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Social positioning matters: A socialized affordance perspective of mHealth in India

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Abstract

Existing research on technology affordance rarely considers the role of social structures in shaping the interaction between human actors and technology. In this paper, we draw upon the concept of social positioning to explore how socialized affordances of technology adoption, as well as their impact in work and social life, are shaped by the social positions that human actors occupy within multiple social structures. We do so by examining the adoption of mHealth devices by community health workers in India. The study generates theoretical implications for research on affordances of technology and social structures by integrating social positioning of actors in the analysis of a digital practice, and enriching IS research by incorporating the broader social arrangements and power relations.

KEYWORDS
India, mHealth, social positioning, social structure, socialized affordance

1 | INTRODUCTION

Prevailing research around technology and its link to social or economic development often focuses on either the provision of access to technology, the readiness of technology or on the outcomes of technology use. Scant attention is paid in understanding the processes of *how* technology leads to societal effects (Faik et al., 2020; Thapa & Hatakka, 2017). The issue of why technology often delivers unintended consequences remains a subject of inquiry.

As Zheng and Walsham (2021) point out, social contexts, such as properties of social structures, are often treated as a background detached from the digital phenomenon being studied and are rarely integrated in the analysis of the human-technology relationship. They suggest that IS researchers need to incorporate in their analysis the "social positioning of actors within multiple hegemonies, hierarchies and systems of power, and to problematize taken-for-granted boundaries in designing research questions and the research approach" (p.4). This is because human actors are inevitably positioned in varying intersections of power relations and social structure(s) that shape their perception and interaction with technology in everyday life, yet this is rarely reflected upon.

Many researchers have embraced various theories to uncover the social processes that shape the impact of technology on society. Theories such as institutional theory and structuration theory highlight the mechanisms and facilitating conditions, predicated upon human and material agency to address IT related change (Avgerou, 2017; Bass et al., 2013; Chew et al., 2015). However, these have been criticized for ignoring the materiality of technology. Other theories like the practice lens and sociomateriality (Orlikowski & Scott, 2008; Orlikowski, 1992, 2000) tend to focus on the materializing of technology at the level of situated practices but pay less attention to the macro social structures of society which shape the relationship between power systems, technology affordances and its associated social impact.

In this paper, we draw upon the concepts of *socialized affordance* and *social positioning* to situate the immediate human-technology interaction within multiple levels of social structures of society. This is empirically illustrated with an Indian case study of mHealth adoption from the perspective of community health workers (CHWs). Our findings reveal how technology generates different socialized affordances which to some extent transform the routinized work practices of CHWs with paradoxical effects on their role in the primary health care system.

The study seeks to address this research question: *how does the social positioning of human actors interact with socialized affordances of technology?* We take the Giddensian concept of social positioning as part of our theoretical analysis to provide a deeper understanding of formal and informal social structures that enable and constrain individual options and actions in day-to-day life, and how this shapes their perception and enactment of technologies leading to various outcomes.

2 | SOCIALIZED AFFORDANCES OF TECHNOLOGY AND SOCIAL POSITIONING OF ACTORS

2.1 | Socialized affordances

The theory of affordances was originally stipulated by Gibson (1979) who stated that "the affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill" (p. 127). His ecological approach to perception emerged as an antithesis to the representational form of perception. It was about adding "meaning" back into the actor-environment relation by relating meaning with action (Chong & Proctor, 2020). However, the introduction of the concept left some ambiguity about its interpretation. For example, "an affordance is neither an objective property nor a subjective property; or it is both if you like" (p. 129). There have been many scholars who have challenged his "asocial" nature of perception. Our perspective on socialized affordances emerges from the works of Costall (1995), Fayard and Weeks (2014), Zheng and Yu (2016) and Baggs (2021) that address the social nature of affordances.

Human actors are social beings. The starting point of their social actions in life, is "neither the subjective individual action nor an objective structure imposing on human action, but social practices" (Giddens, 1984, p. 2). It is through their conscious or subconscious participation in social practices that they primarily operate in everyday life. Thus, rules, norms and representations of human activity shape how social practices are produced and reproduced over time and vice versa (Costall, 1995; Giddens, 1984). The social world is already laden with social meaning derived from social practices (Baggs, 2021; Costall, 1995), thus the perception of affordances is susceptible to social

influence as well. While our environment affords us possibilities for action, we can always reject, ignore or simply misinterpret them depending on what is socially acceptable or not, and what we have socially learnt or observed about (Fayard & Weeks, 2014).

Furthermore, our practices today are embedded with technology artefacts which are a result of human intervention. The affordances of artefacts are themselves therefore a focus of enduring and cumulative social influence (Bloomfield et al., 2010, Costall, 1995). Baggs (2021) suggests that all affordances are social because "affordances humans pick up on belong to an intersubjective shared reality and are bound up with normatively constrained social practices" (p. 260). For instance, the meaning of the red traffic light is ultimately to be found inside the mind of the individual driver. The affordance of "stopping" at a red light exists only in relation to the socially and institutionally accepted traffic light system (Ramstead et al., 2016).

We do not go as far as arguing that all affordances are socialized. Using a mailbox for storage is merely related to the physical properties of the mailbox. Only in a society with a functioning postal system, does a mailbox offer the affordance of "posting mail" to a human actor. We refer to the latter as socialized affordance, which relates to individual, organizational, community, goals situated in social norms, rules and processes. All technologies have affordances, but what concerns human actors is not the mere presence of affordances, but which affordances have *social meaning* to the observer within a specific context (Fayard & Weeks, 2014; 2007, Costall, 1995, 2012).

We adopt the term "socialized" and not "social" (from Fayard & Weeks, 2014) because the latter may cause confusion given it is usually applied to study affordances that arise from social networking within the communication literature (e.g., Sutcliffe et al., 2011) or social interaction within the cognition and behaviour literature (e.g., de Carvalho, 2020). All artefacts have their preferred use (and affordances), or alternate ones that are not intended. However, even when we act upon those alternate uses, we may face sanctions when it goes against the rules of the existing practice (Costall, 1995). Thus, our ability to perceive artefacts, and actualize their use, is shaped by the structural setting in which the actor has a goal to fulfil and learns how to use the artefact. Affordances are thus socialized (enacted in social processes), where the perception and actualization of affordances become accultured into a social process which is shaped by existing social practices (Zheng & Yu, 2016).

In the IS literature, the affordance lens is described as possibilities of action allowed by the material properties of an artefact for goal-oriented action to its users (Bernhard et al., 2013; Bygstad et al., 2016; Leonardi, 2011). The affordance concept is considered a promising concept for theorizing IT-associated organizational change that acknowledges the materiality of IT artefacts and their human interpretation (Stendal et al., 2016; Strong et al., 2014; Volkoff & Strong, 2013). Recent IS studies have started to acknowledge the importance of the organizational context in the perception and actualization of affordances.

For example, Osmundsen et al. (2022) advocate moving beyond the actor-artefact dualism to considering the co-presence of the actor-artefact relation. During their study of a Norwegian digital twin project, they observed that the likelihood of the intended affordance perception of an artefact, is higher when the designer and users of that technology are part of the same conversations and context regarding technology use and implementation. This goes to show that shared social contexts influence whether different actors perceive the same affordances from the same artefacts.

Tim et al., (2020) also highlight the importance of accounting for the technological and organization features as a whole for successful affordance actualization. The mere existence or affordance potential will not directly lead to affordance actualization unless the organizational environment is conducive. Furthermore, not all affordances are aligned with organizational goals and values. Haag et al. (2022) introduce a concept of "deviant affordances," referring to those considered "undesirable" as their actualization would contradict legitimate organizational goals. Under such circumstances, actors often subordinate their individual objectives to organizational ones because the latter provides legitimacy to the decisions about which affordances to actualize, and how.

Thus, a perspective that accepts affordance perception and actualization as a social process can help us reflect on how technological enactment is situated in social practices and contexts. Teasing out the social process may help us understand the dependencies between different affordance and outcomes as well. IS studies tend to take the

social context as an abstract social background in which IT processes and phenomenon is embedded, but how technology constitutes social change is rarely analysed (Faik et al., 2020; Zheng & Walsham, 2021). Studies focusing on organizational, individual levels of change (Winter et al., 2014) and societal change are often conceived as unfolding through the entanglement of material and IT agencies (Orlikowski and Scott, 2014 ; Hanseth et al., 2004). However, these approaches "lack a theoretical vocabulary for discussing macro level phenomena, for which they have been criticized as typically neglecting broader social structures" (Faik et al., 2020, p. 8). By situating the actor-artefact interaction as a social process within the larger structural context, which is imbued with contextual rules and resources, we can attempt to link the micro level (individual change) with the macro level (socio-institutional change). To do so, we adopt the concept of *social positioning* which connects propensity and consequences of individual actions with their social position within intersecting social structures.

