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ORIGINAL ARTICLE

Exploring the Digital Challenges Faced by Community Health Workers in a District of Telangana, India: A Qualitative Study

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ABSTRACT

Background: Community health workers (CHWs), including Accredited Social Health Activists (ASHAs) and Auxiliary Nurse Midwives (ANMs), play a central role in delivering primary healthcare in India. As digital health initiatives like Ayushman Bharat grow, proportionately CHWs are expected to use technology but often face challenges. This study examines the digital challenges faced by Community Health Workers (CHWs) in Telangana, India.

Methods: A descriptive, cross-sectional qualitative study was conducted in between January and April 2023 in Suryapet district, Telangana. Thirty ASHAs and thirty ANMs from rural and urban areas were selected through purposive sampling. Data were collected via in-depth, semi-structured interviews and analyzed thematically using a grounded theory approach with the assistance of Atlasti software. Ethical approval was obtained from the Institutional Ethics Committee of University of Hyderabad.

Results: The Participants of the study were mostly aged 26-45, with ASHAs having basic education and ANMs possessing nursing diplomas. Most CHWs came from lower socioeconomic classes. Work experience varied, with religious and caste diversity present in both CHW groups. The study identified key digital challenges: limited smartphone and internet access, insufficient training, usability issues, language and literacy barriers, data security concerns, resistance to change among senior CHWs, and lack of real-time technical support.

Conclusion: The study underscores the significant digital barriers faced by CHWs in delivering healthcare services and managing patient records. Addressing these challenges is essential to empower CHWs and improve healthcare delivery within the CPHC and CBAC frameworks, thereby ensuring that initiatives like Ayushman Bharat achieve their full potential.

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INTRODUCTION

As the world transitions into an increasingly digital era, driven by advancements in technology and information systems, the integration of digital tools into healthcare systems has become imperative. This evolution is driven by the promise of improving healthcare delivery, enhancing the reach of services, and ultimately fostering better health outcomes.¹ Community Health Workers (CHWs), particularly Accredited Social Health Activists (ASHAs) and Auxiliary Nurse Midwives (ANMs), are foundational to India's public health system.^{2, 3} They serve as critical intermediaries between the healthcare infrastructure and communities, especially in rural and underserved areas. Their roles encompass preventive, promotive, and basic curative services under frameworks such as Comprehensive Primary Healthcare (CPHC) and Community-Based Approaches to Care (CBAC).⁴ With the rollout of major healthcare initiatives, such as Ayushman Bharat and the Ayushman Bharat Digital Mission (ABDM), the integration of digital tools into routine community health work has become a national priority.^{1,5} The Ayushman Bharat Digital Mission (ABDM), led by the National Health Authority (NHA),⁶ BDM has successfully integrated more than 100 health programs and applications, both from government entities and private sector innovators.⁷

Despite the growing emphasis on digital health, CHWs often encounter numerous barriers when using digital technologies in the field. These challenges affect their ability to perform critical tasks such as recording health data, accessing online resources, communicating with supervisors, and delivering timely care.⁸⁻¹⁰ While government programs increasingly rely on digital platforms for monitoring and service

delivery, the ground reality reveals a digital divide among frontline health workers.^{11, 12} CHWs are central to the operationalization of the Health and Wellness Centres (HWCs) and the delivery of CPHC and CBAC. CHWs use digital tools like mobile apps and electronic health records to screen, monitor, educate, and manage Non-Communicable Disease (NCD) patients.¹³ These tools help CHWs collect data efficiently, provide remote care, offer health education, ensure medication adherence, and make data-driven decisions for better patient outcomes and care coordination.⁵

