through chance encounters between supervisors and community members in public spaces, and during public community events. Half of the supervisors (n=7) explained that it was common for beneficiaries to approach them in public places and provide feedback to them. Two beneficiaries also explained how they identified supervisors walking around in their communities and spoke to them. One shared,

"I could report a CHW to supervisor when I see the supervisor in the community and I am comfortable talking to him... I have talked to a supervisor in the past when I saw a group of supervisors walking around in the community... if a supervisor is not around I will go to the hospital. I cannot go to Living Goods office to talk to supervisors because it is too far." (P20, Female, Beneficiary)

Living Goods supervisors can be easily identified in public places through their uniforms while MoH supervisors are well known by the village elders of communities. Some participants (two supervisors, two beneficiaries) explained that they had observed others provide feedback during a public event. One supervisor told us: *"Sometimes they do announce it at the barazar [public community meeting] and make it public"* (P6, Male, Supervisor).

Beneficiaries had mixed feelings about using community events and market places as an avenue for connecting with supervisors and providing direct feedback. Once again, we saw that this method of providing feedback is more conducive to receiving positive feedback, with a supervisor commenting that the community *"can say that the people you have given us are doing a good job"* (P7, Male, Supervisor). However, three beneficiaries said they would not share negative feedback during public events and do not consider it wise for others to do so for fear of escalating an issue. A beneficiary said,

"It is a bad idea to resolve an issue at a barazar [public community meeting]. There are other ways that are better...you can tell the CHW yourself. If in a situation where it is really serious, you can go to the village elders to help solve the issue." (P18, Female, Beneficiary)

All beneficiaries felt that telling someone else about challenges they faced with their CHWs may be construed as spreading gossip. As such, they preferred to remain quiet about CHW issues they encountered. One beneficiary shared,

"I will not tell anyone because I don't like to gossip. I will tell my husband and just endure it... If it is too trivial to tell my husband I will not tell him because he might go fight about it and escalate it... I am not very

confrontational and don't want there to be pain and for things to escalate. I'd rather talk to the CHW I disagree with instead of making it escalate by involving others." (P17, Female, Beneficiary)

In addition to chance encounters in public, four participants (two beneficiaries and two supervisors) told us that beneficiaries talk with village elders when they had issues with CHWs, and preferred to resolve issues locally instead of involving supervisors from MoH or Living Goods (see Figure 1). One beneficiary described,

"If you're in a situation where it is really serious, you can go to the village elders to help solve the issue." (P18, Female, Beneficiary)

Village elders in turn provide feedback to supervisors when they see them in their communities. It is possible that these elders interact with supervisors from partner organizations, but our data suggest that they mainly interact with MoH supervisors (see Figure 1). As such, their feedback often does not make it to Living Goods. One MoH supervisor shared,

"So they know if they go to me with certain issues about the CHWs that I will be able to make a decision." (P7, Male, Supervisor)

The two MoH supervisors we interviewed explained that MoH supervisors can investigate reported issues by presenting the issue to an internal committee, who has the authority to take disciplinary actions such as terminating a CHW's job.

4.2 What Kinds of Feedback are Collected?

At a high-level, we can separate feedback into positive feedback praising the CHW and/or organization, and negative feedback that reports issues or complaints with services received. All Living Goods supervisors (n=9) described how they received a lot of positive feedback from communities expressing their happiness and satisfaction with the CHWs' work and the effectiveness of the products, such as malaria medications. One supervisor explained,

"Sometime late last year, there's this mother that her kids had malaria and it kept recurring until this CHW went in at the middle of the night and treated this kid without the mother leaving the house and she was really appreciative like 'we thank you so much for bringing the CHWs on the ground. They really help us... My kid took the malaria medication after the CHW tested and the second day my child was able to play.'" (P1, Female, Supervisor)

One common source of appreciation stemmed from the fact that CHWs visited beneficiaries at home so that they did not need to stand in queues at their local hospitals. One shared,

