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Recast(e)ing Medicine in India

Contested Hierarchies of Expertise in Digital Primary Care

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Abstract

In this article, I examine a public-private partnership project in West Bengal, India, that trains and deploys people from marginalised castes as digital health workers in rural areas. Although digital technologies offer new opportunities for access to the medical sector, caste hierarchies inherent to the field persist, reinforcing and perpetuating caste-based inequities. This is evident in the division of labour, shaped by caste dynamics and justified through the distinction between professional knowledge and technical skill. The widely-used metaphors of the doctor—and by extension the software—as the mind, and the health workers as foot soldiers, rely on and further entrench long-standing hierarchies of expertise where privileged castes do knowledge work while marginalised castes literally do the footwork. Nevertheless, health workers actively challenge these hierarchies and foreground their creative contributions. While caste lives on in projects of 'empowerment', particularly through the limited and limiting imaginations of health workers' structural position, health workers find ways to visibilise and value their labour and expertise. I argue that their assertions and aspirations may open up new possibilities for thinking about 'empowerment'. Overall, recast(e)ing medicine implies that caste in the health sector is being simultaneously perpetuated and reimagined in ambivalent and partly contradictory ways.

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Keywords

Digital Health Technologies, Primary Care, Caste, Expertise, India.

The medical gaze in a digital age

On 17 September 2022 I received a video via WhatsApp from Rumela,[1] a community health worker[2] who was part of the digital health project I had been studying for the past three years, referred to as 'Horizon' in this paper. The video depicted a priest performing a *puja* in honour of Vishvakarma (*Biśbakarmā*), the god of technical knowledge and skill. Taking place at a rural Horizon office located in a western district of West Bengal, the *puja* aimed to bless the instruments used by health workers. This included bicycles for field visits, tablets with a software program for patient consultations, point-of-care devices for conducting diagnostic tests, and a printer for the doctors' prescriptions. Vishvakarma *puja* is an annual celebration primarily observed by the working class. In the case of shipyard workers in Kolkata, Laura Bear argues that Vishvakarma *puja* allows workers to 'worship themselves . . . as skillful, powerful men with technical knowledge' (2015, 170). While the *puja* was celebrated by the Horizon health workers, it was not observed in the Kolkata headquarters of the Indian-owned social enterprise which had conceptualised, and now manages, the digital health project. The social enterprise, which I call 'Healthcare Solutions' here, considers itself a 'knowledge company' (according to one of its founders). This alludes to divisions of labour and hierarchies of expertise between technical skill and professional knowledge, which lie at the core of this article.

All Horizon health workers who staff rural health centres in different locations in West Bengal are from 'scheduled castes' (SCs) or 'scheduled tribes' (STs)—administrative categories designating marginalised communities in India.[3] As part of the Indian government's affirmative action programmes aiming to 'empower' SC and ST communities, they had received medical and digital skill training and been certified as 'frontline health workers'.[4] Under the Horizon initiative, these health workers cycle around the area and sell medical services at low prices to a rural population (see Fig. 1). On request, they facilitate consultations between rural residents and city doctors. Guided by a software program installed on a tablet, they enter a patient's demographic data and medical history. They also take vital signs,

[1] All names used are pseudonyms.

[2] I use the terms health worker, community health worker, and frontline health worker interchangeably.

[3] Superseding the term 'depressed classes', these categories are enshrined in India's constitution. The lists (schedules) of castes and tribes have continuously evolved and provoked struggles for recognition (see for example Middleton 2015).

[4] This distinguishes them from other non-certified private practitioners at the primary care level in West Bengal.

conduct physical examinations, and administer diagnostic tests. Patients' electronic health records are sent to a backend doctor in a town or city, who then makes a diagnosis and prescribes medicines. Finally, health workers sell the required pharmaceuticals to patients and collect a small fee. With help from health workers and digital technologies, the medical gaze enters people's homes in rural areas.

Figure 1: A health worker on her cycle route (photo by the author).

Michel Foucault argues that the emergence of the 'medical gaze' in European medicine was closely entangled with the birth of the clinic. It 'was no longer the gaze of any observer, but that of a doctor supported and justified by an institution, that of a doctor endowed with the power of decision and intervention' (Foucault 1994, 89), which determined the medical encounter. The medical gaze was tied to an authoritative figure, legitimised by the clinic as a powerful institution, who stood in hierarchical relation to patients and paramedical personnel: an expert. Transcending the clinic, digital health technologies are sometimes portrayed as disruptors of this power dynamic, fostering a democratisation of medical expertise (Topol 2015). Social anthropologists and science and technology studies scholars, however, emphasise the interconnections between digital technologies and

enduring knowledge-power relations, highlighting how they may reinforce, rather than dismantle, existing social hierarchies of gender, religion, class, and caste (e.g., Sarkar 2016, Shakthi 2023, Upadhya 2007). In India, for example, the medical gaze is deeply entangled not only with the institution of the clinic, but also with the institution of caste, as expertise and authority in the medical field are often assigned along caste lines. In this article, I explore what happens when tasks usually conducted by doctors, who are mostly from privileged caste backgrounds, are shifted onto health workers from SC/ST communities through the introduction of digital technologies. Is medical authority being redistributed? And are hierarchies of expertise changing?