The digital challenges faced by CHWs are both widespread and multifaceted. Studies and field reports indicate persistent issues such as poor internet connectivity, limited access to functional digital devices, lack of user-friendly applications, insufficient training, and minimal technical support.^{14, 15} In rural districts like Suryapet in Telangana, these barriers are particularly pronounced due to infrastructural constraints and socio-economic disparities. These challenges not only compromise the efficiency of CHWs but also hinder the overall effectiveness of national health programs that depend on digital data collection and communication. CHWs are the cornerstone of primary healthcare delivery, and their digital empowerment is essential for improving health outcomes, ensuring timely interventions, and achieving the objectives of Ayushman Bharat. Without addressing the digital barriers they face, there is a risk of widening health inequities and underutilizing the potential of national health initiatives. Understanding the digital limitations experienced by ASHAs and ANMs is therefore crucial for improving the quality, accessibility, and accountability of public healthcare services. While several national-level programs emphasize the adoption of digital health

technologies, there is limited empirical evidence on the lived experiences of CHWs regarding these tools, especially in semi-urban and rural districts. This study seeks to fill that gap by providing an in-depth exploration of the digital challenges faced by ASHAs and ANMs in Suryapet District, Telangana. By identifying the

specific obstacles and contextual factors affecting their digital engagement, the study aims to inform policy, training programs, and system-level interventions that can strengthen CHW performance and support the broader goals of digital health transformation in India.

Table 1. Socio-demographic characteristics of CHWs in Suryapet, Telangana

Characteristics	ANMs (n=30)	ASHAs (n=30)
Age		
26-35	5 (16.6)	12 (40)
36-45	14 (46.6)	12 (40)
46+	11 (36.6)	6 (20)
Educational qualifications	26 (86.6)	0
Only ANM training	4 (13.3)	0
ANM and Other degrees	0	23 (76.6)
7th to 10th class and ASHA training	0	7 (23.3)
Religion		
Hindu	11 (36.6)	17 (56.6)
Christian	16 (53.3)	10 (33.3)
Muslim	3 (10)	3 (10)
Caste		
Scheduled Castes (SC)	17 (56.6)	12 (40)
Scheduled Tribes (ST)	3 (10)	11 (36.6)
Backward Classes (BC)	6 (20)	6 (20)
Open Category (OC)	4 (13.3)	1 (3.3)
Years in health work		
10 years and below	3 (10)	11 (36.6)
11-20	23 (76.6)	19 (63.3)
21-30	4 (13.3)	0
Monthly family income		
20,000 rupees and below	0	26 (86.6)
21,000-40,000 rupees	14 (46.6)	4 (13.3)
41,000 rupees and above	16 (53.3)	0

This study is particularly relevant against the backdrop of transformative healthcare initiatives, such as Ayushman Bharat in India, which represents a significant milestone in the

nation's pursuit of equitable and accessible healthcare.

Methodology

The study was conducted in Suryapet District, Telangana State, India a predominantly rural district in southern India with approximately 1.1 million inhabitants. The district comprises both rural villages and urban towns, providing a diverse context for examining community health work.

Study Design: A cross-sectional, descriptive qualitative study was conducted to investigate the digital challenges faced by ASHAs and ANMs. This qualitative study employed a systematic and well-structured approach to explore the digital challenges faced by ASHAs and ANMs within the frameworks of Comprehensive Primary Healthcare (CPHC) and Community-Based Approaches to Care (CBAC), in the context of the Ayushman Bharat initiative. The methodology was designed to provide rich, in-depth insights into the experiences and perspectives of CHWs regarding the use of digital tools and the challenges associated with technology integration.

Participants: The study sample population consisted of 30 ASHAs and 30 ANMs working in Suryapet District. Purposive sampling was employed to ensure diversity across rural and urban areas, capturing a range of ages, socioeconomic backgrounds, and work experience levels. Inclusion criteria required participants to be active CHWs (either ASHA or ANM) in the district, with at least six months of field experience and a willingness to provide informed consent. CHWs with less than six months of experience or those unwilling to participate were excluded from the study.

Data Collection Instrument: A semi-structured interview guide was designed, consisting of open-ended questions about experiences with digital tools. The guide was pretested with five CHWs (whose data were not included in the

study results) to ensure the clarity and relevance of the questions. Feedback from the pilot testing was used to refine the wording of the questions prior to the full study.

Sample Size: A total of 60 interviews (30 ASHAs and 30 ANMs) were conducted. The sample size was determined based on the concept of thematic saturation we continued recruiting participants until additional interviews no longer yielded new themes or insights. This saturation-driven approach is commonly used in qualitative research in place of a formula-based sample size calculation.

