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Building a Digital Ecosystem for Community-Based Rehabilitation: Insights from a Multi-Platform Social Media Strategy in Thailand

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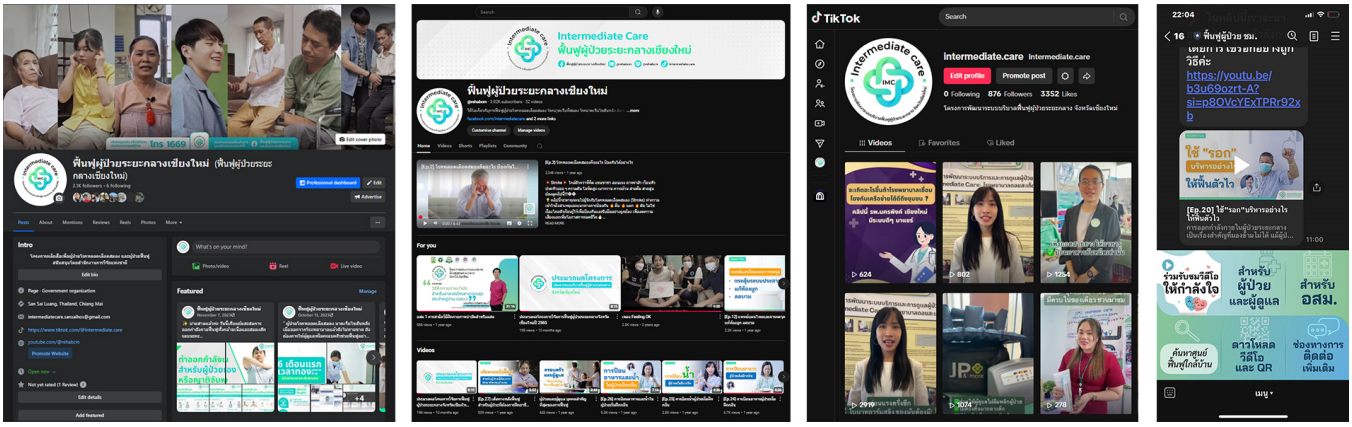


Figure 1: First page previews of our Facebook, YouTube, TikTok, and LINE platforms, aligned from left to right

Abstract

Access to rehabilitation services in low- and middle-income countries (LMICs) remains critically limited due to inadequate infrastructure, financial constraints, and shortages of trained professionals. Community-Based Rehabilitation (CBR) addresses these gaps by involving patients, families, and local stakeholders, yet its effectiveness is hindered by resource challenges. Digital technologies, particularly social media platforms, offer promising opportunities to extend CBR's reach, but their potential remains underexplored in LMIC contexts. This study investigates the design and implementation of a digitally delivered CBR intervention in rural Chiang Mai, Thailand, leveraging Facebook, YouTube, TikTok, and LINE to disseminate rehabilitation resources. Using participatory workshops with stakeholders, we identified critical needs and developed video content tailored to local contexts. The intervention's performance was evaluated through platform analytics, revealing insights

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into engagement and user interaction. Our findings provide actionable design recommendations for scalable, inclusive digital CBR solutions, addressing gaps in accessibility, content delivery, and stakeholder engagement.

CCS Concepts

• **Human-centered computing → Empirical studies in accessibility**.

Keywords

Community-Based Rehabilitation, CBR, Social Media, Low- and Middle-Income Countries, LMIC, Thailand, Stroke, Patients, Caregivers, Health Professionals

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1 Introduction

Global demographic and health trends indicate a growing need to integrate rehabilitation services into primary healthcare systems [6]. Without treatment, conditions like stroke, spinal cord injuries, and chronic illnesses often lead to physical and cognitive impairments that impact quality of life and independence [26]. Integrating rehabilitation into primary healthcare provides immediate health benefits and broader social advantages, as early intervention reduces disability progression and improves community health outcomes [26]. Despite this need, global rehabilitation infrastructure remains inadequate – particularly in low- and middle-income countries (LMICs). Rehabilitation services in these regions are often inaccessible and unaffordable with only half of 2.4 billion people worldwide in need receiving the services required [68]. Access to rehabilitation services in LMICs is often constrained by the limited availability of trained personnel, adequate facilities, and financial resources [6].

Community-Based Rehabilitation (CBR) was initially launched by the World Health Organization (WHO) to increase access to rehabilitation services at the community level, aiming to achieve rehabilitation, equalisation of opportunities, and social inclusion [70]. CBR is implemented through the combined efforts of patients, their families, healthcare professionals, and other community stakeholders and was shown effective in improving clinical outcomes and enhancing the quality of life of patients in LMICs. However, the number of studies remains limited as indicated in a systematic review on the topic by Valentina Iemmi [99]. Additionally, most research on CBR focuses on a single role, such as patients, rather than including multiple stakeholders, as emphasised in [74, 86].

Digital interventions in CBR remain underexplored, particularly in LMICs, though related efforts, such as remote physical activity [101] and video-based home exercises [67]. Social media has also emerged as an accessible, cost-effective tool for healthcare in areas with limited infrastructure, supporting initiatives like telemedicine [42], health promotion [29], and peer support communities [19]. Despite these advancements, research gaps persist: CBR studies in LMICs are hindered by infrastructure and access challenges [70, 102]. Furthermore, the potential of social media in delivering CBR remains overlooked, particularly regarding cross-platform strategies, with no existing studies, to our knowledge, offering design recommendations for social media interventions in these settings.