Digital technologies in the social sector are often envisioned as embodying an empowering potential for marginalised groups (see Abbate 2018 for similar discourses in the US). In the case of Horizon, they are supposed to provide professional opportunities to the health workers who operate them—one reason why the project is financed by a government agency that focuses on improving livelihoods of SC/ST communities. Yet, while digital technologies may recast the primary care sector in India by allowing SC and ST health workers to enter the medical field, I argue that caste hierarchies inherent to the field often persist—albeit coded in different ways. In this article, I demonstrate how health workers' labour and expertise are often rendered invisible or devalued through the distinction between professional knowledge and technical skill, whereby only the former translates into medical authority. While this replicates longstanding fault lines of inequality, I also argue that these hierarchies are constantly contested and partly unsettled. Health workers make their creative contributions visible, and some use their association with the medical field to improve their professional standing. After outlining the methods used and discussing the broader social dynamics that shape medicine in India, I scrutinise development discourses that focus on skilling people from marginalised communities.

Methods

Between 2019 and 2022 I conducted research on digital health in West Bengal, a state in Eastern India with a SC population of 23.51% and a ST population of 5.8%, according to the 2011 Census. I closely followed Healthcare Solutions' implementation of Horizon through ethnographic fieldwork for eighteen non-consecutive months in India as well as through online meetings and conversations during the COVID-19 pandemic.

During this time, I spent five months in a village in a western district of West Bengal, where the first Horizon health centre is located. In this district the SC population is slightly lower than the state average, while the ST population is almost three times

as high. The village itself has residents from SC and ST backgrounds, but also houses a sizeable population of 'upper' castes. In addition to conversing with village residents and Horizon patients, I observed daily routines at the health centre and accompanied twenty health workers on their cycle routes. The health workers who staff the digital care centres established by Healthcare Solutions are women and men in their twenties or thirties who are from SC or ST communities. They live in various villages and commute to their workplace three times a week. Most male health workers pursue different occupations during the rest of the week. Women mainly conduct household and agricultural labour. While the health workers' economic position differs, all have secondary school or college qualifications.

I also observed and participated in the activities of Healthcare Solutions' corporate staff at their headquarters in Kolkata. The co-founder of Healthcare Solutions, who I call Dr Chowdhury, is a doctor, but he prefers to refer to himself as a medical entrepreneur. Most of his employees have a background in education, business, or computer science. I accompanied the implementation team during visits to different rural Horizon centres. I also observed the activities of the IT team and conducted oral history interviews with people who had been involved in developing the software program. Finally, I interviewed doctors affiliated with Horizon recruited through Dr Chowdhury's network. Some are retired professionals who view their involvement as a form of charitable work, while others are at the start of their careers, seeking to gain valuable experience and supplement their income. Both doctors and corporate staff are mainly from *bhadralōk* backgrounds.[5]

Medical expertise and caste

Expertise and authority in the medical field in India have historically been closely tied to caste, as well as to gender, class, and rural-urban dynamics. Most doctors used to come from 'learned castes' (Ray 2019, 20), were male, and belonged to upper (middle)-class, urban backgrounds. Even though the Indian constitution provides for affirmative action benefits for marginalised communities, they have 'played a minuscule role in the overall composition of the medical profession . . . at least until the implementation of the Mandal recommendations began in the

[5] In a state that has been dominated by class-based rhetoric due to thirty-four years of Left Front rule, caste is often seen to play a less prominent role than in other parts of India. Nevertheless, the term '*bhadralōk*' is prevalent in West Bengal—a term that designates people from privileged caste and class backgrounds. *Bhadralōk* 'were mainly drawn from the three upper castes of Bengal . . . so much so that the term in the latter half of the [19th] century had become almost a "synonym for high caste"' (Ghosh 2016, 13). The term is also linked to non-manual labour (e.g., office work). While, today, *bhadralōk* is used more generally to denote the educated middle class (Ghosh 2016), the health workers explicitly refer to themselves by its antonym: *'chōṭalōk*'. Furthermore, they describe themselves as 'SC/ST' in contrast to 'general' castes. In this article, I also use the terms 'privileged'/'marginalised' and 'upper'/'lower' castes.

1990s' (Kumbhar 2021).[6] However, medical education remains unaffordable for many students from SC/ST backgrounds, and most doctors in India still belong to privileged castes today. Imrana Qadeer describes this as an 'undeclared system of reservations for the upper castes' (2006, 96). Moreover, affirmative action programmes are increasingly being contested, as anti-reservation protests illustrate. Leveraging the rhetoric of merit and excellence, protesters essentially deny expertise to medical students and doctors who qualify for affirmative action (Subramanian 2019).

People from disadvantaged caste backgrounds often enter paramedical professions, such as nursing. These professions are connected to lower status and salaries because they involve 'labour that is devalued, disrespected and stigmatized' (Ray 2019, 134). In a system where 'work gets assigned the ritual marks of purity and impurity' (Gopal 2013, 92), labour that implies contact with bodies and bodily waste is often seen as ritually polluting. However, the status of professions may change over time. As Ajantha Subramanian (2019, 2) describes with regard to the rise of engineering through the 19th and 20th centuries, '[t]echnical knowledge went from being the purview of Indian lower-caste artisans to becoming integral to state power, economic development, and upper-caste status'. Yet, the professionalisation of technical knowledge reinforced the distinction between engineering and artisanship, thereby sidelining 'lower' castes. In fact, engineering's new value was 'intimately linked to its disassociation from the 'tainted' technical labor of the lower castes' (2019, 14). Similar developments can be observed in the nursing profession with growing internal distinctions between prestigious, managerial roles and 'dirty', menial tasks, where the latter are often assigned to 'lower' castes (Ray 2019). Additionally, nursing provides emerging opportunities for transnational migration (Walton-Roberts 2012, 2015; Prescott and Nichter 2014), which are, however, largely unattainable for community health workers.