Data Collection: Data were collected between January and April 2023. The interviews were conducted by the principal investigator using the semi-structured interview guide. A purposive sample of 30 ASHAs and 30 ANMs was selected from various sub-centres within Suryapet District, Telangana. The selection process aimed to ensure demographic diversity by including participants from both rural and urban settings, various socioeconomic backgrounds, and a mix of permanent and contractual ANMs. All interviews were conducted face-to-face, following ethical guidelines and informed consent procedures. Open-ended questions and probing techniques were used to encourage participants to share their experiences, challenges, and perspectives regarding the use of digital tools in their healthcare roles. The interviews aimed to explore a wide range of challenges, including practical difficulties, emotional responses, and perceptions of empowerment or disempowerment related to the integration of digital technology into their work. The primary outcome of this qualitative study was the identification of the major digital challenges/themes encountered by ASHAs and ANMs, derived from their interview narratives.

In other words, the study's goal was to uncover and categorize the key issues that hinder CHWs in using digital tools effectively.

Data Analysis: A grounded theory approach was adopted for the analysis of interview data. This methodology allowed for the emergence of themes, patterns, and categories from the narratives of the participants. The data analysis process was iterative and inductive, without any preconceived categories or themes imposed on the findings. The analysis utilized Atlas.ti (version 9) qualitative data analysis software to facilitate the coding of interview transcripts. Utilizing open coding in Atlas.ti, followed by axial coding, allowed for the identification and refinement of themes and patterns. The process started with open coding, where key concepts in the interview transcripts were identified and

labeled. As the analysis advanced, axial coding helped uncover connections and relationships between these codes. Through ongoing comparison and further refinement, categories and themes began to emerge naturally from the data.

Ethical Considerations

This research adhered to the highest ethical standards, including obtaining informed consent from all participants. Confidentiality and data protection were maintained throughout the study, ensuring the anonymity of participants. The study received ethical approval from University of Hyderabad ethics review board with reference number UH/IEC/2020/244, reinforcing the commitment to ethical research conduct.

Table 2. Themes and Subthemes Identified from CHWs' Experiences

Themes	Subthemes
1) Limited Access to Technology	Lack of smartphones or tablets Unreliable internet connectivity Inadequate mobile data plans Shared or outdated devices Lack of electricity in some areas
2) Inadequate Training	No formal digital training provided One-time or irregular training sessions Lack of hands-on practice No refresher courses Training not in local language
3) Usability Issues	Complicated app navigation Software glitches and freezing Non-intuitive interfaces Difficulty in logging in or submitting data System errors causing data loss
4) Data Security and Privacy Concerns	Fear of leaking patient data Lack of clarity about data confidentiality Use of unsecured devices/networks No guidance on ethical handling of digital records
5) Language and Literacy Barriers	Apps not available in simple local language Medical terms hard to understand Limited English proficiency Difficulty typing or reading on-screen text
6) Resistance to Change	Preference for paper-based records Fear of making mistakes with technology Negative past experiences with digital tools Lack of confidence in digital systems
7) Lack of Technical Support	No helpline or point of contact Delayed troubleshooting Dependence on family or peers for tech help Issues left unresolved during fieldwork