2.2 | Social positioning

According to Giddens the social position of a human actor is defined as "a social identity that carries with it a certain range (however diffusely specified) of prerogatives and obligations that an actor who is accorded that identity (or is an "incumbent" of that position) may activate or carry out: these prerogatives and obligations constitute the role-prescriptions associated with that position" (Giddens, 1979, p. 117).

A starting point to understanding the concept of social positioning is Giddens's duality of structure (Giddens, 1979, 1984). He proposes that structures, identified as rules (or schemas) and resources that pattern social behaviour and practices, are dual in nature (Sewell, 1992). Structures are both the medium and the outcome which constitute, sustain and maintain social systems (Giddens, 1984). Therefore, human agency and structure, far from being opposed, in fact presuppose each other. Thus, duality of structure takes the position that social action cannot be fully explained only by structure or agency. Instead, "it recognizes that actors operate within the context of rules produced by social structures, and only by acting in a compliant manner are these structures reinforced" (Gibbs, 2021). Alternatively, by exercising reflexivity in their thoughts and actions, human actors can modify social structures by acting outside the boundaries that structures place on them (Sewell, 1992).

Human actors are often positioned at the intersection of various structures. Sewell (1992) calls these intersections "*structural complex*." Giddens (1979, 1984) describes the structuration process as consisting of three interconnected analytical dimensions of social structures, namely, *signification*, *domination* and *legitimation*, which are produced and reproduced in the social practices of *communication* (signification), *power* (domination) and *sanctions* (legitimation). All individuals navigate through these dimensions via various *modalities* (*interpretive schemes*, *facilities* and *norms*) which are available to human actors in a setting, and from which they draw upon to reproduce or reconfigure social practices.

For example, an economically low-class Indian woman lies at different intersections of class, gender and culture. Where she is expected to comply with certain types of Indian cultural codes of communication and norms, to also identify with the norms and the power dynamics of patriarchy applied to her gender in that context, and finally to navigate through various systemic norms and power dynamics of her economic class that condition her access to means and opportunities. But a "given array of resources (utilitarian or authoritative) can be claimed by different actors embedded in different structural complexes (or differentially claimed by the same actor embedded in different structural complexes), that is, rules and learned behaviours can be borrowed or appropriated from one structural complex and applied to another" (Sewell, 1992, p.19). Where the aspect of being a woman in India (gender) can impact the prospects of getting employment (economic class), or her rebellion (human action) against existing cultural practices can open her to more opportunities to elevate her economic class (social change).

Agency is generally formed by a specific range of cultural and social rules and resources available in a person's particular social milieu and is culturally and historically determined (Giddens, 1984). But the capacity to exercise agency is far from uniform, that is, agency differs enormously in both kind and extent (Giddens, 1979; Sewell, 1992).

One's agency is contingent on their social positions: "[w]hat kinds of desires people can have, what intentions they can form, and what sorts of creative transpositions they can carry out vary dramatically from one social context to another depending on the nature of the particular structures that inform those social contexts" (Sewell, 1992, p.20). Occupancy of different social positions within intersecting structural complexes—for example, by gender, wealth, social prestige, class, ethnicity, occupation, generation, sexual preference or education—gives human actors knowledge of different rules, and access to diverse kinds and amounts of resources and hence different potentials for transformative action. Structures, in short, empower and disempower human actors differentially, which also implies that they embody the desires, intentions and knowledge of actors differentially as well (Giddens, 1979; Sewell, 1992).

In a nutshell, the concept of *social positioning* provides a more nuanced and complex view of society, in which human actors derive their social identity and obligations by navigating through various intersections of structures, each with its own rules, norms and knowledge. It places emphasis on the human actor as someone who is subjected to the schemas governing social practices and reproduces them, but also holds the capacity to initiate incremental or substantial change, depending on their positions in the power complex.

Within IS literature the duality of structure has been largely applied to highlight the relevance of human agency (Chu & Smithson, 2007; Pozzebon & Pinsonneault, 2005; Orlikowski, 1992, 2000), or the organizational context and its relationship with technology (Bernardi, 2018; Bernardi et al., 2019; Sarker & Sahay, 2003; Schultze & Orlikowski, 2004; Walsham, 2002). However, most of the practice-based research on technology focuses on the micro-level interaction between the human actors and the technology-use in organizations, and does not account for the broader, more endurable properties of social structures, nor the power relations among actors (Leonardi & Barley, 2010). The social context of the technology and human actor is rarely taken as part of the analysis but often seen as external to the human-technology interaction (Zheng & Walsham, 2021).

In this paper, we attempt to take the social context of the human-technology interaction as properties of social structures and shift the terminology from "technology user" to "human actor." This helps us shift the lens from seeing the technology-human interaction in isolation to seeing the human actor and technology artefact as situated in complex and enduring structures of society (Zheng & Walsham, 2021). Social actors' interaction with technology is constrained and enabled by their social positionings, thereby conditioning how affordances of technology are enacted in practice (Fayard & Weeks, 2014; Zheng & Yu, 2016). The study thus highlights the contextual conditions, in association with the pluralistic social positionings of human actors and how they impact the social process of affordance actualization.

3 | METHODOLOGY

3.1 | Background: Community health workers and mHealth

Community health workers build bridges between the formal health system and the rural communities working mainly to improve the relevance, acceptability and accessibility of public health services (Agarwal et al., 2015; Braun et al., 2013; Scott et al., 2019). In developing countries especially, the social position of the CHWs centres around being agents of health-related change for their communities. They serve many functions including, conducting home visits, preventive treatment of diseases, data collection, education and counselling and referrals for further care in their communities. By directly visiting households, CHWs increase access to care for groups that are particularly difficult to reach, such as secluded women, the extremely poor, or the lowest classes of society subject to stigmatization (Agarwal et al., 2015; Braun et al., 2013).

The introduction of information and communication technologies (ICTs) to rural CHWs has been shown to bridge lacunae in their work environment resulting from under-capacitated facilities, constrained access to information and delayed responses to emergencies (Agarwal et al., 2015). mHealth applications in most low-resource

settings are mostly used to streamline maternal and child health services (Agarwal et al., 2015; Ilozumba et al., 2018). Systematic reviews done by (Bassi et al., 2018; Scott et al., 2019; Early et al., 2019; Agarwal et al., 2015; Braun et al., 2013) show that the use of mHealth (mobile phones, smartphones and personal digital assistants) by CHWs in low resource settings has helped improve the CHW's workflow by eliminating several shortcomings that they face in the field such as the increased workload of managing paper registers, lack of standardization of collecting and reporting data, the loss of paper documents, difficulty in scheduling household visits and follow-up appointments with beneficiaries, poor communication with supervisors, poor communication with the beneficiaries due to lack of resources, poor compliance to standards and guidelines, and limited data security.

Health technologies also become a medium to support education and training of CHWs and help geographically dispersed CHWs with timely and accurate information, shared through various multimedia formats (Ilozumba et al., 2018; Bonnell et al., 2018; Nyemba-Mudenda & Chigona, 2017). Florez-Arango et al. (2011), p. 133 state that "although CHWs are the backbone of health care delivery in developing countries, they too often have little formal education and training, and so devices that use a combination of text, audio, images and video can be used to improve their ability to provide quality community-based care."

While there are improvements in the workflow processes and an increase in self-efficacy cited by CHWs using mHealth interventions, they are also plagued with several social and infrastructural constraints (Ilozumba et al., 2018; Nyemba-Mudenda & Chigona, 2017; Scott et al., 2019). The acceptability and usability aspect greatly differ in many settings. Infrastructural barriers such as poor electricity, lack of mobile connectivity, faulty hardware, lack of charging points, theft, security, poor roads, poor PHC (primary health care) facilities, lead to weak acceptability and reception of mobile communication technologies by CHWs. Social barriers such as the existing lack of trust in the public health care system, prevalence of traditional and religious beliefs of giving birth at home, poor credibility of CHWs due to lack of knowledge and training, and poor communication with their supervisors create discrepancies in the number of maternal and infant patients being registered through the mHealth application versus how many resorting to the treatment provided by PHC centres or the health workers in practice (Gopalakrishnan et al., 2020; Nimmagadda et al., 2019; Carmichael et al., 2019).

The combination of both social and infrastructural barriers has morphed the social position of the health worker into a technical one, whose job has become one where they merely collect and report data for the government like an inanimate instrument. This robs them of building and sustaining a relationship with the community. Existing mHealth research from an IS and ICT4D perspective focuses more on how and why technology leads to a particular outcome, especially failures (Sahay, 2016). While this perspective addresses the social context enveloping technology use, it does not attribute enough emphasis to the health worker's perspective on technology use as situated within specific structural complexes that impact them during their routine workflow processes. As CHWs are socially positioned at the nexus of the community and the health system and are also the primary users of the technology, their perspective on technology use becomes vital. Therefore, in this study we specifically focus on the interaction between the CHW and a mHealth artefact during their routine workflow. We address the various socialized affordances of technology that emerge in practice for the CHWs from their very own perspective.