All in all, despite affirmative action and other development programmes which try to transcend caste, caste-based inequities continue to endure (e.g., Salovaara 2022). Although caste may be coded and obscured (Malik 2022), it continues to shape the structural organisation of the medical sector, for example by determining who can enter the field, in what positions, and conducting which tasks. Similar to what Barbara Harriss-White and Kaushal Vidyarthee (2010, 318) describe in relation to the economy, caste 'persists and transforms itself' in the medical field.

[6] The Constitution of India instituted affirmative action programmes, which are commonly called 'reservations'. These include quotas for members of SC/ST communities in public educational institutions and government offices as well as access to certain development programmes. The 1980 report from the Mandal Commission, a governmental commission headed by B.P. Mandal, advised extending reservations for Other Backward Classes. The implementation of these recommendations a decade later led to nationwide anti-reservation protests.

In short, caste does not vanish but rather 'takes on new guises' (Salovaara 2022, 984). In the case of Horizon, it manifests as a denial of expertise and authority. While the digital health project enables people from marginalised castes to enter the medical field and take on tasks usually performed by doctors, the health workers must constantly explain their educational qualifications to members of privileged castes. Health workers described to me how villagers from 'general' castes often raise doubts (*sandeha kare*) about the project and refuse to accept their expertise. 'It is difficult to make them understand,' Sunita said. 'They are not direct, but we can feel it'. And indeed, Horizon's services are used mainly by village residents from marginalised castes. When caste is coded as competence, health workers from SC/ST backgrounds are not taken seriously despite their credentials. In the remainder of this article, I demonstrate in greater detail how caste is expressed through the division and stratification of labour which go hand in hand with hierarchies of expertise that distinguish between professional knowledge and technical skill. This limits imaginations of how people from marginalised castes can operate in the medical field, even within discourses of empowerment.

Digital technologies for empowerment

The structural tenacity of caste is often overlooked in international development discourses (Mosse 2020), particularly in development projects focused on digital technologies. When it is acknowledged, digital technologies are usually portrayed as remedial measures against it. 'Popular and policy notions on development often begin with grandiose fantasies associated with advancing towards an "information society" or a "digitally empowered local economy" wherein old sociological variables such as caste are perceived to have aged and deteriorated' (Kamath 2018, 378). However, even though '[a]ccess to information technologies holds the powerful promise of economic and social mobility in contemporary India,' Sreela Sarkar has demonstrated how ICT training programme participants who are from marginalised communities remain 'restricted in terms of economic and social mobility' (2016, 970). Discourses of empowerment regarding digital *health* run along similar lines. Digital technologies are often praised for their ability to recast the nature of the healthcare sector—a promise they often cannot keep, precisely because caste is 'a complex institution, simultaneously weakened and revived by current economic and political forces' (Mosse 2018, 422).

Digital health technologies have been employed in various ways in India. The Indian government launched the Ayushman Bharat National Initiative, which involves remodelling rural health centres into so-called 'health and wellness centres' where patients can connect to urban doctors via a digital platform with the help of community health workers (Bärnreuther 2024). Besides state initiatives, an increasing number of private actors are introducing digital technologies into the

primary care sector and funding their projects through government, donor, or philanthropic Corporate Social Responsibility (CSR) money. Horizon is one such project. It focuses not only on providing access to healthcare in rural areas, but also on providing people from SC/ST communities with a livelihood through skill training.

Over recent decades, skill training has gained traction in India as a 'welfare measure for employment and livelihood generation' (Gooptu 2019, 243) and 'path to upward mobility' (Malik 2022, 98). It is 'aimed at low-income groups with low levels of literacy, such as school dropouts' (Gooptu 2019, 242) or other marginalised communities (e.g., SC and ST). Within a logic of empowerment, 'skills are understood as freely deployable assets . . . unencumbered by social and cultural influences' (Gooptu and Chakravarty 2018, 294). While the skills taught are supposedly shaped by labour market demands, trainees mainly qualify for low-skilled jobs and manual work in industries such as retail, hospitality, security, or healthcare. 'In the IT sector, they produce employment at the lower rung of the information economy that is temporary, gendered, and vulnerable to exploitation' (Sarkar 2021, 309). Similarly in the medical sector. The Horizon health workers attend a six-month skill development programme for frontline health workers and receive additional digital training, which essentially allows them to do basic medical and technical work. While this provides an entry point into a highly competitive labour market, the health workers' status as 'entrepreneurs' remains precarious (see Bärnreuther 2023 for details on the financing mechanism).[7] One could argue that health workers are valorised as cheap labour in the field of primary care, which is increasingly shaped by the logic of capital accumulation. Moreover, skill development programmes may reinforce longstanding social hierarchies and perpetuate deep-seated forms of discrimination by assigning only low-valued labour to trainees. The 'persisting differential valuation of work' (Mosse 2020, 1251) becomes evident in Horizon's division and stratification of labour, as I show in the next section. Overall, skill training programmes can be read as 'both radical acts that break from casted pasts *and* insufficient, in themselves, to counter the broader reiteration of hierarchy' (Salovaara 2022, 979, emphasis in the original).

Division and stratification of labour

Skill training has enabled the individuals who staff the Horizon centres to enter the health sector as community health workers. Community health workers have gained prominence once again through the Universal Health Coverage agenda, which led to a 'rediscovery of the potential of national CHW [community health

[7] Although Horizon is financed by an agency of the West Bengal state government, it operates through a franchise-like model where health workers are supposed to run the centres as 'health entrepreneurs' and become financially self-sustainable over time. In reality, most centres do not run sustainably and health workers are stuck in precarious working conditions.

worker] programmes and a growing enthusiasm for them among leading figures and organisations within global health' (Wintrup 2023, 4). They are often connected to a strategy called 'task shifting', which the World Health Organization (2008, 2) defines as moving specific tasks 'from highly qualified health workers to health workers with shorter training and fewer qualifications in order to make more efficient use of the available human resources for health'.[8] But, since task shifting from doctors to paramedical personnel mainly involves shifting manual and menial tasks, hierarchies that have long shaped the medical sector remain intact.