RESULTS

Table 1 illustrates the demographic characteristics of 30 ANMs and 30 ASHAs. In terms of age distribution, 14(46.6%) of ANMs fall within the 36-45 age range, while 80% ASHAs are relatively evenly distributed between the 26-35 and 36-45 age brackets [12 (40%) each]. Educational qualifications reveal that 4 (13.3%) ANMs hold another degree in addition to ANM training, while 26 (86.7%) ANMs have completed ANM training only. In contrast, 23 (76.6%) ASHAs predominantly possess basic education coupled with ASHA training and 7 (23.3%) ASHAs hold other degrees in addition to ASHA training. Religious affiliations revealed a diverse composition, with 16 ANMs identifying as Christians, 11 (36.6%) as Hindus, and 3 (10%) as Muslims. Meanwhile, 17 (56.6%) ASHAs are Hindus, 10 (33.3%) are Christians, and 3 (10%) are Muslims. In terms of caste, 17(56.6%) ANMs belong to SC (Scheduled Caste), 3(10%) are ST (Scheduled Tribe), 6(20%) are BC (Backward Class) and 4(13.3%) are OC (Open Category), while 12 (40%) ASHAs belong to SC, 11(36.6%) are ST, 6(20%) are BC and one belongs to OC community. Years in health work show that 23 (76.6%) ANMs have been working for 11-20 years, while ASHAs exhibit greater diversity in their experience; however, 11 (36.6%) ASHAs have worked for 10 years or less. The study results reveal that the average monthly income of ASHAs is 7,500 rupees. The average monthly income of contractual ANMs is 21000 rupees, and the monthly income of permanent ANMs ranges between 21000 and 60000. Notably, 26 (86.6%) ASHAs come from families with a monthly income of 20,000 rupees or less; according to the Modified Kuppuswamy scale, they belong to the upper lower (IV) class. Remarkably, 16 (53.3%) ANMs, most of whom

are contractual, come from families with a monthly income of 41,000 rupees or above. According to the Modified Kuppuswamy scale, they belong to the lower middle (III) class. The data analysis reveals a multifaceted landscape of digital challenges that CHWs face within the framework of comprehensive primary healthcare (CPHC) and community-based approaches to care (CBAC).

The following challenges collectively present formidable obstacles that impact the ability of community health workers (CHWs) to carry out their crucial roles effectively (Table 2).

1. Limited Access to Technology: One of the most prevalent challenges emerging from the data was the limited access to technology among CHWs. Many ASHAs and ANMs encountered difficulties obtaining essential digital tools or reliable internet connectivity. This limitation significantly hindered their ability to access digital health resources, communicate with healthcare facilities, and collect and transmit patient data effectively. Such constraints were especially pronounced in rural and remote areas, where infrastructure and connectivity remain inadequate.

"In my village, network signals are often weak, and sometimes we don't even have electricity for days. It's frustrating when we can't reach healthcare facilities or provide timely information to the patients because of these issues." -ASHA5

"Our smartphones are outdated, and we can't afford new ones. We're expected to do so much with these limited tools. It's like trying to build a house with just a hammer and a saw." -ANM3

"I wish I had a tablet or a better phone to access health information and communicate with the clinic. Sometimes, it feels like we're stuck in the past while the world is moving forward with technology." -ASHA2

2. Inadequate Training: The findings underscored another recurring challenge - insufficient training and education on the use of digital tools and platforms. ASHAs and ANMs expressed frustration at the lack of comprehensive and ongoing training programs to equip them with the necessary skills and knowledge to utilize digital solutions effectively. This training gap hindered their confidence and competence in using technology, contributing to their overall job performance.

"We were given these smartphones, but nobody really taught us how to use them effectively. I'm often afraid I might mess up something important. I've seen my senior colleagues struggle with digital tools. It's disheartening to watch them lose confidence because they don't have proper training." - ASHA1

"I've been doing this job for years, but the digital tools keep changing. We need continuous training to keep up, and that's something we don't get. They expect us to use these apps and record data accurately, but I've never had a proper training session. It's like learning to swim by jumping into a river with no guidance." -ANM4

3. Usability Issues: Usability issues were a prominent theme in the data. CHWs reported significant challenges related to the usability of digital tools. User-unfriendly interfaces, software glitches, and complex navigation systems were frequently cited as barriers to the seamless integration of digital solutions into their healthcare workflows. These challenges, coupled with limited training, deterred CHWs from adopting technology for healthcare tasks.