3.2 | Research setting

Within the Indian context, primary health care (PHC) centres form the main link to the country's community health worker programs. PHC centres house 3 tiers of health workers, each assigned with responsibilities surrounding community health. For the purpose of this study, only the first two tiers (T1 and T2) of health workers were analysed, as they were the ones that directly interacted with the mHealth intervention.

Secondly, there is no single mHealth intervention that is universally implemented in all the 23,391 PHC centres across the 29 states of the country by the government of India (Bassi et al., 2018; Sriram, 2018). There is the universal and standardized HIS (health information system) program, into which PHC centres feed in the monthly health

data about their communities collected by their health workers, but that is not the focus of this study. Our focus is on the adoption of mHealth interventions at two primary health care centres in India. In recent years, many state governments in partnership with their respective local NGOs and/or with private technology companies, have implemented mHealth interventions in the form of smartphones or android tablets to assist health workers in streamlining their existing workflows at the PHC level (Gopalakrishnan et al., 2020).

For this study, data from two PHC centres was acquired. PHC centre 1 was situated in the southern state of Karnataka, while the second PHC centre was situated in the northwest state of Gujarat. These two PHC centres were chosen for their similarities in the applicability and use of mHealth interventions by the community health workers. Despite being in two different settings, they offer several contextual similarities, this has been represented in Table A1 in the appendix. Both centres in the year 2015, implemented an mHealth intervention in the form of an *android tablet through a public private partnership*. Both centres cater health services to rural populations and the android tablets were specifically used to streamline the delivery of maternal and child health services by the T1 health workers. The tablets house a plethora of specialized technical features relating to systematic data collection and reporting on various maternal health issues. The motivation for launching the mHealth intervention in both the centres was to achieve the overall goal of improving PHC centre efficiency. This incorporated addressing the following issues:

- Errors in the collected data by the health workers
- Call for improvement in the number of pre- and post-natal registrations at the PHC level
- Lag in data reporting by the health workers
- Cumbersome task of collating data from different paper registers by the health workers
- Poor communication between the T1 and T2 health workers and the PHC centre
- Poor response to emergency care by the PHC centre
- Poor health education communication between T1 health workers and beneficiaries (community members)

Both PHC centres used in this study are in rural areas where electricity and mobile connectivity issues are prevalent. However, one mHealth tablet affords offline data recording and saving, and the other tablet is loaded with an internet data pack. If there are mobile connectivity issues, then CHWs generally sync the data collected in the tablet into the PHC computer systems by physically going to the PHC centre which has been equipped with internet connectivity. At the end of every month, data collected in the PHC computer systems is fed into the governmental HIS in a standardized format. While there were no hardware issues cited from one of the PHC centres, the CHWs in the second PHC centre did cite some hardware issues with the tablet which have been discussed in the findings below. As the tablets are remarkably similar in terms of functionalities, we do not differentiate them in the findings and analysis and refer to them as "the tablet."

3.3 | Data collection and analysis

This is an interpretive case study (Walsham, 2006). Qualitative data collection centred specifically, around the use of mHealth tablets used by T1 (tier 1) health workers and few T2 (tier 2) health workers respectively at both the PHC centres. The goal of the tablets was to smoothen the routine workflow of the CHWs in order to improve the overall PHC centre efficiency. Data collection methods included 40 semi-structured interviews and field observation. Field observation was conducted in January 2016 at PHC centre 1, and from March–May 2017 at PHC centre 2, respectively. It was used to shadow health workers and observe what a typical routine day looked like for them. This also helped as an indirect guide for developing the interview topic guide. The observation helped us understand, for which CHWs, the interactions with the tablets were deepest and how (Ritchie & Lewis, 2003). This observation guide has been represented in Table A2 of the appendix. Visual aids in the form of photographs, video and audio

recordings were taken during the interview and observation process, which later assisted in creating iteration in the thematic coding process. Secondary material was also collected in the form of paper health records that the health workers used as an original template to compare and match up the electronic data.

Semi-structured interviews were conducted, whilst the health workers were conducting their routine day to day duties. The staff at the PHC centre were interviewed separately when the health workers were not around. The semi-structured format permitted us to explore fully the participants' reasons, feelings, opinions and beliefs (Ritchie & Lewis, 2003). Interviews first started with broad open-ended questions to understand what CHWs, PHC supervisors and community members generally felt about the tablet use and its impact on their workflow, and slowly moved on to more specific questions where they could expand on their insights. The questions varied depending on how strongly associated with the technology the participant was (i.e., CHWs emphasized more on how they felt about using the technology, vs. PHC staff who focused more on the efficiency aspect of the technology use, from a managerial perspective). Tables A3 and A4 in the appendix provide a list of the interviewees and the interview questionnaire. Fake names are used to represent the participants.

An abductive reasoning was adopted during the data analysis process. This helped us immerse in the routine workflow of the health worker while also allowing us to turn away from the task of scrutinizing evidence and being open to changing possibilities (Creswell, 2013). There was constant back and forth between the empirical observations and the theoretical propositions that were finally adopted in this study. Early analysis of the data revealed the structural and contextual aspects impacting the health worker in their day-today practices. For instance, there is a "taboo" surrounding open discussions of sensitive health issues in the community. The need to incorporate structural elements in the socialization of affordance led us to Giddens and his concept of social positioning.

Thematic analysis was applied (Braun & Clarke, 2013) to analyse the interview transcripts. The phases of thematic analysis were strictly followed: familiarizing with the data, generating initial codes, searching for themes, reviewing themes, naming themes and finally building the construct. The first step was to read the interview transcripts several times and take notes on key/constant topics. The field notes helped cross-reference the themes emerging from the data and helped understand the link between the health workers' accounts with the accounts given by the PHC staff.

The analysis went through several cycles of coding and categorizing. Codes were created, and later categorized into broader themes. The main themes which emerged from the empirical data were "affordances that emerged in practice" and "structural position of the CHWs in the community and the PHC hierarchy." Depending on the emergence of the themes, we carefully integrated the concepts of socialized affordances and social positioning into our analysis. Table A5 in the appendix explains the thematic analysis process.

While data collected through the tablets is synced into the governmental HIS health information system, the latter is not included in this study. The mHealth initiatives at the two PHC centres reported here are non-representative of other mHealth interventions in other PHC centres of India. Our findings are specific only to these two PHC centres.

4 | CASE STUDY: COMMUNITY HEALTH WORKERS (CHWs) AND mHealth

Traditionally the social position of a health worker was that of a change agent, someone who would bridge the community with the PHC centre and create health related awareness for the community (Lehmann & Sanders, 2007). However, over the past few years their position has morphed more into one where they are merely an "instrument" used for data collection from the local communities for the PHC centres (Agarwal et al., 2015). In our findings, the intervention of technology had a two-fold effect on the CHWs. While reconfigurations to their existing social position of being an "instrument of data collection" to being a "change agent" were noticed, it was also supplemented by a further reinforcement of their existing social position of being used as an "instrument."

4.1 | Community health worker processes in the Indian PHC context

The original method of data collection and reporting on maternal and child health (such as ante and postnatal care registration, childbirth and immunization registrations, follow-up on existing treatments) would entail the T1 health worker to manually write and record data in paper-based registers. Each health worker would be allotted a set of household visits to conduct within their given radius. The health workers during these house visits, would have discussions with the beneficiaries (community members) about their health, ongoing treatments, registration and follow-ups. They would manually fill the required health information in the register. Sometimes the health workers would conduct 30–40 household visits in a day and the data would be filled in 25–30 registers. This would be reported to the local PHC centre at the end of the week. This process has been diagrammatically represented below in Figure 1.

Manually filling up registers and collating the data, alongside doing the house visits, and reporting to the PHC centre, was a time-consuming and cumbersome process. Therefore, T1 health workers required assistance from T2 health workers. The heavy workload and time pressure often resulted in errors and delays in data reporting, which would be particularly problematic during the management of emergency cases. This would render the PHC centre ill equipped to provide the right kind of treatment or care, sometimes even resulting in patient mortality. These failures would be attributed to the health workers, thereby undermining their credibility from the perspective of the PHC staff and the community. The CHWs on the other hand were frustrated by the lack of institutional support from the PHC centre and felt dejected and burdened by their tasks.