What are the tasks shifted to Horizon health workers? During consultations, health workers first feed patients' demographic data into the software, take their vital signs, and inquire about any medical complaints. The software program then prompts specific questions (e.g., 'when did this complaint start?'). After completing the medical history, health workers perform the physical examinations elicited by the software and conduct point-of-care diagnostic tests. They then send the filled-in electronic health record to one of the backend doctors located in towns and cities. After surveying the data, doctors quickly consult with patients through a video call and send their instructions and a prescription via the digital platform. Health workers explain the prescription to patients, sell them the required medicine, and collect a small fee.

Although health workers do not care for patients in the same way as nurses do, they are still exposed to infections (e.g., during the COVID-19 pandemic) and ritual pollution (e.g., through bodily fluids). Working on the frontlines, they directly interact with and touch patients. Health workers also perform digital work, which mainly consists of entering data into the software program. As what I heard described at a telemedicine conference as 'foot soldiers of digitalisation' they are employed for repetitive routine work which is conducted in the 'field' and stands in contrast to creative IT work, such as coding, which happens in urban offices (see also Malik 2022 on the caste-based distinction between the creative work of makeup artists and mundane work of beauticians). This reflects the division and stratification of labour in India's medical and IT sectors more generally, which are shaped by caste dynamics. As Carol Upadhya observes on the IT sector, 'the best "high-end" and top management jobs are likely to be monopolised by people from more privileged social backgrounds (i.e., middle to upper class and caste, from the best institutions), while greater "diversity" may be found at the lower end of the job market' (2007, 1865; see also Shakthi 2023), which is associated with lower status and salaries. Thus, health workers are located at the lower echelons of the labour hierarchy, in both the medical and technical fields: they are seen to conduct manual, and sometimes menial, tasks as well as repetitive, routine work. This

[8] Digital technologies in the health sector further encourage task shifting: when patients lack the equipment or ability to use them directly, community health workers become crucial intermediaries.

stratification of labour is justified and naturalised through hierarchies of expertise that distinguish between knowledge and skill.

Hierarchies of expertise

While various anthropologists have tried to overcome the Platonian hierarchisation of theoretical knowledge over practical application (e.g., Ingold 1990), the distinction between knowledge and skill is prominent in India and often maps onto caste hierarchies. Very broadly, the traditional division of labour between castes has been based on a dichotomy where knowledge work is associated with privileged castes, and manual work with marginalised castes. Although health workers unsettle this hierarchy of expertise to a certain extent by valuing their own practical skills (see below and also Ilaiah 2007 for an argument that locates knowledge in labour itself), it is mirrored in Horizon: privileged castes provide professional knowledge (as managers, IT engineers, or doctors), whereas marginalised castes execute the footwork (as health workers). While health workers are relegated to executive limbs, it is the digital platform that is seen as the brain and, therefore, as perpetuating the authority of a doctor in the field.

The digital platform: mimicking a doctor's mind

This is highlighted by a picture printed on banners advertising the Horizon project. It depicts a tablet through which clinical consultations are held, wearing a doctor's coat and with a stethoscope (see Fig. 2). The picture confers medical authority onto the technology and projects the digital platform as a surrogate doctor.

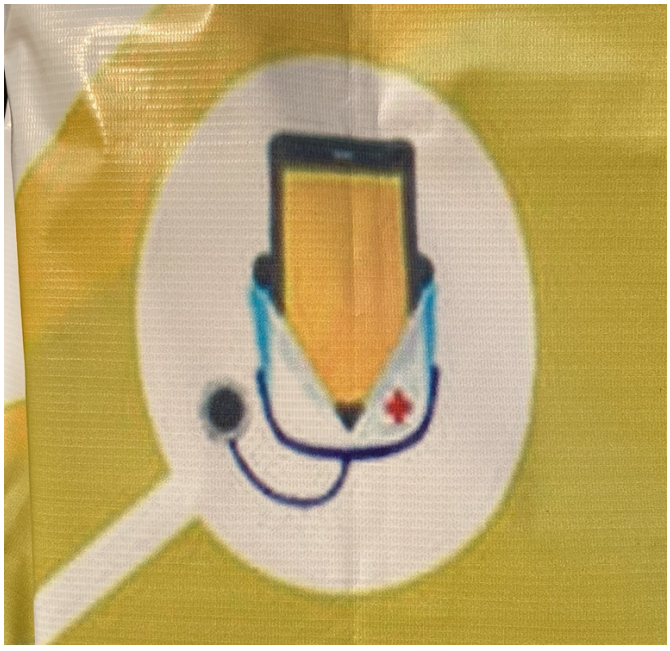

Figure 2: Picture on a Horizon banner (photo by the author).

Dr Chowdhury, the co-founder of Healthcare Solutions, reiterated this point when he described the functioning of the software program as 'mimicking a doctor's mind'. The 'doctor's mind' that is mimicked is Dr Chowdhury's, since he was instrumental in developing the algorithm. During an interview, he described how he had encoded his knowledge into the technology: 'The decision tree was developed in an excel file. My job was to write . . . rows and columns of: if this is the problem then what are the questions, what are the possible associations? What are the possible answers to each question? And, if this is the answer, then what should be the next question?' The algorithm was then reviewed by some of his colleagues, and new features are still added, for example, when doctors who use the software report that items are missing. While the notion of 'mimicking a doctor's mind' may well be exaggerated, what is nevertheless encoded in the software is a biomedical doctor's way of inquiring about and understanding sickness.