"The app we're supposed to use is so complicated. It's not user-friendly at all. It takes me forever to enter patient data, and I often make mistakes. I take help from my colleagues and from my family, but we're all struggling with the same problems. It's like we need a special

training just to understand how to use the app." - ASHA6

"I spend a lot of time navigating through the software, and it's not designed with our workflow in mind. It feels like I'm wrestling with the technology rather than using it to help patients. Every update to the software seems to make it even more confusing. We need tools that simplify our work, not make it more complicated. We're wasting time trying to figure it out when we could be out there helping people." -ANM7

4. Data Security and Privacy Concerns: Participants in the study expressed valid concerns about data security and privacy when using digital platforms. They worried about unauthorized access to sensitive health information and breaches of confidentiality. These concerns, often stemming from a lack of clarity and assurance regarding data protection measures, raised questions about the safety of health data in the digital realm. This concern over data security and privacy further contributed to the reluctance of CHWs to fully embrace digital technology.

"Our patients trust us with their personal health details. Using digital tools to record their information is essential. Sometimes, I think about what happens to the health data I collect. Are they secure? Who has access to this information?" -ASHA8

"I've heard about data breaches in the news. Our patients depend on us to keep their health information confidential. We need robust data security measures to ensure their trust in our healthcare services. It makes me concerned about the safety of our patients' health information. We need assurances that their privacy is protected from unauthorized use or leaks." -ANM4

5. Language and Literacy Barriers: CHWs highlighted language and literacy barriers faced

by them while using digital tools. ASHAs and ANMs working in diverse linguistic and cultural contexts encountered difficulties in entering patient information and interpreting health records in different languages or dialects. This challenge not only affected the quality of healthcare data but also added an additional layer of complexity to their tasks.

"I have to constantly switch between languages to record patient data, and that can lead to misunderstandings and errors. When they see me struggling with the app in their language, it can affect their trust in our healthcare services. We need solutions that are more user-friendly, especially for those who have limited education."—ANM9

"I believe technology can greatly assist us, but the language barriers make it difficult to ensure accurate health records. Educational barriers can affect our confidence in using digital tools. We need solutions that are more inclusive and accessible for all. I didn't have the opportunity to complete my formal education, and sometimes I struggle with the digital tools because of it. It can be frustrating."—ASHA11

6. Resistance to Change: A recurrent theme in the results was the resistance to change. Some CHWs exhibited a preference for traditional, paper-based methods of record-keeping. This resistance was often rooted in familiarity and comfort with manual processes and posed an additional challenge to the successful integration of digital technology into their roles.

"I've been doing this job for years with pen and paper. It's hard to switch to digital, and it feels like I'm losing something I'm familiar with. I know digital tools can help, but I'm used to my old ways. Learning something new at this stage in my career is intimidating. My greatest worry about making mistakes with digital tools, and that can affect the quality of healthcare."—ANM14

"Some of my colleagues are very resistant to digital technology. They say it's more trouble than it's worth, and they'd rather stick to the traditional methods. The older generation of health workers is the most resistant. They feel they've managed just fine without technology, so why change now?"—ASHA17

7. Lack of Technical Support: The absence of readily available technical support was another concern highlighted by the data. When technical issues arose, CHWs often had limited resources to troubleshoot effectively, leading to disruptions in their healthcare tasks and causing frustration.

"When my smartphone froze last time, I had no one to turn to for help. We're on our own when it comes to fixing technical issues. We often encounter technical problems, and it's a struggle to find a solution. It affects our work, and it feels like no one really cares."—ASHA19

"The digital tools we use are great when they work, but when they don't, it's frustrating. I wish there was someone I could call for assistance. There's a lack of resources to help us with technical issues. It's like we're expected to be tech experts, but we're not. We need reliable technical support to make the most of these digital tools. Without it, we're left feeling helpless when problems arise."—ANM4

CHWs face challenges in assisting their clients (NCD Patients, Mothers, Children, etc., whoever accesses the CHW services) with utilizing digital tools for managing NCDs. Beneficiaries often lack access to technology and digital literacy skills, and may have concerns about the privacy and security of health data. Resistance to change and cultural preferences for traditional healthcare practices also impact beneficiaries' willingness to adopt digital tools. CHWs must overcome their barriers and provide support, education, and assistance to help beneficiaries navigate the digital landscape in underserved or

remote communities. Addressing these obstacles is crucial for the successful implementation of digital health initiatives for NCD management. These results underscore a complex and multifaceted landscape of digital challenges faced by CHWs in the context of CPHC and CBAC. These challenges not only hinder their ability to provide efficient healthcare services but also contribute to job dissatisfaction and hinder the achievement of the objectives of initiatives such as Ayushman Bharat. Addressing these challenges is crucial in empowering CHWs and enhancing the effectiveness of healthcare delivery within the CPHC and CBAC frameworks.