However, with the introduction of the tablet, the technical process of data collection and reporting were considerably streamlined and accelerated. The tablet included an inbuilt software that contained various features designed to assist the health worker in filling data correctly and systematically. The tablets were also of small size and easily portable compared to multiple registers. The tablets were connected to a mobile network and therefore, when they

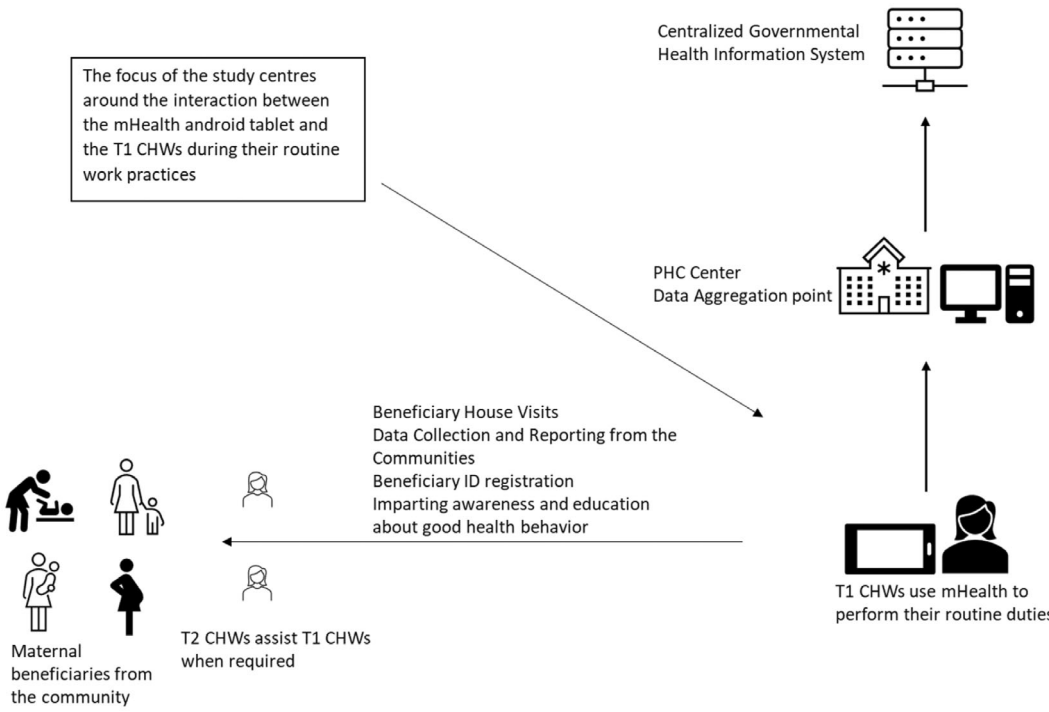

FIGURE 1 Diagrammatic representation of the CHW's workflow

TABLE 1 The different outcomes along with their related socialized affordances

Socialized affordance (action possibilities)	Outcomes	
	Intended outcome (In line with the PHC goal)	Unintended outcome
1. Streamlining Everyday CHW Work Processes	Improved data collection and reporting	• Change of CHW perceptions by the PHC staff • Increase in CHW workload • Exclusion of Tier 2 health workers
2. Facilitating Health-related Interactions between the Community and CHWs	Educating the community on good health behaviour and health practices	• Strengthening CHW confidence and motivation
3. Facilitating Monitoring and Accountability Processes	Improved CHW surveillance	• Undermining CHW autonomy and job satisfaction (CHW demotivation)

would receive a mobile signal, the data (from the tablet) would automatically be synced into the computer systems of the PHC centre, thereby delivering timely health data to the PHC staff.

The tablet was designed with a purpose of aiding CHWs in their existing work processes, in order to fulfil the institutional goal of improving the overall efficiency of the workings of the PHC centre. Objectives such as improved data collection and reporting, educating the community about good health practices, and regular CHW surveillance were viewed as intended outcomes, that were expected to be fulfilled during the implementation of technology, to meet the overall goal. However, we also observed certain unanticipated outcomes for the CHWs in practice. The adoption and use of mHealth tablets are part of the CHWs' everyday work routine which is imbued with existing community norms, relations between the CHWs, and the existing perception of the CHWs by the PHC staff and the community. When technology gets enmeshed in the everyday social processes of the CHWs' work routine, it also gives rise to outcomes that were not intended during the design and implementation of technology. These have been listed in Table 1 below.

In the rest of the section, we elaborate in detail *how* these unintended outcomes materialized, and what role did technology play in the process. To do so, we present findings on how the CHWs enacted socialized affordances of technology during their everyday work practices. Following that, we analyse how the intersectional social positioning of CHWs shaped the socialized affordances of technology and their associated outcomes.

4.2 | Streamlining everyday CHW work processes

The inclusion of technology in the CHW's routine work processes afforded the streamlining of everyday CHW work processes. The timely syncing of data with the PHC centres, automatic collation of data or the systematic input of data is afforded by the tablet and enacted by the CHWs, in line with the overall PHC goal of improving PHC efficiency.

However, the interaction between the tablet and CHWs is also embroiled in a social process. CHWs are regarded as members of their communities and as employees of the PHC centre. In their day-to-day tasks, CHWs interact with other CHWs, members of the community and the staff at the PHC centre. Each interaction is imbued with certain norms and power dynamics. For instance, the PHC staff due to their authority regard CHWs as subservient, whereas within the community, norms around traditional birthing practices still prevail. Thus, CHWs navigate between these intersecting structures of domination, signification and legitimation, during their routine work processes, which also impacts how affordances of the tablet are perceived and enacted. Due to this complexity, we

observe affordances which are socialized into the existing PHC work process and social context of the community. The intended outcome of "improved data collection and reporting" is achieved when the socialized affordance of 'streamlining everyday CHW work processes' is actualized. But we also observe certain unintended outcomes materializing in practice from the same affordance. These have been outlined below.

4.2.1 | Change of CHW perceptions by the PHC staff

The streamlining of CHW work processes has inadvertently changed the perception of the health worker in the eyes of the PHC staff. The PHC supervisor and the district head at one of the PHC centres were noted saying:

> "Although we always trusted the judgment of the health workers… as they are the ones who directly interact with the community, due to the poor data quality it was difficult to take their judgment on the beneficiaries seriously…the data was of poor quality because of them… the registers would be filled with mistakes and delays.
> But today they are the primary users of the tablet itself and are also the ones who put the data in it which is then reported to us. This improvement in reporting has increased our trust on them, the data has less errors, and as soon as the tablet catches mobile connectivity it syncs the data collected by them into the PHC center system."

When asked about this change to the health workers, Jaya, and Binita (T1 CHWs) responded by saying:

> "We now feel 'khushi' (happiness) with the way we are perceived by the PHC staff because now the PHC staff look at us as if we are important. Before we would be scolded in our weekly and monthly meetings about the delay and the mistakes in the information that we had collected, but today they rely on our feedback and even cross check with us on the information recorded in the health tablet with the observations made during our regular house-visits, especially if it is a severe case. It is a nice feeling. We feel 'khushi' (happiness) now that our self-worth in the eyes of the PHC staff has increased."

Here, we observe the "blame" aspect being considerably reduced. This is occurring because the interaction between the CHW and tablet is conditioned by the existing relationship between the CHWs and the PHC centre. By virtue of the PHC hierarchy, CHWs were regarded as subservient to the PHC staff, thus making it easier for the PHC staff to attribute the inefficiencies of the PHC system to the CHWs. However, the socialized affordance of "streamlining the everyday CHW work processes" inadvertently diffused the blame aspect. This not only led to an improvement in the existing PHC staff and health worker relationship, but also contributed towards the micro-reconfiguration of their social position from being an instrument of data collection to someone who could make a health-related contribution to the community.

4.2.2 | Increase in CHW workload

Although the use of the tablet has considerably improved CHW work processes, in most instances, health workers also felt overburdened with work due to the inclusion of technology. Health workers simultaneously collected data in the tablet and registers, with the fear that the tablet might have hardware faults or, that the health centre officials might ask for the paper registers for accountability purposes. The aspect of doubly inputting data also led to duplication of data. Additionally, in the initial phase of the technology implementation, health workers were also required to

transfer all existing data from the registers to the tablet. This was done alongside collecting beneficiary identification information by going from one house to house another, to maintain an electronic repository of the ID (identification) information of the community members.

They performed these tasks whilst performing their routine duties along with attaining basic training on how to use the tablet. Health workers expressed that the process of collecting ID information in addition to their existing responsibilities as, time-consuming and cumbersome. Especially as many community members were reluctant to give their personal or family information. T1 CHW Supriya was noted saying:

> "Initially we had to fill in registers with the information we collected in our routine visits and those registers would be then sent to the PHC center. But since the use of the tablet, we had to take all the existing information about our patients and their families from the registers and put it in the tablet and collect beneficiary identification (ID) data, while doing our routine visits! Too much work, and then we also have to go home and take care of our own families."