Missing from this picture are the health workers who operate the digital platform. Guided by the algorithm, they conduct consultations. Through the health workers' questions, Dr Chowdhury explained, a medical complaint is deconstructed into multiple elements. However, it is 'the doctor [who later] reconstructs those responses in an interplay with their pre-existing medical knowledge and wisdom and reaches a diagnostic possibility'. So, while the health workers deconstruct the patient's narrative into a structured report with the help of the software, the 'reconstruction' requires a doctor's 'knowledge and wisdom' to interpret data. While health workers skilfully enter data according to the algorithm, doctors expertly interpret this data. Thus, the distinction between skill and knowledge goes hand in hand with a division of labour between data entry and data interpretation, or history taking and diagnosis/prescription.

Health workers: 'foot soldiers' of digitalisation

In contrast to the mind, Healthcare Solution employees often described health workers as 'foot soldiers' or being doctors' 'eyes, ears, and hands'. These notions not only follow a long history of depicting medical workers as bodily extensions of specialists (e.g., Amrith 2006) but also carry caste connotations, associating health workers with manual and menial tasks. Although the Horizon model involves shifting tasks from doctors to health workers, Dr Chowdhury described these tasks as 'purely skill-driven and not knowledge or experience-driven'. The distinction between skill- and knowledge-driven tasks assigns medical authority only to doctors. This can be made clear with the example of diabetes I encountered during my fieldwork. The health workers had been trained to conduct capillary blood glucose (CBG) measurements and to interpret the data as normal or abnormal. At times, when they proclaimed results to patients in the health centre or their homes, they appeared almost as authoritative as doctors. However, they were not allowed to enter 'diabetes' into the electronic health record since that would constitute a

diagnosis, which only doctors are authorised to pronounce, regardless of the actual division of labour. Instead, health workers were instructed to select ‘general weakness’ as the ‘chief complaint’—even if the patient did not have any symptoms—enter the CBG measurement, and wait for a doctor to make the diagnosis.

Health workers were also advised to follow all procedural steps closely. When one health worker, who was himself a non-certified medical practitioner, once started to give his own advice to patients, he was immediately reprimanded for not adhering to the clear division of labour between doctors and health workers. After all, health workers were considered to be the eyes, ears, and hands of a doctor, but not their brain. Their tasks were executive instead of creative—a notion that was challenged by health workers, as I describe below. Moreover, health workers’ eyes, ears, and hands were considered to be less precise than those of a specialist. Doctors were therefore instructed to take data generated by health workers with a grain of salt, as they would not, for example, be able to get the same visual clues from observing a patient as a doctor would. Some doctors also reported that they would always check during conversations with patients whether the records created by health workers were correct and complete.

Yet, the health workers’ hands were also supposed to convey to patients that they were physically being treated by a doctor, since touch is an important component of medical consultations in rural India (Bärnreuther 2024). Most village residents I spoke with emphasised not so much the centrality of a doctor’s brain but rather the value of their touch. During training, when health workers were learning how to take pulse or blood pressure measurements, their teacher instructed them to touch patients with confidence during the examination because, as he explained, ‘what would people say [if you don’t examine them]—“The doctor has not even taken my pulse. What kind of doctor is this?”’ In this sense, a health worker’s touch supposedly marked the absent presence of a doctor. However, many patients did not equate the touch of health workers with the potentially healing touch of doctors. In fact, touch from ‘lower’ caste workers may be considered problematic, as it constitutes ‘an intimate gesture that . . . threatens to collapse the boundaries between self and the other’ (Ray 2019, 138). For example, one Brahmin villager told me that she had never visited the Horizon health centre because she assumed it was only for ‘adivasis’, referring to the ‘scheduled tribe’ status of many health workers.

It was in these cases that Healthcare Solutions emphasised the skill training and government certification of health workers *vis-à-vis* patients. For example, in a group discussion with villagers Dr Chowdhury explained: ‘What does digital mean? It’s not like you are pressing the on/off button of a TV or a machine. All the health

workers are trained health workers. They did a six-month course, they had to pass a test, and the certificate they got came from Delhi [i.e., from the central government]', pointing to the carefully laminated certificates which were displayed prominently on a wall in the health centre. To counteract the health workers' low social status, Dr Chowdhury acknowledged the work they do as more than merely pressing a button, and foregrounded their educational credentials. But at the same time, Healthcare Solutions made sure to emphasise that it is still doctors who take decisions. Thus, while Dr Chowdhury explained to local residents that 'exactly the same way a doctor sees you, they [health workers] also see you,' he added that health workers 'cannot make decisions like a doctor, for example which medicines to give or which tests to do'. Although health workers were being portrayed as skilled, Healthcare Solutions also made sure not to liken them to doctors. In this sense, Dr Chowdhury simultaneously affirmed and negated their medical authority.

Creative contributions

Although health workers were tasked with repetitive and manual work, '"rote" and "menial" work [may] actually demand creativity and improvisation' (Irani 2015, 213). Health workers told me how they had contributed to the digital platform's development and how they are instrumental in keeping the project operational, particularly by mediating and translating between different actors. In short, they highlighted their active and creative contributions—an assertion that can be read as a contestation of casted hierarchies of expertise.