DISCUSSION

This study sheds light on the digital challenges faced by Accredited Social Health Activists (ASHAs) and Auxiliary Nurse Midwives (ANMs) within the frameworks of Comprehensive Primary Healthcare (CPHC) and Community-Based Approaches to Care (CBAC). These challenges include limited access to technology, insufficient training, usability issues, concerns regarding data privacy, language and literacy barriers, resistance to change, and lack of technical support. Collectively, these obstacles hinder the effective delivery of healthcare services by community health workers (CHWs) and impact the implementation of initiatives like Ayushman Bharat.

Limited access to digital tools and reliable internet connectivity emerged as a fundamental barrier, particularly in rural and remote areas. Many CHWs shared frustrations about not receiving customized official devices or having to rely on personal phones with limited data. One ANM from a rural sub-centre noted, *“We never got good tablet or good smartphone from the department we just manage with our own*

mobiles, and they don’t support the apps properly.” Similarly, an ASHA stated, *“In our village, the network only works in one corner. Sometimes we climb onto a rock to send reports.”* These first-hand accounts illustrate how infrastructural inadequacies hinder their ability to communicate, collect, and transmit data. While nearly 60% (39 out of 60 participants) of participants reported these challenges, the narratives underscore deeper systemic inequities in digital access and the urgent need for improved infrastructure in underserved areas. Our findings are supported by a study that documented how frontline health workers in Karnataka lacked access to basic digital tools and had to frequently share or borrow devices, making consistent data entry and service provision difficult.¹⁶ Another study found that poor connectivity and unreliable device functionality in rural India led to CHWs abandoning digital applications in favour of manual methods.¹⁷ Similarly, other studies emphasized that digital inaccessibility due to infrastructure, cost, and uneven distribution of technology remains a major impediment to the effective implementation of digital health solutions in public healthcare systems.¹⁸ These studies collectively affirm that without sufficient access to functional devices and stable connectivity, digital health initiatives risk reinforcing existing service delivery gaps. Another critical concern is the lack of comprehensive and continuous training. Nearly 65% of CHWs (39 out of 60 participants) reported feeling inadequately prepared to use the digital tools provided to them, which affected their confidence and performance. One ASHA explained, *“They showed us once how to use the app, but after that, no one came to help when we faced problems.”* An ANM similarly noted, *“We are expected to use it daily, but there is no refresher training. We forget things and then*

feel helpless.” These experiences reflect a gap not just in initial orientation but in ongoing capacity building, highlighting the need for structured and context-sensitive digital literacy programs tailored to CHWs’ evolving needs. Without structured and ongoing digital literacy programs, CHWs are left to navigate complex applications without sufficient guidance. This finding aligns with prior research emphasizing the importance of tailored training for effective digital tool adoption. For example, a study developed a digital training program for CHWs and found that structured, iterative, and language-accessible modules significantly improved CHWs’ ability to detect and refer mental health cases.¹⁹ Similarly, other studies noted that without regular, hands-on training, CHWs struggled with both confidence and accuracy when using digital platforms.^{20, 21} These findings highlight the crucial role of continuous and context-specific training in enabling Community Health Workers (CHWs) to effectively utilize digital tools.

Usability issues further complicated the interaction between CHWs and digital platforms, as reported by 60% of participants (36 out of 60). Many CHWs described the applications as difficult to navigate, with inconsistent menus and poorly labelled icons. One ANM shared, *“Sometimes the app just shuts down while entering data, and we don’t know if it’s saved or lost.”* An ASHA noted, *“The buttons all look the same, we press the wrong one and have to start over.”* These usability barriers caused frustration and inefficiencies, often disrupting workflow and discouraging consistent use of digital tools. The findings highlight the need for user-friendly, localized interfaces that align with CHWs’ digital literacy levels. Several ASHAs noted that they had to rely on family members or colleagues for help in completing digital forms.