The socialized affordance of streamlining CHW work processes now accommodated another outcome that was not originally intended, which is the increase in CHW workload. This affordance was conditioned by the fear CHWs hold towards the authority of the PHC centre. CHWs chose to enact the affordances of technology even when it personally constrained them in order to avoid blame or other severe consequences by the PHC centre. This further reinforced the existing perception of the CHWs being an instrument for data collection. The overburdened health workers became even more disgruntled as they felt a deep lack of institutional support from the PHC staff. The PHC staff, instead of assisting the health workers in reducing their workload, were perceived as allocating them with more work.

4.2.3 | Exclusion of tier 2 health workers

Furthermore, the use of the tablet itself reinforced the existing CHW hierarchy. The primary health care structure in India involves an official hierarchy of health workers that consists of three cadres of health workers. The tier 1 (T1) or senior level of health workers are recruited by the PHC centre based on their education qualification (whether they completed basic schooling) and are paid a salary. The tier 2 (T2) health workers are recruited as volunteers, and paid in incentives, and operate at the village level. Their primary task is to assist the T1 health workers in data collection and reporting but also to sensitize the community on health, nutrition and sanitation issues.[1]

In the two PHC centres where this study was conducted, T2 workers worked collaboratively with the T1 health workers. But with the adoption of tablets this appeared to have changed. The tablets were mandated for use only by the T1 health workers, given their educational background, seniority and link with the PHC centre. The rule around the mHealth tablet use demanded that only users with basic level education (T1) were officially authorized to use it, thus restricting the way T2 health workers collaborated with the T1 health workers on some occasions.

In cases where the existing relationship between the two tiers followed along the lines of sisterhood, the T1 health workers at their discretion would let the T2 health workers use the tablet and let them continue to assist T1 CHWs in everyday tasks. In some other cases, where the existing relationship was more formal and less personal, the T1 health workers prohibited the T2 health workers from using the tablet. As a result, some T2 health workers felt redundant and invisible, or in some cases even felt belittled and inept for using the technology. Yashti and Rajeshri (T2) were noted saying:

> "We were the biggest support they (T1 health workers) had before. The process of filling up 25-30 registers and then reporting it to the PHC center was not an easy task. Many a times we would relieve them of some of the burden by doing the household visits ourselves and reporting it to them,

> who would then fill the register. But since they have started using the technology, they do not involve us as much, they want all the recognition for themselves! We request the supervisor at the PHC center sometimes, to let us use the tablet as well."

In this circumstance, the socialized affordance of streamlining CHW work processes led to another unintended outcome, that is, exclusion of T2 workers. During the data collection process, T2 CHWs felt excluded from the work process, in which they were originally participating, while T1 CHWs continued to participate and earn their recognition. Some T2 health workers felt less valued and redundant, and therefore less motivated to perform their responsibilities. As a result, the hierarchy among the health workers that previously existed only informally, and with less demarcation, further strengthened.

4.3 | Facilitating health-related interactions between the community and CHWS

Many health workers reported that the multimedia feature of the tablet enabled them to use videos and images to support their routine interaction with the beneficiaries. The social process of gathering beneficiaries, showing videos and engaging conversations greatly assisted them in imparting health education, especially to young adults. The videos provided visual cues, and examples to explain symptoms and causes of sensitive health ailments such as AIDS, contraception or family planning.

Before adopting mHealth, health workers would try and gather beneficiaries to discuss issues on health and sanitation or have such conversations with the beneficiaries during the routine house visits. Only some of them would be in audience, and even then, it would be difficult to gauge to what extent the beneficiaries absorbed the information, and if they managed to implement it in everyday practice. Furthermore, due to the stress of managing a heavy workload, CHWs were not always able to remember all the relevant health literature when interacting with the beneficiaries. This resulted in further stress, leading to rushed or incomplete communication, thereby undermining, and discouraging further interaction. As noted by Kiran (T1 CHW):

> "Before when we would gather the beneficiaries and teach them about health and sanitation, we would never know if they were able to understand anything or not. People wouldn't even bother gathering and even if they did gather, we would ask them if they had any questions at the end of our conversation, but either no one would ask, or they would hesitate to ask."

However, the multimedia feature of the tablet has aided communication with the beneficiaries. The videos afforded by the tablet form a platform which bridges the learning gap between what the health workers try to teach, and what the community members learn in practice. This has also helped the CHWs better their own understanding about the different health concepts which has helped them during their community interactions. The videos not only make imparting health information/education interactive but also grasp the attention of those present, giving more leeway to understanding the concept and encouraging inquiry from the beneficiaries. Bhagya and Binita (T1) were noted saying:

> "But now our communication has improved because of the tablets. When we call them to gather around, they come out and listen to us, out of curiosity of seeing the tablet. We are now able to make it more interesting for them to listen and understand what we are teaching, for example, orally explaining about HIV becomes extremely difficult especially to young adults. As it is a sensitive topic, teenage boys often feel shy, or are reluctant to listen to what we have to say to them and oftentimes, they even shun us or run away from us!

> But the very same issue when shown through a video in the tablet, captures the attention of the beneficiaries and makes the understanding much more interactive. Even teenage boys sit and watch the video and are willing to listen to us about AIDS related issues."

Here, the socialized affordance of facilitating health-related interactions between the community and CHWs is conditioned by the PHC's intended objective of educating the community about various health related aspects. The interaction with the technology is supported through a social process, which involves CHWs socially gathering their community and explaining health related things to them through the tablet. This impacts the community's perception of the CHW as someone who is knowledgeable and helpful. This inadvertently impacts the social position of the CHW from being an instrument of data collection to a change agent who can make a difference in the community.

4.3.1 | Creation of CHW confidence and motivation

Conducting conversations around sensitive issues such as AIDS, contraception, family planning or safe sex practices has been quite challenging for the health workers. During our observation phase we noticed that within rural areas such as these, traditional and conservative values still pervade every conversation and event. Moreover, midwives, elderly women and mothers-in-law are regarded as the source of knowledge for maternal information or wisdom, whereas young female health workers talking about sexual or maternal issues is not always well-received in communities such as these. This would make it exceedingly difficult for the CHWs to carry out discussions around such topics not only with men but also with women.

The socialized affordance of facilitating health-related interactions has increased the health worker's confidence and self-efficacy. The unintended outcome of creating confidence for CHWs occurred due to the change in the community's perception of the CHWs, which consequently impacted the social position of the CHWs as agents of change. CHWs now felt confident in their abilities to hold health related conversations with the community. T1 CHWs Binita and Supriya were noted saying:

> "We feel good about doing what we do today. The ability to explain sensitive health information to the members of the community has improved our perception in their eyes, making us feel more motivated to do our job."

4.4 | Facilitating monitoring and accountability processes

In the former case, the PHC staff regarded the health workers as inept and inefficient, while the health workers viewed the PHC staff as unhelpful and unsupportive. Due to the poor relationship between the PHC staff and health workers, health workers would often be demotivated to perform their routine tasks with the assumption that the blame for inefficiencies would, by default, land onto them. But now, the tablet affords the aspect of being geo-positioned, wherein through an electronic dashboard at the PHC centre, the progress of the health workers can be remotely monitored. Secondly, the system also has a provision of sending reminders to the health workers to complete their tasks in a timely manner. Health workers commented that reminders such as logging in new maternal registrations or conducting follow-up checks, greatly helped them when they forgot about conducting them or were lagging. Geo-tracking thus changed the relationship between the PHC centre and the health workers. As a PHC supervisor at PHC centre 2 commented:

> "The trust and accountability factor has greatly increased because now we are able to maintain the accountability of the health workers. The tablet stores the details of all the beneficiaries and their

designated health worker, so, if a CHW does not fill in the required data for the day, we can immediately track which health worker is responsible for it."

The socialized affordance of facilitating monitoring and accountability processes led to the achievement of the intended outcome of improving CHW surveillance. While this helped achieve the PHC goal, it also personally constrained the CHWs. This, in turn, reinforced the "instrument" perception of the CHWs. They were continued to be viewed as inanimate instruments that needed to be monitored. However, we observed a twofold effect of this affordance.

4.4.1 | Increase in CHW demotivation

Enacting affordances of monitoring and accountability is a social process. CHWs perceive the aspect of being monitored or geo-positioned as uncomfortable. Thus, leading them to work harder at the expense of their personal time and obligations. However, they continue to enact these affordances, even when it constrains them in order to avoid any severe consequences that they might face if they deviate from adhering to the PHC goal. This in turn demotivates them to do their job. Sarika (T1 CHW) was observed saying:

"What is this, our routine job of conducting house to house visits is any way hard as it is, and now we are being watched! We would like our space and freedom to do our tasks when it is suitable for us. We have to go home and take care of our husbands and children as well."

However, it was also observed that some other CHWs enacted this affordance because it motivated them to do their job better. They felt that they were put under surveillance due to the importance of their role at the community level, thus keen to perform their tasks with rigour. This also reduced the occurrence of the health worker being blamed for the loss of data because technological glitches could easily be identified. Thus, the socialized affordance is not only conditioned by the PHC goal but also by how CHWs interpret its enactment in practice.