"Government facilities have long lines so it is just easier for me to call the CHW. Otherwise it is a waste of my time... I need to go on a motorbike to get to the hospital...I can identify a good CHW as one taking time out of their day to come see me." (P18, Female, Beneficiary)

Many participants (five supervisors and four beneficiaries) shared examples of what they consider to be "good" CHWs performance in which CHWs helped community members in dire health situations

or went above and beyond their daily responsibilities of performing two hours of household visitation. One beneficiary shared,

“The CHW found out I was pregnant and he sent me messages on how to eat, how to take care of myself, up to the moment I delivered my baby and even after my delivery. That CHW was really helpful.” (P18, Female, Beneficiary)

Compared to the abundant examples of positive feedback, participants provided only a few concrete instances of negative feedback. We also noticed that, after describing a few examples of negative feedback (provided below), many participants turned to hypothetical instances of negative performance. For example, care recipients would report negative feedback as *“I heard this from someone else”* instead of *“this happened to me”*, and when we followed up about the impact it had on them, they told us, *“it did not happen to me”*.

Supervisors explained that, although infrequent, beneficiaries sometimes provide negative feedback during direct phone calls about CHW performance, such as *“the CHW is not working well”*. One relatively common source of negative feedback (brought up by three supervisors and all beneficiaries) occurs when CHWs become unreachable when they are needed, leading to perceptions that CHWs are not invested in their job. One beneficiary shared,

“The [CHW] does not respond when you call and acts as if they are being pushed to do the job.” (P18, Female, Beneficiary)

Another frequent (five supervisors, all CHWs, and four beneficiaries) negative issue that came up relates to Living Goods' sustainability model, in which CHWs sell medications to beneficiaries. Since several other programs have provided medications for free, beneficiaries were often not happy when asked to pay. We discuss this and other issues related to the sustainability model later in the paper.

4.3 How is Feedback Currently Used?

Our data shows that feedback collected from communities provides diverse benefits to Living Goods by helping them understand the impact of their services, improve training, motivate CHWs, and detect fraudulent behavior.

Many supervisors (n=10) explained that insights from beneficiary feedback are used to improve CHW training and delivery of services. Relevant information gained from direct phone calls to households are passed on to field supervisors which may come up as a topic to address in CHW-supervisor meetings and for other Living Goods departments, such as the marketing team. One supervisor explained,

“The feedback we receive is used towards improving services... For example, telling us about our products and saying that it was expensive, this information goes to the marketing department. Some provide feedback saying that our CHW is not efficient and this can help us in the process of CHW training. When we identify negative feedback... we ask the manager to focus more on it... and then closely monitor the CHW to see if they could be further trained.” (P21, Female, QA Supervisor)

Feedback is also important in helping Living Goods understand if CHWs adhere to the care protocols and procedures for which

they have been trained and ensure that CHWs do not overstep their level of expertise. One supervisor shared:

“[Beneficiary feedback] helps us to understand if [CHWs] treat what we focus on, or go there and overdo to say [they] treat all the diseases. The information the [beneficiary] gives us helps us to assess that. We see the weaknesses and it helps us to focus on those during the [CHW-supervisor] monthly meetings so that it is clear to [the CHWs] and so that it doesn't happen again.” (P2, Female, Supervisor)

Supervisors and CHWs felt that positive feedback acted as a driving force that motivated CHWs to keep serving their communities. Every month all CHWs and supervisors in a district meet as a group where they discuss issues and share positive feedback from their communities. This feedback primarily focuses on success stories from community members. A supervisor explained,

“The feedback goes a long way for us, we feel like we changed somebody's life... we've changed the mentality of how people viewed [their health services]... If a CHW has a success story, I tell them to share by word of mouth during our monthly in-service meeting... we share with the rest of the CHWs.” (P1, Female, Supervisor)

Another prominent use of beneficiary feedback is to help detect fraudulent CHW behavior and/or data fabrication. Some supervisors (n=3) explained that CHWs could fabricate the number of home visits in their mobile app. As such, supervisors are always on the lookout for fraudulent behaviors, asking beneficiaries when they accompany CHWs on home visits or via in-person phone calls to households. A supervisor shared,