These findings align with earlier research, which shows that complicated interfaces, frequent glitches, and non-intuitive navigation impede workflow and increase the risk of data errors.²² As supported by previous studies, the success of digital integration largely depends on how well tools are adapted to users’ needs. For instance, a study emphasized that CHWs were more receptive to digital tools when applications were simplified, included regional languages, and allowed for offline access. A Cochrane review also concluded that decision-support tools tailored to CHWs’ local contexts improved adoption and reduced data entry errors.²³ These findings reinforce the need for a user-centered design approach that considers the digital literacy levels, language preferences, and working conditions of CHWs.

Data security and privacy concerns were also prominent in our findings. Nearly 45% of CHWs (27 out of 60 participants) expressed apprehension about the confidentiality of patient information and the potential for data breaches, especially when using shared or unsecured devices. One ANM remarked, *“We use our own phones, and sometimes our children also use them I worry that someone might see patient details by mistake.”* Similarly, an ASHA stated, *“We don’t know who can access the data once we upload it. There’s no clarity about where it goes.”* Many participants were uncertain about how long data were stored, who could access it, and whether accidental disclosure could result in professional consequences. These concerns, compounded by limited training and a lack of institutional clarity on data protection protocols, negatively affected their trust in digital systems and reduced their willingness to use certain features. Similarly, a study observed that CHWs participating in a digital training program lacked foundational knowledge of data privacy principles and expressed discomfort using

mobile applications without clear guidance on confidentiality practices.¹⁹ The authors emphasized the need to integrate data protection modules into CHW digital literacy efforts. Moreover, the study has reported that in the absence of formal data handling policies, CHWs often rely on informal practices that risk patient privacy and compromise ethical standards in care delivery.¹⁹ These findings underscore the urgent need for structured training, clear institutional policies, and user assurances on data security to foster trust and compliance with digital health systems.

Language and literacy barriers add another dimension to the digital divide. Almost 90% of CHWs (55 out of 60 participants) in our study reported difficulties with English-based digital tools, particularly when serving communities where local languages are the primary language. An ASHA explained, *“Everything is mainly in English, even if I can read it, many words are difficult to understand. We need Telugu instructions.”* Another participant added, *“Sometimes I just guess what the button means because there are no clear symbols or translations.”* These language-related challenges not only slow down data entry and reporting but also increase the likelihood of errors, further highlighting the need for multilingual, context-sensitive digital interfaces tailored to the linguistic realities of CHWs and their communities. Our findings are consistent with those of other research that found that CHWs using smart devices for health promotion in low-resource settings struggled with monolingual English interfaces, resulting in limited engagement and reduced confidence.²⁴ Similarly, a cross-country analysis of CHWs during the COVID-19 pandemic emphasized that language mismatches between the digital platforms and local populations restricted effective communication and data collection,

especially in regions with low literacy and high linguistic diversity.^{5, 25} These studies reinforce the importance of designing multilingual, culturally contextualized digital tools that accommodate both the users' language proficiency and the sociolinguistic needs of the communities they serve.

Resistance to change, particularly among senior CHWs, reflected a strong preference for traditional, paper-based systems. This reluctance often stemmed from a fear of failure, unfamiliarity with digital technology, or the perception that digital tools would add to their workload. In our study, 25% of older CHWs (15 out of 60 participants) expressed anxiety about damaging devices or making errors that could not be easily corrected, leading them to avoid digital tools unless absolutely necessary. One senior ANM shared, *“With pen and paper, I know what I’m doing. With the phone, I’m afraid I’ll press something wrong and lose everything.”* Another ASHA noted, *“It’s easier for us to write. The app feels complicated and stressful.”* These narratives highlight the emotional and psychological barriers to digital adoption, suggesting the need for peer mentoring, reassurance, and gradual digital transitions to build confidence and reduce resistance. This is supported by previous research, which found that senior CHWs experienced high stress when adapting to new digital platforms and often felt that digital expectations exceeded their training and comfort levels.¹⁶ Additionally, a study reported that in low- and middle-income countries, older CHWs often demonstrated lower levels of digital readiness and required peer mentoring and structured institutional support to transition to digital workflows gradually.²⁶ These findings highlight that overcoming resistance to change requires more than technical training; it calls for a supportive organizational culture, hands-on

mentorship, and clearly demonstrated benefits of digital integration in daily tasks.