5 | UNDERSTANDING SOCIALIZED AFFORDANCES THROUGH SOCIAL POSITIONING

As shown above, the enactment of socialized affordances is conditioned by the enduring structural properties of the context. Managerial goals of the PHC centre, and the existing social position of the CHWs in the community, get enmeshed with the technology use in every day CHW work practices. Below we attempt to delineate and analyse the above enmeshment.

5.1 | CHWs as positioned under the PHC context

CHWs are socially positioned at the intersection of the primary health care system and their community's social system. In the PHC context, CHWs perform their duties as deployed by the PHC centre, in order to achieve the goals, set by the PHC system (*structures of legitimation*). They carry out their role as an instrument of data collection, as per the training and information given to them by the PHC centre (*structures of signification*). CHWs are institutionally positioned at the lowest tier of PHC hierarchy, and thus subject to the managerial power of the PHCs (*structures of domination*). Affordances of technology are thus socialized, when they interact with the social position of the CHWs who are situated at the intersection of structures of domination, legitimation and signification instantiated by the

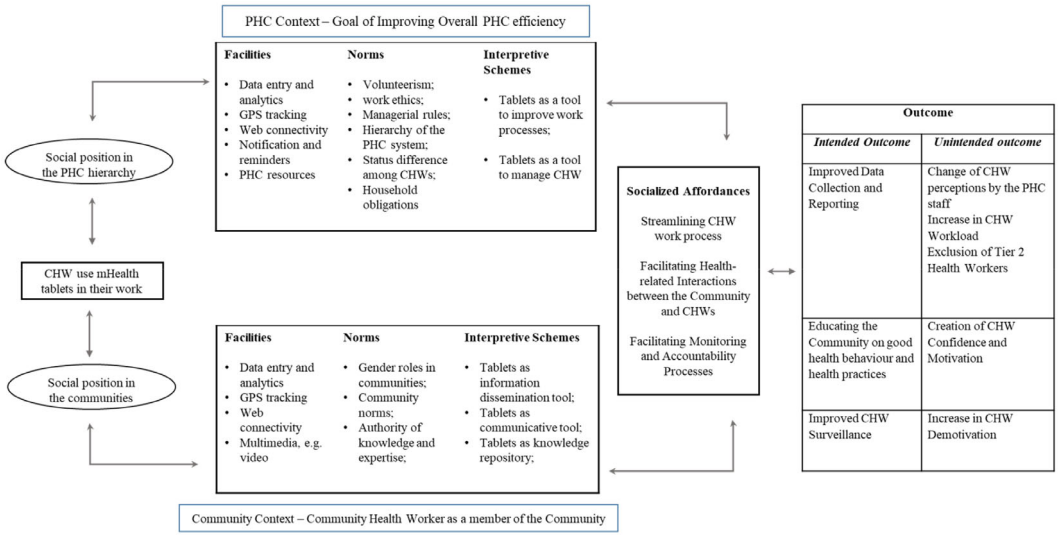

FIGURE 2 Interrelationships between the CHW's social position, socialized affordances of technology and outcomes

PHC centre. Features of technology such as data entry, multimedia functionality or monitoring, are enacted as *facilities* that aids the PHC centre to have power over the CHW's day to day tasks. While the use of technology itself, acts as a tool to aid CHWs in enhancing their existing stocks of knowledge (*interpretive schemes*) when carrying out their duties. The enmeshment of the tablet in the regular work processes of the CHWs is shaped largely by the goal (*norm*) set by the PHC centre to improve its efficiency.

However, the perception and actualization of technology affordances are not only in line with the institutional goal but also part of a social process. The enactment of the various features of technology is weaved into the everyday work of the CHWs, infused by the social interaction and relations that the CHWs have in the community and with the PHC centre.

When affordances of technology interact with the CHW's social position, they also encounter unintended outcomes. CHWs feel overburdened, and experience a lack of institutional support, when the affordance of "streamlining of CHW work process" gets actualized. In this scenario, their existing social position is further reinforced. The structures of domination and legitimation are activated when CHWs are forced to subordinate the responsibilities of their personal lives in order to adhere to the rules and goals set by the PHC centre. The hierarchy between T1 and T2 CHWs is strengthened, making certain T2 CHWs feel excluded. Affordances of technology here reinforce the PHC centre's control over the CHWs when socialized within the existing structures of domination and legitimation.

Thus, the same affordance that gave rise to improved "data collection and reporting," or "facilitating monitoring and accountability processes" lead to a variety of unintended outcomes. This has a recursive impact on the social position of the CHW, CHWs who were feeling already burdened are further burdened. Despite the overburden, CHWs continue to carry out their routine work tasks, thus cementing their social position as a silent cog in the machine rather than an active agency. This complex interrelationship is depicted in Figure 2 below.

5.2 | CHWs as positioned under the community context

However, the above is only one part of the CHW's structural complex. The other part resides in the CHWs' role as members of their own community with a different structural context. This has been represented in Figure 2 above.

Certain norms of the communities consider talking openly about safe-sex practices, contraception and AIDs, as a taboo. The CHWs residing within the community themselves are also ingrained with such norms, which is compounded by their gender role at the household and community level. They are largely regarded as wives, mothers, daughters and younger women in the communities. They are obliged to follow the rules and norms of the community and hold domestic responsibilities towards their families, which are expected to take priority over their roles as CHWs holding institutional responsibilities under the PHC centre. Authority of knowledge and power are held by the more elderly members (such as midwives and mother-in-laws) of the community who are regarded as more experienced in helping with maternal health issues. As a result, CHWs as junior/younger women in the community struggle to derive legitimacy and credibility from the community members.

Knowledge about the accepted taboos of their communities, act as *interpretive schemes* or stocks of knowledge that CHWs hold. This activates the *structure of signification* as instantiated in the practices of the community. The taboo itself acts as the *norm*, from which the *structures of legitimation* are enacted. Lastly, the existing community perception of the elderly women who are expected to have better maternal knowledge than the CHWs, form the *structures of domination*.

In this case, socialized affordances of technology interact with the social position of the CHW as someone who has knowledge about the norms and practices of the community. Therefore, when the CHWs perceive and actualize affordances of technology, it directly impacts their perception by the community. The socialized affordance of "facilitating interactions" delivers the intended outcome of educating the community about safe health practices. However, it also gives rise to the unintended outcome of strengthening CHW confidence. This occurs because technology, again, is enmeshed in the social practice of the CHWs gathering community members and sharing information through videos. In this social practice, CHWs may sometimes challenge existing norms, power structures and knowledge of the community. The multimedia features of the tablet afford a space where CHWs can discuss issues they are not expected to discuss (e.g., AIDS and safe sex practices). In doing so, they exhibit their medical knowledge and awareness about such issues thus contesting the authority of the elder women and midwives of the village. This in turn shifts how they are perceived by the community and reconfigures their social position to be agents of change. CHWs are not just viewed as "instruments of data collection" but now show potential for becoming agents that can create health-related change in the community.

In short, the socialized affordances identified in the findings above, emerged in day-to-day CHW practices due to the intertwining of technology-use with various social structures and the pluralistic social positions of CHWs. The affordances of technology are thus socialized, that is, conditioned by the structural properties of the context, which help us understand how and why we may observe a variety of outcomes when the same affordances are enacted in different contexts or across different people. But those very same unintended outcomes and socialized affordances may feed back into the social position of the CHWs. Despite their enhanced influence in the communities and effectivities in the PHC system, the powerlessness of CHWs in the PHC system and their lack of voice continue to be the case.

6 | RESEARCH IMPLICATIONS

This paper seeks to incorporate social structures, via the lens of social positioning, in understanding socialized affordances of technology. By examining the case of mHealth adoption in primary health care in India, we unpack the process through which adoption of technology generates outcomes that are shaped by the social positioning of actors.

6.1 | Contributions to technology affordance research

This paper provides a detailed understanding of mHealth adoption by CHWs as situated in a structural complex which incorporates the actor's need to navigate through intersecting norms, power relations and frames of

understanding. CHWs in day-to-day work and life are simultaneously constrained and enabled by the dual roles as members of the community and as employees of the PHC centre. From a Giddensian perspective, a person's interpretation, motivation, actions and their outcomes cannot be determined by the inherent properties of the individual, nor a simple social position, for example, one's role in the organization; "family, moral or political concerns may be implicated as well (Whittington, 2010, p.147)." In other words, the adoption of technology as a utilitarian/functional resource may give rise to differential socialized affordances contingent on the pluralistic social positionings of CHWs in their respective structural complex.