“There were times we used to get fraudulent data about clients and we have reduced it. When we call beneficiaries, they are able to give us the actual data... So we see that some of our CHWs who had high performance [that were outliers] now came back to normal... We have been able to improve our services through coaching [CHWs] because our [beneficiary responses] helped us to find [fraudulent] data.” (P21, Female, QA Supervisor)

Finally, supervisors explained that receiving beneficiary feedback has helped them revise their key performance indicators for CHWs. For example, in the past, high levels of fraudulent activity were detected among CHWs after they were told they would receive monetary incentives if their performance increased. When responses from beneficiaries showed that CHWs had been fabricating their records, the organization changed its key performance indicators to instead focus on the quality of data reported by CHWs instead of increased performance. This example illustrates the power of beneficiary feedback to impact organizational work practices.

4.4 What Socio-technical Factors Impact Feedback Systems?

Having described how feedback is collected and used, we now describe some of the socio-technical complexities that impact the environment where feedback is collected and the tensions that arise between stakeholders.

4.4.1 Community Relationships. Since CHWs are chosen from and embedded within the communities that they serve, they often have preexisting relationships with different people in the community that may impact their work. In some cases, these relationships might be cordial leading to positive feedback. In other cases, they could be negative regardless of how well CHWs carry out their work. As one supervisor shared,

“There are some CHWs who relate well with their communities. Some of them are family members and their community really loves them. So for those CHWs, we get a lot of positive feedback. Their relationship is different compared to other CHWs even though the other CHWs are doing a really good job.” (P1, Female, Supervisor)

Moreover, since CHWs are frequently collecting sensitive health information from beneficiaries, the nature of their relationship with the beneficiary may affect how they do their work. For example, several supervisors (n=8) described how community members sometimes feel CHWs are asking for information that is too personal. One supervisor shared,

“Most of the information that the client gives our CHWs is personal information. Like when registering a pregnancy, ‘when was your last menstrual period?’ This is a male CHW, this is a mother you are asking. This is not your wife, this is not your relative. So some of the clients don’t give actual information because they are like ‘why is he asking me how many children I have? If I have ever had a miscarriage?’ but in pregnancy care, you have to know these things so that you see if there’s a risk factor.” (P1, Female, Supervisor)

Half of the supervisors (n=6) told us that they encouraged CHWs to maintain strong relationships with their communities by treating beneficiaries when possible, regardless of who the beneficiary is. A number of CHWs (n=4) told us that it was common for them to treat community members outside their officially assigned households (each CHW is assigned 30 to 100 specific households). However, treating beneficiaries outside a CHW’s area, or “crossing boundaries”, increases the complexity of collecting feedback. CHWs explained that when they treated beneficiaries outside their boundaries, it was not reflected in their CHW app. One CHW told us,

“I treat them, ask the other CHW to record the community member’s data and then ask that CHW to give me back the medicine I gave out in order to make sure that the stocks count.” (P10, Male, CHW)

Since these out-of-bounds beneficiaries are considered to be outside the CHWs area and the treatment is not reported in their mobile application, CHWs often do not share any feedback that was received. As such, beneficiary feedback is lost in transmission during exchange of reports.

Beyond beneficiaries, CHWs also face challenges in their communities due to relationships with village elders. Supervisors (n=3) explained how the village elders may have issues with CHWs due to perceived power dynamics. One explained,

“Sometimes the village elders disagree with the CHWs. Maybe they think that the CHWs are being paid some little bit of money. The village elders are in charge of a

certain village and the CHWs are also put in charge of households in the same village based on certain health indicators. Now the misunderstanding comes from the village elders. When they see the CHWs walking around with this air of jurisdiction they think that they [CHWs] are over-doing their work and that is when they [village elders] come up with [negative] issues about the CHW.” (P6, Male, Supervisor)

Since village elders who are in conflict with CHWs may provide unwarranted negative feedback to supervisors regarding the CHW’s performance, supervisors explained that they need to dig deeper and properly investigate any issues raised instead of taking it at face value. One supervisor shared,