Finally, the absence of timely technical support leaves CHWs vulnerable when devices malfunction or software issues arise. In our study, 50% of CHWs (30 out of 60 participants) reported being unable to complete digital tasks due to software freezes, login failures, or data sync problems, often with no immediate help available. One ANM expressed frustration, *“When the app stops working, we don’t know whom to call. We just leave the work and wait until someone from the office visits.”* An ASHA shared, *“Sometimes it takes days to fix a small issue because no one responds quickly.”* These delays not only disrupt healthcare service delivery but also contribute to de motivation and a lack of confidence in digital systems. This is consistent with findings from a study, which described how CHWs in Karnataka frequently faced technological breakdowns that went unresolved due to the lack of local maintenance structures or responsive helpdesks, which further compounded their already heavy workload.¹⁶ Other research has similarly observed that CHWs using mHealth apps often rely on informal support from peers or family members when technical problems arise, highlighting a systemic gap in institutional support systems.¹⁷ These findings underscore the pressing need for a dedicated, responsive technical support infrastructure tailored to the working conditions of CHWs, particularly in rural and low-connectivity settings.

Our findings bear significant implications for policy formulation and practical application. To ensure that frontline workers can fully engage in the digital health transformation anticipated by initiatives such as Ayushman Bharat, it is imperative for stakeholders to comprehensively address these challenges. Policy-makers may consider improving digital infrastructure (for

instance, extending reliable internet connectivity to remote areas and providing CHWs with devices that are fit for purpose), implementing ongoing training programs tailored to the needs and literacy levels of CHWs, and adopting user-centric design for health applications (ensuring interfaces are intuitive and available in local languages). Additionally, establishing a robust technical support system for CHWs will help in the timely resolution of technical issues that arise in the field. We also recommend fostering a supportive environment that encourages CHWs to embrace new technologies by addressing resistance to change through mentorship and success stories.^{26, 27}

From a research perspective, future studies could evaluate the impact of specific interventions (e.g., a new training module or a tech support hotline) on mitigating these digital challenges. Comparative studies across different regions or states could also be valuable to see if the challenges we identified are pervasive or if there are context-specific differences. By highlighting these implications and future directions, our study aims to contribute to both improved practice on the ground and the ongoing scholarly conversation on the integration of digital health in community healthcare.

The strength of this qualitative study lies in its in-depth exploration of CHWs’ experiences, yielding rich insights that quantitative surveys might overlook. The inclusion of both ASHAs and ANMs from diverse settings (rural and urban) strengthens the findings by capturing a broad range of perspectives. However, there are notable limitations. First, the study was conducted in a single district of Telangana, which may limit the generalizability of the findings to other regions with different contexts. Second, as with any interview-based research, there is a risk of response bias; participants might have under- or overstated certain

challenges due to recall issues or social desirability. Finally, our study focuses on challenges without evaluating specific interventions; therefore, while we identify needs, we cannot directly measure the impact of the solutions. These limitations notwithstanding, our findings provide valuable guidance for improving digital health integration at the community level.

Conclusion

This study highlights the multifaceted digital challenges faced by ASHAs and ANMs within the frameworks of Comprehensive Primary Healthcare (CPHC) and Community-Based Approaches to Care (CBAC). Key barriers include limited access to technology, inadequate training, usability issues, data privacy concerns, language and literacy difficulties, resistance to change, and the absence of technical support. These challenges hinder the effective utilization of digital tools and impact the quality and efficiency of healthcare delivery at the community level. Addressing these barriers through infrastructure development, user-friendly digital design, regular training, and robust support systems is essential to enhance the digital readiness of CHWs. Strengthening the digital capabilities of CHWs is critical to realizing the goals of initiatives like Ayushman Bharat and ensuring equitable healthcare access in India's evolving digital health landscape.

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