Software development

When the digital platform was being developed, it had to be made usable for health workers in rural areas. Dr Chowdhury recounted how he had realised the software program needed to be based on 'the lowest common denominator. . . . Its boundary conditions should be the least capability of the least trained health worker. Otherwise, it will fail.' He therefore set up a pilot health centre where the IT team observed how health workers who had undergone skill training were able to handle the software and follow algorithmic instructions. One important challenge was data entry into a platform that was intentionally designed in English so that it could be scaled up to other linguistic regions. Since the health workers were unfamiliar with the language and unable to write in English, the IT team decided to design the user interface in such a way that they would mostly have to select options or enter digits. This involved minimising free text fields and introducing drop-down menus or numerical fields. In this way, various clinical symptoms and findings had to be converted into either one of several options (like yes/no or right/centre/left), or numerical or colour representations. Another challenge was the kind of physical examinations the health workers were able to perform after being trained. Dr Chowdhury explained:

> If it is a matter of training, can this training be given to them? Yes or no. If it is not a matter of training or if it is a matter of training and the training cannot be given, is it something that we can eliminate completely, or is it a mission-critical point? If it is a mission-critical point . . . how can we alter the presentation of this mission-critical element, so that it becomes understandable to them?

This meant that, in cases where health workers were unable to perform certain tasks, which were central to the medical encounter, the IT development team searched for ways to make these tasks manageable, for example by including pictures or GIFs in the instructions. Dr Chowdhury emphasised that the design process was iterative, resulting in software that had been adapted to meet health workers' abilities: 'The health workers' skill set, English typing ability and knowledge ability became the determinant of the software. That is the biggest field learning that we had.' Hence, while the software frames the structure of clinical interactions, it was itself structured according to health workers' skills.

The health workers who had been employed in the pilot centre where the digital platform was developed emphasised that their feedback had been critical to the design process. Anjuli, for example, used the analogy of cooking when she explained how the software had been created (*tairī karā*). 'To make a meal, you first have to get vegetables from the market, then wash them, cut them, cook them, and finally experiment with spices until it is ready.' And, she continued, health workers were central, particularly to the last stage: according to their constant feedback about what worked and what did not work, the right 'spice mixture' regarding user experience had been found. This became obvious from the different versions the software had taken over the years: it had gradually improved in response to the health workers' feedback. She therefore insisted that the health workers were an integral part of this process of experimentation: 'we worked on a research level' (*research levele kāj karechilām*).

Operation

In addition to their contributions during software development, health workers had to constantly address technical challenges while operating the digital platform in the field. For instance, the tablets on which the software program was installed often experienced connectivity issues in remote areas. In response, health workers resorted to using their personal phones (see Hampshire et al. 2017 for Ghana and Malawi). Software failures were also a common occurrence. While health workers reported bugs to the IT team, they had to continue consultations with waiting patients. In fact, what were called technical glitches by Healthcare Solutions could be termed systemic flaws that health workers tried to amend through continuous improvisation (see Umlauf and Park 2018 on the important role of improvisation in global health infrastructures). They relied on paper notebooks to manually record

data, and communicated with doctors through other ways, such as WhatsApp messages and phone calls (see Fig. 3). Yet, waiting patients often directed their frustrations over technical failures toward the health workers, interpreting the system's malfunctions as a reflection of their incompetence. Additionally, patients frequently faced a shortage of pharmaceuticals. Health workers therefore developed an alternative medicine distribution system, sourcing medications from pharmacies near their own homes when supplies ran out at Horizon. It was their resourcefulness and improvisational skills that enabled an unstable system to function in rural India. However, health workers' creative contributions were often invisibilised by Healthcare Solutions to avoid drawing attention to the shortcomings of the project.

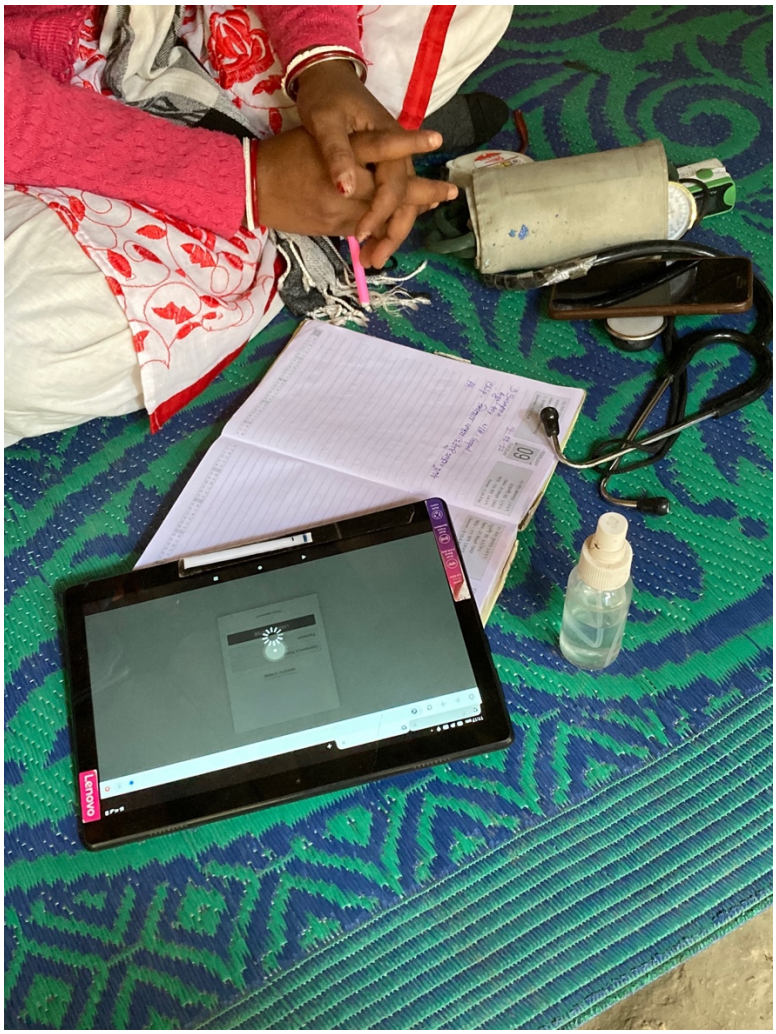

Figure 3: Health worker in front of a non-functioning software programme on a tablet during a consultation, using a notebook and her personal mobile phone (photo by the author, retouched for anonymisation purposes).