“So sometimes we take time before we make a decision. You cannot rush and make a decision based on what the village elders say.” (P7, Male, Supervisor)

4.4.2 Sustainability Challenges. The majority of the negative feedback that Living Goods receives relates directly to their chosen sustainability model. As described earlier in the paper, Living Goods tries to achieve longterm sustainability by not paying stipends to CHWs, requiring CHWs to instead sell medications to community members instead of providing them for free. One supervisor shared,

“We don’t pay stipends to [CHWs] because it is not sustainable. We have seen partners come on the ground and leave after two years but for Living Goods, we are here for the longterm so we have to look for a sustainable way of making sure that we are still supporting the community and not run out of medicines... Our prices are a little bit below or at the market level and the quality is so high.” (P1, Female, Supervisor)

CHWs are able to make commissions that range from 60 shillings (\$0.60) to 600 shillings (\$6.00) depending on the item sold². A supervisor told us, “the higher the price, the bigger the margin.” However, many participants (nine supervisors, seven CHWs and four beneficiaries) explained how the adopted sustainability approach has led to conflicts between CHWs and beneficiaries, which drives negative feedback on pricing. One participant described,

“I don’t want the CHW to inflate the price. That’s something I thought they could do... They say to me: ‘This medicine is 50 shillings, can you add 10 shillings so I can eat a banana?’” (P20, Female, Beneficiary)

Tensions surrounding money may affect both the services that beneficiaries receive and the process of collecting feedback. For example, the majority of our beneficiaries (n=4) explained that they would avoid seeing a CHW if the person asked them for extra money. One beneficiary shared,

“A CHW comes to me and he’d try to sell the medicine to me as a business saying ‘I traveled to get here so instead of 100 shillings, I’ll sell to you for 150 shillings.’ If a CHW tries to increase the price of the medicine, I could just tell them no and avoid the service with them.” (P18, Female, Beneficiary)

²For perspective, 120 shillings can purchase a meal in a local restaurant and 200 shillings can be used for a 20-minute taxi ride.

For their part, the CHWs faced numerous challenges trying to negotiate money with their communities. One CHW told us how he wanted to preserve good relationships with the community and also provide people with necessary health services, so would often just ask community members to pay whatever they could. He said,

“I don’t want people to run away from me so I ask them to give me whatever they can and I top up the rest myself.”

(P8, Male, CHW)

CHWs also felt conflicted selling medications to beneficiaries they thought could not afford to pay and sometimes they provided the medications without asking for money. One CHW explained,

“Sometimes we don’t get the profit. You just give because she is totally poor that you don’t even want to sell to make profit... and the child is nearly dying. What can you do?” (P11, Female, CHW)

Another common scenario we encountered was for a CHW to provide a community member medicines on credit. However, when CHWs went back to ask for payment, beneficiaries frequently refused to pay because they felt the medications should have been provided for free. All CHWs we spoke with were currently owed money by various community members (by two to five people). One CHW shared,

“These people believe that we were given the drugs for free. You just give drugs because you can’t leave a child dying... When you go back for the payment, they say we are being given free... so it makes us to go to our pockets again to support the community.” (P9, Male, CHW)

At other times, CHWs completely avoid visiting households with a history of not paying for medications or health products. They also explained to us how, to avoid conflict with beneficiaries with delinquent debt, they secretly only gave items on credit to people they felt would pay. One CHW explained,

“You have to avoid people with bad history of payment. If two beneficiaries are here and one asks me to provide goods to be paid for later but the other is someone who does not pay and is watching my response, I’ll quietly tell the first person that asked me to go and come back later so I can keep it secret that I gave the item on credit.”

(P14, Female, CHW)

Unfortunately, if both CHWs and beneficiaries avoid each other due to tensions surrounding money, then the health services that the community receives and the feedback collected about those services will be negatively impacted. Interestingly, although about half of the CHWs (n=3) we spoke with suggested the need to pay CHWs a regular stipend, none of our participants brought up the need to increase community awareness of Living Goods’ sustainability practices so that beneficiaries are aware they need to pay for medicines and know that CHWs are not extorting them.