The social positioning lens has enriched the understanding and relevance of socialized affordances within IS and ICT4D research and adds to the technology affordance perspective to provide explanations for the differential impact of technology on different social groups (Strong et al., 2014; Volkoff & Strong, 2017).

A socialized affordance perspective considers the affordances of technology as shaped by the social, cultural and institutional understanding of the artefact by the human actor, thereby also embedding the relationality of affordances in social dynamics. Socialized affordance becomes the junction where technology meets the structural properties enveloping the human actor. It exposes how the situatedness of actors influences their ability to perceive and actualize affordances of technology, and how those affordances become embedded in the production and reproduction of the local (social) practices (Faik et al., 2020; Zheng & Yu, 2016, Costall, 1995). Such an integrative perspective towards affordances allows researchers to explain how technology shapes outcomes without determining it, and to recognize that technology affordances are contingent on actors' needs, goals and the power relations they are situated in (Fayard & Weeks, 2014).

6.2 | Contributions to technology and structure research

Furthermore, a social positioning lens takes the existing technology and structuration research in IS and ICT4D, beyond the practice lens. The practice lens as proposed by Orlikowski (2000) draws upon Giddens (1984) duality of technology and structure to conceptualize how technological practices and structure reinforce each other. However, the practice view of technology hardly touches upon the positionality of actors within a social structure, which influences the processes of technology use and its effects in practice. By bringing in the concept of social positioning from Giddens (1984), we can sensitize our research to a more sophisticated understanding of human actors as situated in large complex social structures. By viewing human actors as positioned in structural complexes, sensitizes us to the multiplicity of rules, regulations, norms and interpretive schemes that human actors are constantly navigating through. It helps us better understand how human actors interact with structures of domination, signification and legitimation and how technology enactment gets embroiled within that. By addressing the social position of actors, we are able to link the broader macro-structural layer with the micro level enactment of technology affordances through human actors at the ground level (Jones & Karsten, 2008).

Secondly, a social positioning lens helps sensitize researchers to actors' relationship with other actors in the field, and how their enactment of technological affordances may reproduce or change structural rules and norms. Instead of privileging structure or agency, such a lens magnifies the delicate interconnections between social actors and social institutions. Socialized affordances are entangled with organizational and social structures of power relationships, norms, meanings and produced in social practices.

Thirdly, we are also able to critically engage with one of the under-explored tenets of Gidden's structuration theory. We have broadened the scope of existing research from its traditional focus on phenomena associated with computer-based information systems at the individual, group and organizational levels, to address the broader institutional and social arrangements in which technology is increasingly implicated (which would also be more in line with Giddens's own position) (Jones & Karsten, 2008; Whittington, 1992).

6.3 | Contributions to technology (mHealth) and community health worker research

Our findings align with many of the other mHealth studies done in India and other countries (Bassi et al., 2018; Gopalakrishnan et al., 2020; Ilozumba et al., 2018; Naik et al., 2020). Enhancement of CHW confidence and self-efficacy, increase in workload, and improvements in interaction between the CHWs and the community have been reported by other CHW and mHealth studies. However, our theoretical lens brings a new perspective to understanding the impact of technology on the health workers during their routine work practices. We have been able to make visible the complex structural conditions that envelope health workers during their routine use of technology. The visibility of such conditions reveals that while the mHealth technology does afford improvement in the technical efficiency of health care management at the PHC level, it also impacts the role of community health workers structurally.

This perspective of CHWs is very rarely addressed when understanding the use of mHealth applications (Nandi & Schneider, 2014; Sahay, 2016; Sochara report, 2005). In our case, community health workers become pivotal in understanding the intended and unintended effects of mHealth technologies. By recognizing the social position of the health workers as situated at the nexus of the PHC centre and their communities, we provide a more nuanced understanding on how their adoption of mHealth devices may influence their subjectivity and their relationships with the community and the PHC system. The affordances of mHealth technologies are not only shaped by the dominant managerial and technical rationality but also by the interaction of the human actors with their social context.

7 | CONCLUDING REMARKS

This study highlights how the social positioning of actors shapes their relationship with technology thereby giving rise to various socialized affordances and outcomes. Integrating the two theoretical lenses of social positioning and socialized affordance allows us to unpack the complexity of the interaction between the structural contexts and the technology-actor interaction. Human actors are concurrently enabled and constrained by structural properties of social systems, which shapes what technological affordances emerge, and the intended and unintended outcomes of digital practices.

It should be noted, however, that this case is not representative of other mHealth initiatives in other PHC centres of India. There are significant discrepancies in local contexts across the vast number of PHC centres and digital health initiatives. We do not seek to generalize the findings of this study to India nationwide. Our contribution stems from illuminating the nuances of digitizing community health work processes in this particular mHealth initiative and incorporating social positioning in the discussion of socialized affordances. While the empirical study was conducted over a few months, for future research it would be beneficial to carry out a longitudinal study, which would help uncover, whether the adoption of mHealth leads to any structural change in the long term, for example, if the health workers become formally included in meetings or decision-making processes at the PHC level or if policy changes around the health worker's role occur.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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ENDNOTE

[1] This aspect is different within different PHCs in different Indian states. In a country like India, with two different state governments, the responsibilities and use of technology by the different tier health workers vary depending on every

state's health program, goals and mission. While in some states the T2 workers directly report to T1 workers, in others they work collaboratively to deliver the health services to their community.

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APPENDIX A

TABLE A1 Similarities and differences between the two PHC centers

PHC centers	Private partners of the PHC centre	mHealth app type	Used by	Motivation for mHealth implementation	Common findings	PHC centre specific findings
PHC1	Local NGO, Private Software Company	mHealth app Android tablet	Tier 1 CHWs assisted by Tier 2 CHWs sometimes	• Errors in the data collected by CHWs • Lag in data reporting • Cumbersome task of collating data from different registers • Poor communication between Tier 1, Tier 2 CHWs and supervisor at the PHC centre • Poor management of emergency cases	• Streamlining of workflow processes • Reduction in data errors • Reduction in time lag of data reporting • Enhanced accountability and monitoring of health worker • Lack of infrastructural support • Duplication of data—using paper registers and tablet • Reinforcement of hierarchies between Tier 2 and Tier 1 CHWs • Tier 1 CHWs feeling an increase in self-confidence	Improvement in dealing with emergency cases by Tier 1 CHWs
PHC2	Local NGO, External Funding Agency, Higher Education Institution	mHealth app Android tablet	Tier 1 CHWs assisted by the Tier 2 CHWs sometimes	• Errors in the data collected by CHWs • Lag in data reporting • Cumbersome task of collating data from different registers • Poor communication between Tier 1, Tier 2 CHWs and supervisor at the PHC centre • Poor management of emergency cases	• Streamlining of workflow processes • Reduction in data error • Reduction in time lag • Enhanced accountability and monitoring of health worker • Improved data communication between PHC staff and Tier 1 CHWs	Enhancement in the health-related interaction between the Tier 1 CHWs and the beneficiaries

(Continues)

TABLE A1 (Continued)

PHC centers	Private partners of the PHC centre	mHealth app type	Used by	Motivation for mHealth implementation	Common findings	PHC centre specific findings
					• Lack of infrastructural support • Duplication of data—using paper registers and tablet • Reinforcement of hierarchies between the Tier 2 and Tier 1 CHWs • Feeling an increase in self confidence	

TABLE A2 Field observation guide

General Field observation guide
How are the Tier 1 CHWs using technology?
How are the Tier 1 CHWs getting along with using the tablet?
What are the reactions of the CHWs about using the tablet?
How do the community members feel about the use of the tablet by CHWs?
How does the PHC staff feel about the tablet?
How is the communication between the PHC staff and CHWs managed?
What is the relationship between CHWs and PHC staff like?
What is the relationship between CHWs and the community like?

TABLE A3 Semi-structured interview topic guide

General Interview topic guide for PHC staff
(*broad*)
How do you feel about the Tier 1 CHWs at this centre?
How do you feel about the community you cater to?
Can you describe the routine processes at the PHC centre?
How do you feel about the tablet that is being used by the CHWs?
What changes has the use of the tablet bought?
What are the major changes the tablet has created?
(*specific*)
Has the tablet created any changes in the data reporting process of the CHWs?
Has the tablet created any changes in the data collection process of the CHWs?
How has the use of the tablet impacted your communication with the CHWs?
General Interview topic guide for CHWs
(*broad*)
For how long have you worked as a CHW?
Do you like being a CHW?
What are your main responsibilities as a CHW?
What is your daily job like?
What are your feelings about using the tablet?
(*specific*)
Has the health tablet improved the data collecting process?
How did you do your job before you were given the health tablet?
How is the use of the health tablet different from the paper-based system?
How has the use of the health tablet affected your daily routine?
How has the use of the tablet affected your work process?
How has the use of the health tablet affected the relationship between you and the PHC staff?
How has the use of the health tablet affected the relationship between you and the community?
Has the use of the tablet created any major changes for you personally?
Overall, what is your opinion on the use of the health tablet?