Mediation

In the field, health workers did not view themselves as mere limbs of doctors, but as active mediators. Anjuli depicted the health workers' position in the following way: 'there is a doctor on the one side, there is a patient on the other side, and I am in the middle (*mājhkhāne āmi*)'. Through their mediating skills, health workers made it possible for Healthcare Solutions to reach populations that had not been available to urban, private doctors before. To enable access into rural homes, health workers had to emplace the digital health project locally. This involved numerous negotiations with local political leaders and authorities as well as navigating bureaucratic obstacles due to the project's status as a public-private partnership. Moreover, many residents perceived Horizon as a 'company' trying to profit off them, a tension that had to be constantly negotiated. The health workers also faced opposition from local medical practitioners and chemist shops which perceived them as competition. It was only through community engagement, extensive groundwork, and emotional labour that health workers managed to gain acceptance for the project. In this sense, health workers played a vital role in ensuring the effective implementation of the plans that had been formulated in the Kolkata boardroom.

Health workers also bridged cultural gaps between urban doctors and rural patients, thereby facilitating smooth consultations. For example, listening to patients' stories, health workers filtered medical complaints out of supposedly irrelevant information. Anjuli explained to me how patients convey their problems to her, which she then forwards to the doctor in a highly condensed form.

> People tell me about their suffering freely: "Since morning, my stomach feels heavy (*bhār, bhār*), there is discomfort". But that has a medical term. And we [the health workers] know that. We know what that means, we are trained. For ten minutes, we listen to their [the patients'] words. This talk of ten minutes we send to the doctor in only three lines. Only three lines. The doctor can very quickly understand what the real problem is. We've depicted the gist (*engl*.). Like when the milk thickens after boiling, it becomes very tasty. We only give this part to the doctor.

Most doctors appreciated these condensed versions. Dr Joydeep, for example, explained to me that patients 'mention everything from family problems to economic problems'. Since health workers turn these elaborate narratives into 'thickened' clinical reports, he regarded them as important facilitators who helped him reduce consultation time significantly. However, as this kind of labour is difficult to quantify and datafy, it often remains invisible.

Translation

Health workers also mediated language problems between urban doctors and rural patients. Anjuli described her role as listening to what patients say in the 'regional dialect' (*añcaler bhāsā*) and then conveying it in 'proper language' (*engl*.) to the doctor. In addition, health workers had to translate local Bengali concepts into the software language, which is medical terminology in English. There were several challenges in this regard. For example, pain can be indicated in various ways in Bengali (and this also differs regionally). First of all, there are two broad types of pain, *byathā* and *yantranā*. While *byathā* is usually interpreted as a constant background pain, *yantranā* denotes a pain that occurs more episodically and corresponds to the software category 'always there but sometimes worse'. But meanings are hard to pinpoint and may vary from case to case. Additionally, instead of just complaining about pain, most patients would qualify it further in terms of different intensities and types. In contrast to the four ways in which the software describes pain (mild, moderate, severe, varies), there are at least nine expressions, and probably many more, which denote different intensities and qualities in Bengali. For instance, '*dap dap*', '*miś miś*', and '*kin kin*' are all slightly different notions which signify 'mild pain'. However, each term is associated with a different quality: *dap dap* refers to a dull pain, mostly in the head. *Miś miś* is related to muscle pain and sometimes connected to fever (see Sujatha 2007, 183 on Tamil Nadu). And *kin kin* denotes a sharp pain, for example the toothache when one eats something cold.

During a training meeting with Healthcare Solutions, health workers mentioned translating these expressions into software categories as the most pressing challenge they face in the field. In response, Healthcare Solutions advised them to only give patients the specific options that are available in the software. Dr Chowdhury explained:

> *Miś miś*, *dap dap*, *jhan jhan*, *kaṭ kaṭ*—what is their meaning in English? . . . What do you write? Here [in the software] *kaṭ kaṭ* is not written anywhere. Mild, moderate, severe is written. . . . If these things don't match the software . . . you will have to ask questions while looking at the software. . . . You will ask, is the pain very bad? Not bearable at all, or can you bear it a little? Or can you bear it sometimes but it is very inconvenient? You have to ask these questions and put the answers under mild, moderate, severe.

Healthcare Solutions thus instructed health workers to reframe their open questions ('how is your pain?') into closed questions ('is the pain mild, moderate or severe?') that reflected their software categories in order to match regional concepts with pre-programmed terminology. A few months later, however, the IT team decided to develop a drop-down menu with Bengali options. When health workers click on the respective term, the software would automatically assign it to

the English language categories, meaning that the translational work that used to be conducted by health workers would now be automated.

(In)visibilising Expertise

This shows the ambivalent stance with which Healthcare Solutions' employees regard health workers' expertise: while they partly value their labour and skills, they simultaneously curtail their emerging authority through automation and standardisation. Mobilising the argument that human intervention is prone to 'human error', Healthcare Solutions aims to minimise health workers' influence in digital consultations as much as possible. Furthermore, health workers' recommendations for improving the project are frequently ignored. Rather than acknowledging and encouraging creative contributions, health workers are supposed to function like a conduit, executing the visions of urban, *bhadralōk* professionals. In realms where health workers' inputs cannot be denied, they are often invisibilised, despite the fact that this labour provides the foundation for Horizon's digital health economy. This is because, if health workers' contributions were to be acknowledged, it would highlight the systemic flaws of the project. Yet, when the technical system fails, rural residents usually blame health workers, questioning their competence.