5 DISCUSSION

Having developed a nuanced understanding of how feedback is collected and used in the backdrop of socio-technical challenges, we now synthesize our findings into design opportunities for ICTD researchers and practitioners interested in gathering and using

feedback in ways that engage a wide range of stakeholders, including care-recipients. In our discussion, we adopt a reflective design approach [30] and critically think about practical ways to embrace and build on the nuances we found in current practices. In particular, we discuss missed opportunities to collect and use feedback in an equitable and systematic way, and we propose practical design opportunities that adopt the parts of existing practices that work well while augmenting other aspects that could be strengthened.

5.1 Equitable and Systematic Feedback

A key finding in our research is that beneficiaries without mobile phones are not well accounted for in current feedback practices. This surprised us, because we initially had understood feedback activities as mostly analog and did not anticipate how phone access might matter. When Living Goods supervisors call households, they randomly select and call 30 beneficiaries who: 1) were visited in the last quarter, and 2) have registered a phone number with their CHW. Typically, some of the selected individuals do not answer the call, at times because they share the phone with someone who lives or works elsewhere. As a result, beneficiaries without phone numbers are systematically ignored and their feedback can only be heard if they have chance encounters with supervisors in public or if CHWs volunteer reports on the feedback that was received during household visits. Beneficiaries need an equitable channel to ensure that organizational decisions are not based on the voice of only the people with better access to mobile devices. Designing a feedback system that ignores this problem could further marginalize beneficiaries who are too poor to afford mobile phones.

While household visits and public encounters hold potential to engage a wider cross-section of the population, these feedback channels are better suited to positive feedback than to negative feedback. Beneficiaries consistently explained that they struggle to provide negative feedback directly to CHWs, because of the potentially fraught relational dynamics of criticizing a neighbor who lives nearby. Even when beneficiaries communicate directly with supervisors, they are reluctant to offer frank criticisms because they are worried about the ramifications of their actions. For example, they fear being labeled as “gossips” in their communities. This finding suggests that beneficiaries are prone to response bias, a well-known problem in the ICTD literature [8, 15, 36]. Beyond making feedback practically possible, an effective feedback system would also need to normalize the activity of surfacing criticisms, mitigate response bias in beneficiaries, and proactively deal with the potential unintended consequences that people may encounter.

In our particular empirical context, beneficiaries, CHWs and supervisors reflected on a specific organizational policy as a way of illustrating the dynamics of community feedback. However sensible Living Goods’ user-fee strategy may be from a sustainability perspective, it emerged as a challenge for CHWs. Prior studies have similarly found that the design of remuneration models for CHWs can disrupt how they carry out their work [2, 31]. Part of the challenge has to do with policies that are easily misunderstood by beneficiaries. This was the case, for example, when beneficiaries expressed concern that CHWs who sell medications (rather than giving them away free of charge) may be extorting them. This is a compelling example of how NGOs might use feedback systems

to navigate important but difficult policy questions in cooperation with the communities they serve. In some cases, organizations may identify opportunities to adapt the policy to deal with unforeseen edge cases and unintended consequences, such as when CHWs give away items on credit or forgo collecting payment because they consider a specific household “too poor”. In other cases, organizations may discover the importance of communicating more widely the constraints or strategies that inform a certain policy, so that the policy is better understood among the beneficiary population.

5.2 Design Opportunities for Feedback

Without conducting this qualitative study, we could not have learned of the challenges of equity affecting beneficiaries without phones. One design opportunity has to do with building feedback systems into tools already used by health workers, in ways that could be accessed by beneficiaries that may or may not have phones of their own. For example, when beneficiaries provide positive feedback during household visits, CHWs could record this in their apps, and they might also record critical feedback about care received at clinics. Supervisors could use their mobile app to record feedback when they encounter beneficiaries at a market place, and organizations could also consider having supervisors visit select households without the CHW present. By formalizing feedback in ways that cater to people who own devices and those who don't, feedback collection practices could become more systematic and more equitable.