TABLE A4 Interviewee list and interview duration (pseudo names have been used)

Interviewees	Pseudo-names	Interviewee time length	Degree of interaction with the mHealth tablet
Tier 1 CHW	Jaya	01 hour: 2 minutes	High
Tier 1 CHW	Kiran	50 minutes: 20 seconds	High
Tier 1 CHW	Binita	01 hour: 15 minutes	High
Tier 1 CHW	Bhavna	01 hour	High
Tier 1 CHW	Bhagya	50 minutes: 19 seconds	High
Tier 1 CHW	Seema	45 minutes	High
Tier 1 CHW	Supriya	2 hours: 15 minutes	High
Tier 1 CHW	Sarika	1 hour: 15 minutes	High
Tier 2 CHW	Sanvi	30 minutes	Intermediate
Tier 2 CHW	Yashti	30 minutes: 3 seconds	Intermediate
Tier 2 CHW	Rajeshri	20 minutes: 2 seconds	Intermediate
Tier 3 CHW	Vasudha	40 minutes: 13 seconds	None
Tier 3 CHW	Anjali	20 minutes	None
Supervisor 1	Nagendra	01 hour: 30 minutes	Intermediate
Supervisor 2	Mahesh	01 hour: 15 minutes	Intermediate
mHealth Engineer 1	Rohit	20 minutes: 18 seconds	High
mHealth Engineer 2	Anita	35 minutes: 30 seconds	High
mHealth Engineer 3	Yashpal	40 minutes: 20 seconds	High
District Head	Bhavin	01 hour: 05 minutes	None
Beneficiary 1	Aarohi	15 minutes: 34 seconds	None
Beneficiary 2	Hiral	13 minutes: 34 seconds	None
Beneficiary 3	Palak	25 minutes: 30 seconds	None
Beneficiary 4	Meenakshi	25 minutes: 56 seconds	None
Beneficiary 5	Rudrani	15 minutes: 30 seconds	None
Beneficiary 6	Urvi	20 minutes: 45 seconds	None
Village community members	15	01 hour: 15 minutes	None

TABLE A5 Thematic analysis table

Theoretical theme	Theoretical codes	Selective codes	Open codes	Participant quote examples
Socialized Affordances of Technology	Social processes of technology-human actor interaction	Streamlining of data collection and reporting processes by the CHWs Facilitating health-related interaction between community and CHWs Accountability and Monitoring of CHWs Streamlining technical aspects of the everyday work processes of the CHWs by in-built features of technology	Reduction in data errors Reduction in data lag Reduction in data loss Reduction in blame on CHWs Improved data sharing by CHWs with the PHC centre More pronounced division of work between CHWs Easier tablet interface interaction by the CHWs Use of videos and images to deliver health information Use of videos and images to aid interaction with the community Collection of beneficiary ID information Dual collection of data in registers and tablets Additional visits to the PHC for charging the tablet and syncing the data. Timely completion of Tasks Increase in additional work for the CHWs Increase in surveillance of CHWs Technical Efficiency achieved through the inbuilt features • Real time tracking • GPS dashboard • Automated Reminders • Automated data collation • Automated Data Analytics • Automated Data Sync • Data Storage	**Yashti and Rajeshri:** "But since they have started using the technology, they (tier 1 CHWs) do not involve us as much, they want all the recognition for themselves! We request the supervisor at the PHC centre sometimes, to let us use the tablet as well. **Bhagya**: "we feel more appreciated now for the work we do, the PHC supervisor blames us less" **Jaya and Binita:** "we now feel 'khushi' (happiness) with the way we are perceived by the PHC staff because now the PHC staff actually looks at us as if we are important. We feel 'khushi' (happiness) now that our self-worth in the eyes of the PHC centre has increased." **Nagendra:** "…the data was of poor quality because of them… the registers reported to us would be filled with mistakes and delays. But today they are the primary users of the tablet itself and are also the ones who put the data in it which is then reported to us. This improvement in reporting has increased our trust on them, the data has less errors and as soon as the tablet catches connectivity it syncs the data collected by them into the PHC computer system". **Bhagya:** "before when we would collect data in the registers the PHC staff would blame us, for not being able to meet emergency case needs because the data would be filled with errors, but today that has improved" **Mahesh**: "The tablet has also become a source of information delivery for the health workers." **Binita**: "We feel good about doing what we do today. The ability to explain sensitive health information to the members of the community has improved our perception in their eyes, making us feel more motivated to do our job."

(Continues)

TABLE A5 (Continued)

Theoretical theme	Theoretical codes	Selective codes	Open codes	Participant quote examples
			• Data Retrieval • Portability • Ease in Data input (due to smoother interface) • Availability of videos and images • Ease in video and Image retrieval	**Saika:** "What is this, our routine job of conducting house to house visits is any way hard as it is, and now we are being watched! We would like our space and freedom to do our tasks when it is suitable for us." **Bhagya:** "You see in the beginning of using the tablet, we were also going from one house to another to collect their identification information." **Supriya:** "during busy period, it becomes quite tiring to go all the way back to the PHC centre to sync the data or charge the tablet as there is better connectivity and electricity there". **(PHC staff) Nagendra:** "the dashboard at the PHC centres can now geographically monitor the progress of the CHWs." **(mHealth engineer) Anita:** "the reminder feature also ensures that if any CHW is running behind her tasks, she is reminded to do the task." **Mahesh:** "The improvement in the data quality, ensures that CHWs give us more up to date and correct information, helping us allocate the correct governmental pregnancy schemes" **Bhagya:** "before when we would collect data in the registers the PHC staff would blame us, for not being able to meet emergency case needs because the data would be filled with errors, but today that has improved, the tablet starts beeping red, in front of the beneficiary who needs immediate help and we call the PHC centre and let them know, this is causing the community members to blame us less"
Social Position of the CHW as a PHC employee	Institutional role of the CHW as subservient to the PHC staff	Relationship between the CHW and the PHC centre CHW's restrictions and obligations in her own job as mandated by the PHC centre	CHWs receiving blame by the community CHWs receiving blame by the PHC staff	**Sarika:** "We are scared that the district officer might hold us accountable if we lose the data, due to some technical glitch."

TABLE A5 (Continued)

Theoretical theme	Theoretical codes	Selective codes	Open codes	Participant quote examples
	Managerial power of the PHC centre over the CHWs		Following rules set by the PHC on tablet use CHW's obligation towards following the PHC centre's orders CHWs adhering to the everyday workflow as mandated by the rules of the PHC centre Appreciating the role as a CHWs, and their responsibility towards the community only when the PHC staff acknowledges it Poor electricity Hardware faults Lack of charging points	**Kiran:** "We are scared that the district officer might blame us if we lose the data, due to some technical glitch, so we collect the data in registers and in the tablet" **Supriya:** "during busy period, it becomes quite tiring to go all the way back to the PHC centre to sync the data or charge the tablet." **Sarika:** "What is this, our routine job of conducting house to house visits is any way hard as it is, and now we are being watched! We would like our space and freedom to do our tasks when it is suitable for us." **Bhagya:** "we feel more appreciated now for the work we do, the PHC supervisor blames us less" **Seema**: "We feel motivated to do our job now. Before, even the community members would blame us for not being able to deal with emergency situations." **Sarika:** "We feel more valued by the community for what we do today. The PHC staff take us more seriously." **Jaya and Binita:** "we now feel 'khushi' (happiness) with the way we are perceived by the PHC staff because now the PHC staff actually looks at us as if we are important. Before we would be scolded in our weekly and monthly meetings."
Social position of the CHW as a member of the community	Social obligations of the CHW in the community	CHW's recognition and acknowledgement of her domestic role in the community CHW's recognition of community norms and rules around the health practices of the community	CHWs complaining about workload CHWs complaining about not getting time with their families CHWs complaining about not getting time for their domestic responsibilities CHWs awareness about the community's maternal practices CHWs awareness about their role compared to older women in the community	Supriya: "Too much work, and then we also have to go home and take care of our own families." Sarika: "What is this, our routine job of conducting house to house visits is any way hard as it is, and now we are being watched! We would like our space and freedom to do our tasks when it is suitable for us. We have to go home and take care of our husbands and children as well" Noted from the participant observation: that CHW's are generally viewed at as younger/junior women and most

(Continues)

TABLE A5 (Continued)

Theoretical theme	Theoretical codes	Selective codes	Open codes	Participant quote examples
				community members turn to midwives or mother-in laws to look for maternal health related advice. Traditional birth-giving practices involve the maternal beneficiaries giving birth by squatting at a secluded podium. Thus, the responsibility of CHWs is to enlighten the community members about the benefits western practices of giving birth and the importance of at home health, nutrition and sanitation practices.