At other times, Healthcare Solutions strategically visibilises health workers' expertise. Employees promote health workers' qualifications when advertising the project and display their certificates prominently in the health centre. Moreover, the social enterprise regularly showcases health workers' technical skills to funding agencies to demonstrate the project's success, particularly since it functions under the banner of 'empowerment'. They also invite potential future funders on field visits in the hope of attracting money for further skill development initiatives targeting 'scheduled castes' and 'scheduled tribes'. The skills of 'lower' caste health workers thus constitute a currency for Healthcare Solutions. Similar to Sareeta Amrute (2020), who describes how 'race' in corporate tech workplaces in Berlin becomes productive not only through the value of divided labour but also through 'diversity', 'caste' in India becomes economically productive: not only because health workers function as a pool of cheap labour taking over tedious, manual work, but also because Healthcare Solutions as a social enterprise sustains itself through 'empowerment' programmes.

Health workers, in turn, try to manoeuvre and redefine the structural position ascribed to them by making their expertise visible. Using their connection to the medical field, they find new ways of self-representation and professional advancement. For example, they post pictures on social media wearing white uniforms resembling lab coats and posing by the office's sole computer, thereby associating themselves with high-status work. Furthermore, as illustrated by the

Vishvakarma *puja* depicted in the introduction, health workers celebrate their technical skills as a source of power and pride. These may not only instil a sense of accomplishment but also open career prospects, particularly during a time of high unemployment. Some health workers have begun using their newly acquired medical and digital skills in unexpected ways, such as practising as uncertified rural medical practitioners outside their duty hours or securing more lucrative employment. This indicates potential prospects for social mobility and status gain, at least on a horizontal level. It is worth noting, however, that it is mainly men from more affluent backgrounds who have been able to move towards better opportunities. Nonetheless, the self-representations and practices of health workers may serve as an inspiration to go beyond the limited imaginations regarding career prospects for marginalised communities.

Conclusion: recast(e)ing healthcare

With the help of trained health workers who cycle through villages and use digital technologies, the medical gaze enters people's homes in rural areas in India. In this article, I analysed whether the digital health project leads to shifting hierarchies of expertise and novel distributions of medical authority. While trained health workers from marginalised communities are recognised as skilled, it is only doctors who are valued as possessing the authority to decide and intervene. This is undergirded not just by legal regulations (only doctors are allowed to prescribe), but also by 'upper' caste rural residents who are suspicious of health workers' qualifications, and Healthcare Solutions who constrict health workers' agency. The metaphor of the doctor (and by extension the software) as the mind, and the health workers as foot soldiers or eyes, ears, and hands, clearly relies on and further entrenches divisions of labour where privileged castes do knowledge work while marginalised castes literally do the footwork. Since the medical gaze is entangled not only with the institution of the clinic but also with the institution of caste, digital primary care is embedded in longstanding knowledge-power relations and reinforces established hierarchies of expertise.

The tasks necessary for digital consultations are ranked according to the distinction between mental, professional knowledge and manual, technical skill, whereby only the former translates into medical authority. The tasks that are shifted from doctors to health workers are perceived as being skill-based instead of knowledge-based. As their eyes, ears, and hands, health workers function as doctors' stand-ins, but not as fully recognised replacements. This is in contrast to the software, which is often equated with a 'doctor's mind.' Skill and knowledge are also associated with different data work. While skill often overlaps with repetitive work (e.g., health workers feed data into the software as foot soldiers of digitalisation), professional knowledge is considered essential for interpreting this

data. The persistent stratification of labour and ranking of expertise indicate that health workers' structural position remains confined to the logic of caste even within empowerment projects.

Although caste lives on through the limited and limiting imaginations of health workers' futures, health workers themselves do find ways to visibilise their labour and unsettle caste-inflected notions of expertise. They foreground their active and creative contributions as part of the software development process, as amending technical failures, as emplacing the project within local political and social structures, as thickening patients' narratives into medical reports, as translating regional into 'proper' language, and as compressing complex everyday experiences, such as pain, into the software's clinical categories. In short, they see themselves as providing expertise in terms of research, operation, mediation, and translation. By asserting their expertise, health workers strive to manoeuvre and redefine the structural position ascribed to them and aim for new professional opportunities.

While it is important that caste is being addressed in development projects, and while digital health technologies are recasting India's primary care sector to some extent by enabling marginalised communities to enter the medical field as community health workers, the field's inherent hierarchies and inequities persist. The opportunities provided to health workers are already casted, which becomes evident in their training as frontline workers and their precarious status as 'entrepreneurs'. Nevertheless, although caste finds expression by assigning health workers a familiar structural position, health workers find ways to visibilise and value their labour. The discrepancy between elite and subaltern interpretations of expertise, along with some health workers' unexpected use of their medical and digital skills, definitely complicates, if not partially unsettles, caste-inflected hierarchies. This illustrates that caste in the medical field is being simultaneously perpetuated and reimagined through development projects in ambivalent and contradictory ways. And that health workers' assertions may open up possibilities for rethinking the notion of 'empowerment', for example in terms of addressing the social inequities embedded in the medical field by taking seriously health workers' aspirations.

Authorship statement

The article was conceived and written solely by the author.

Ethics statement

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