To alleviate the fear of backlash, collecting both positive and negative feedback with anonymity may be worth exploring. Research has shown that anonymity can increase self-disclosure and empower people to better express themselves [4, 21]. Anonymous feedback channels could be designed in a way that augments current practices, rather than replace them. Supervisors and CHWs could continue to use current feedback channels, with the understanding that this feedback tends to be positive and is highly motivating. In parallel, beneficiaries could use an anonymous channel to provide all types of feedback, without fear of facing a backlash and/or being labeled in the community as “gossips”.

Since beneficiaries primarily use feature phones to make phone calls and send SMS, we propose augmenting current feedback practices with accessible technical approaches previously described in the ICTD literature. DeRenzi et al. [9, 10] used an Interactive Voice Response (IVR) system to successfully provide feedback to CHWs with low-end mobile phones, and they found that supporting multiple interaction modalities is beneficial for engagement. Vashistha et al. [36] showed that using social proof, by telling someone what others are doing, can mitigate response bias [8] and improve critical feedback from underserved communities. Building on these findings, we propose a beneficiary feedback system that caters to feature phone users, provides multiple interaction modalities, integrates anonymity, and leverages social proof. For example, beneficiaries could receive a dedicated phone number to an IVR system where they could anonymously call or text to leave detailed reviews or ratings about services received. They could also receive encouraging IVR prompts and SMS that socially-proof them to leave honest feedback by telling them the number of people who have recently provided feedback. Beneficiaries without mobile devices could indicate during face-to-face encounters with supervisors that

their feedback should be recorded anonymously. Then all feedback collected can be made available as summarized web dashboard analytics used by supervisors to inform CHW training and improve the quality of services. Taken together, these opportunities suggest a path forward for systematic and equitable feedback.

6 CONCLUSION

We present the first systematic research on the challenges and opportunities of designing beneficiary feedback systems that connect care recipients to the community health feedback loop. Through a qualitative study with 23 participants, we contribute to the ICTD community by uncovering insights on how beneficiary feedback is collected and used in an organizational context; and we propose design opportunities for implementing beneficiary feedback systems that collect feedback in a systematic and equitable way.

Our study has a number of limitations. Our findings are limited to the research context we studied and may not generalize to other organizations due to diverse practices. Our work is situated in Kenya; designers of feedback systems in other cultural contexts might uncover different dynamics. While we do not aim to provide an exhaustive guide for designing beneficiary feedback systems, we do expect that the challenges and opportunities we describe will be relevant to many in the ICTD community, practitioners and researchers alike.

ACKNOWLEDGMENTS

We are deeply grateful to our research participants who made the time and effort to give us valuable and detailed responses. We also thank the anonymous reviewers for their helpful comments and suggestions. This work was supported by the Children's Investment Fund Foundation UK. The funder played no role in conducting the research or the decision to publish.

REFERENCES

- [1] Yaw Anokwa, Thomas N Smyth, Divya Ramachandran, Jahanzeb Sherwani, Yael Schwartzman, Rowena Luk, Melissa Ho, Neema Moraveji, and Brian DeRenzi. 2009. Stories from the field: Reflections on HCI4D experiences. *Information Technologies & International Development* 5, 4 (2009), pp–101.
- [2] Nava Ashraf, Oriana Bandiera, and B Kelsey Jack. 2014. No margin, no mission? A field experiment on incentives for public service delivery. *Journal of Public Economics* 120 (2014), 1–17.
- [3] Peter Barron, Yogan Pillay, Antonio Fernandes, Jane Sebidi, and Rob Allen. 2016. The MomConnect mHealth initiative in South Africa: Early impact on the supply side of MCH services. *Journal of public health policy* 37, 2 (2016), 201–212.
- [4] Michael S Bernstein, Andrés Monroy-Hernández, Drew Harry, Paul André, Katrina Panovich, and Gregory G Vargas. 2011. 4chan and/b: An Analysis of Anonymity and Ephemerality in a Large Online Community. In *ICWSM*. 50–57.
- [5] Dipanjan Chakraborty and Aaditeshwar Seth. 2015. Building citizen engagement into the implementation of welfare schemes in rural India. In *Proceedings of the Seventh International Conference on Information and Communication Technologies and Development*. ACM, 22.
- [6] Apala Lahiri Chavan. 2005. Another culture, another method. In *Proceedings of the 11th International Conference on Human-Computer Interaction*, Vol. 21. Citeseer.
- [7] Steven S Coughlin. 1990. Recall bias in epidemiologic studies. *Journal of clinical epidemiology* 43, 1 (1990), 87–91.
- [8] Nicola Dell, Vidya Vaidyanathan, Indrani Medhi, Edward Cutrell, and William Thies. 2012. Yours is better!: participant response bias in HCI. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 1321–1330.
- [9] Brian DeRenzi, Nicola Dell, Jeremy Wacksmann, Scott Lee, and Neal Lesh. 2017. Supporting community health workers in India through voice- and web-based feedback. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. ACM, 2770–2781.
- [10] Brian DeRenzi, Jeremy Wacksmann, Nicola Dell, Scott Lee, Neal Lesh, Gaetano Borriello, and Andrew Ellner. 2016. Closing the feedback Loop: A 12-month

- evaluation of ASTA, a self-tracking application for ASHAs. In *Proceedings of the Eighth International Conference on Information and Communication Technologies and Development*. ACM, 22.
- [11] Andy Dow, John Vines, Rob Comber, and Rob Wilson. 2016. ThoughtCloud: Exploring the role of feedback technologies in care organisations. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. ACM, 3625–3636.
- [12] Andy Dow, John Vines, Toby Lowe, Rob Comber, and Rob Wilson. 2017. What Happens to Digital Feedback?: Studying the Use of a Feedback Capture Platform by Care Organisations. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. ACM, 5813–5825.
- [13] Brittany Fiore-Silfvast, Carl Hartung, Kirti Iyengar, Sharad Iyengar, Kiersten Israel-Ballard, Noah Perin, and Richard Anderson. 2013. Mobile video for patient education: the midwives' perspective. In *Proceedings of the 3rd ACM Symposium on Computing for Development*. ACM, 2.
- [14] Mareike Glöss, Moira McGregor, and Barry Brown. 2016. Designing for labour: uber and the on-demand mobile workforce. In *Proceedings of the 2016 CHI conference on human factors in computing systems*. ACM, 1632–1643.
- [15] Melissa R Ho, Thomas N Smyth, Matthew Kam, and Andy Dearden. 2009. Human-computer interaction for development: The past, present, and future. *Information Technologies & International Development* 5, 4 (2009), pp–1.
- [16] Isaac Holeman, Tara Patricia Cookson, and Claudia Pagliari. 2016. Digital technology for health sector governance in low and middle income countries: a scoping review. *Journal of global health* 6, 2 (2016).
- [17] Lilly Irani. 2010. HCI on the move: methods, culture, values. In *CHI'10 Extended Abstracts on Human Factors in Computing Systems*. ACM, 2939–2942.
- [18] Peter Kollock. 1999. The production of trust in online markets. *Advances in group processes* 16, 1 (1999), 99–123.
- [19] Stephen Kosack and Archon Fung. 2014. Does transparency improve governance? *Annual Review of Political Science* 17 (2014), 65–87.
- [20] Jonathan Ledlie. 2010. Huzzah for my Thing: Evaluating a Pilot of a Mobile Service in Kenya. *Qual Meets Quant, London, UK* (2010).
- [21] Xiao Ma, Jeff Hancock, and Mor Naaman. 2016. Anonymity, intimacy and self-disclosure in social media. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. ACM, 3857–3869.
- [22] Xiao Ma, Jeffrey T Hancock, Kenneth Lim Mingjie, and Mor Naaman. 2017. Self-Disclosure and Perceived Trustworthiness of Airbnb Host Profiles. In *CSCW*. 2397–2409.
- [23] Mikhail I Melnik and James Alm. 2002. Does a seller's ecommerce reputation matter? Evidence from eBay auctions. *The journal of industrial economics* 50, 3 (2002), 337–349.
- [24] Anjali K Mohan, Edward Cutrell, and Balaji Parthasarathy. 2013. Instituting credibility, accountability and transparency in local service delivery?: helpline and Aasthi in Karnataka, India. In *Proceedings of the Sixth International Conference on Information and Communication Technologies and Development: Full Papers-Volume 1*. ACM, 238–247.
- [25] Maletsabisa Molapo, Melissa Densmore, and Brian DeRenzi. 2017. Video Consumption Patterns for First Time Smartphone Users: Community Health Workers in Lesotho. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. ACM, 6159–6170.
- [26] Maletsabisa Molapo, Melissa Densmore, and Limpho Morie. 2016. Apps and Skits: Enabling New Forms of Village-To-Clinic Feedback for Rural Health Education. In *Proceedings of the 7th Annual Symposium on Computing for Development*. ACM, 10.
- [27] Kiran Gopakumar Rajalekshmi. 2007. E-governance services through telecenters: The role of human intermediary and issues of trust. *Information Technologies & International Development* 4, 1 (2007), pp–19.
- [28] Subhajyoti Ray. 2012. Reinforcing accountability in public services: an ICT enabled framework. *Transforming Government: People, Process and Policy* 6, 2 (2012), 135–148.
- [29] David Sando, Hannah Ratcliffe, Kathleen McDonald, Donna Spiegelman, Goodluck Lyatuu, Mary Mwanyika-Sando, Faida Emil, Mary Nell Wegner, Guerino Chalamilla, and Ana Langer. 2016. The prevalence of disrespect and abuse during facility-based childbirth in urban Tanzania. *BMC pregnancy and childbirth* 16, 1 (2016), 236.
- [30] Phoebe Sengers, Kirsten Boehner, Shay David, and Joseph 'Jofish' Kaye. 2005. Reflective design. In *Proceedings of the 4th decennial conference on Critical computing: between sense and sensibility*. ACM, 49–58.
- [31] Debra Singh, Joel Negin, Michael Otim, Christopher Garimoi Orach, and Robert Cumming. 2015. The effect of payment and incentives on motivation and focus of community health workers: five case studies from low-and middle-income countries. *Human resources for health* 13, 1 (2015), 58.
- [32] Vivek Srinivasan, Vibhore Vardhan, Snigdha Kar, Siddhartha Asthana, Rajendran Narayanan, Pushpendra Singh, Dipanjan Chakraborty, Amarjeet Singh, and Aaditeshwar Seth. 2013. Airavat: An automated system to increase transparency and accountability in social welfare schemes in India. In *Proceedings of the Sixth International Conference on Information and Communications Technologies and Development: Notes-Volume 2*. ACM, 151–154.
- [33] Anselm Strauss and Juliet M Corbin. 1990. *Basics of qualitative research: Grounded theory procedures and techniques*. Sage Publications, Inc.
- [34] Steven Tadelis. 2016. Reputation and feedback systems in online platform markets. *Annual Review of Economics* 8 (2016), 321–340.
- [35] U-Report. 2018. (2018). Retrieved July 21, 2018 from <http://www.ureport.in/>.
- [36] Aditya Vashistha, Fabian Okeke, Richard Anderson, and Nicola Dell. 2018. "You Can Always Do Better!" The Impact of Social Proof on Participant Response Bias. (2018).
- [37] Caroline Whidden, Kassoum Kayentao, Jenny X Liu, Scott Lee, Yousouf Keita, Djoume Diakite, Alexander Keita, Samba Diarra, Jacqueline Edwards, Amanda Yembrick, Isaac Holeman, Salif Samake, Boureima Plea, Mama Coumare, and Ari D Johnson. 2018. Improving Community Health Worker performance by using a personalised feedback dashboard for supervision: a randomised controlled trial. *Journal of Global Health*, 8(2). (2018). <https://doi.org/10.7189/jogh.08.020418>