With our work we examine the design, deployment and use of a cross-platform intervention for CBR in LMICs, focusing on rural areas of Chiang Mai, Thailand. This study explores the potential of Facebook[1], YouTube[2], TikTok[3], and the LINE application[4] to disseminate rehabilitation-related content and engage users in the rehabilitation process. We are interested in answering the following research questions:

- RQ1: What are the needs of stakeholders, including patients, family caregivers, village health volunteers (VHVs), and healthcare professionals, for effective CBR in LMICs?
- RQ2: How can a digital intervention be designed to address the needs of CBR stakeholders in LMICs?
- RQ3: How do individuals in LMICs interact with social media interventions, and what insights can be gathered to inform the design of digital CBR solutions?

To address these questions, we adopted a three-phase approach. First, we conducted need-gathering workshops with diverse stakeholders to identify key challenges and requirements in CBR systems. Second, we designed and produced video content tailored to local needs, disseminating it through widely used social media platforms (Facebook, YouTube, TikTok, and LINE). Third, we deployed these interventions and analysed user interactions to evaluate their effectiveness and gather insights for improving digital CBR strategies. Our findings offer insights into the design of digital interventions for CBR, emphasising stakeholder-driven approaches and the use of accessible technologies. Moreover, our work extends discussions on leveraging social media to address healthcare disparities in LMICs, providing actionable design implications for future research and practical implementation in resource-constrained settings.

2 Background

2.1 Community-based rehabilitation in high- and low-income settings

CBR is an approach that delivers rehabilitation services within individuals' homes and communities, prioritising community-level support through utilising local resources and skills [48, 85]. Initially introduced in the 1970s by WHO, CBR has evolved from a primarily medical model to a holistic strategy aimed at rehabilitation, equalising opportunities, reducing poverty, and fostering social inclusion [68]. It is a participatory process involving individuals with disabilities, their families, communities, and healthcare professionals working collaboratively [60, 99]. Research has consistently shown that CBR improves physical functioning, daily activities, autonomy, and social inclusion [36].

[1] https://www.facebook.com/
[2] https://www.youtube.com/
[3] https://www.tiktok.com/
[4] https://line.me/en/

CBR has been implemented across various conditions commonly associated with long-term impairments post-discharge, such as spinal cord injury, traumatic brain injury, and stroke. For stroke survivors, CBR has proven effective in enhancing physical functioning and daily activities in both high-income countries (HICs) and LMICs [108]. In HICs, CBR frequently complements institutional care, reducing hospital stays and associated costs while improving patients' mobility, autonomy, and social integration [53]. However, implementing CBR in LMICs is far more challenging due to systemic barriers such as limited resources, poor access to rehabilitative care (less than 40% compared to over 90% in HICs), and a severe shortage of trained professionals. **LMICs have fewer than 0.01 rehabilitation professionals per 10,000 people**, in stark contrast to 25 per 10,000 in HICs, leading to higher rates of stroke-related disability and mortality [32, 36]. Despite these constraints, CBR in LMICs holds significant potential to deliver locally accessible care and provide culturally relevant solutions, thus reducing the socioeconomic impacts of disability [4].

Several studies from LMICs highlight the potential of CBR to improve both patient and caregiver outcomes, even in resource-constrained environments [11, 38, 39]. For example, in rural Thailand, CBR initiatives have trained family caregivers of post-stroke patients, enhancing their skills and knowledge. This training has led to improved patient activities of daily living and reduced complications [76]. Similarly, a CBR programme in Zimbabwe targeting children with disabilities improved their quality of life, despite facing challenges such as donor dependency, weak government support, and inadequate referral systems [7]. These examples stress the need to adapt CBR models to the socio-economic contexts of specific regions while strengthening resources to ensure sustainable support. However, while current research on CBR in LMICs highlight its potential, it also suffers from limitations, including small sample sizes and a narrow focus on individual groups, such as patients, rather than considering the entire CBR ecosystem [11]. This ecosystem encompasses family caregivers, community health volunteers, and multidisciplinary teams, all of whom play vital roles in CBR's success. Emerging digital tools offer promising opportunities to address these gaps. By expanding the reach of CBR services and enabling new types of delivery methods, digital interventions hold significant potential to overcome barriers and improve rehabilitation outcomes in underserved areas [4].

2.2 Digitally enhanced CBR

Digital technology is increasingly integrated into healthcare, driving advancements in accessibility and quality of care [25, 87, 93]. While the use of digital tools in CBR remains underexplored, their application in rehabilitation more broadly has demonstrated significant potential [3, 55, 83]. For instance, tangible interactions have been used to boost patient motivation through engaging and interactive experiences [100, 103], and IoT-based smart systems have facilitated resource interconnectivity and immediate information sharing in rehabilitation settings [24]. Wearable technologies have extended rehabilitation beyond clinical environments, enabling patients to continue therapy at home [28, 77]. Multisensory design has also been shown to enhance user engagement, learning, and emotional response across various domains, offering promising implications for digital rehabilitation [15, 16]. VR has been used with brain-computer interfaces to promote rehabilitation while enhancing patient engagement and recovery outcomes [104]. AI technologies have been shown to support decentralised rehabilitation services by enabling remote monitoring and smart assistance, particularly in tasks such as activity recognition and movement classification. However, challenges remain in validating these tools for specific clinical populations [61]. Beyond physical rehabilitation, AI-powered chatbots have also been used to assist individuals with dementia, autism, or those experiencing grief. These systems provide conversational engagement and emotional support through accessible, low-cost interfaces [109–111], and studies suggest they hold promise in patient-facing rehabilitation contexts [64].

In rural settings, digital technologies have expanded rehabilitation delivery across diverse environments. For example, cost-effective robotic systems have been developed for upper limb stroke rehabilitation, focusing on reducing production costs in low-resource clinical contexts [20]. Telerehabilitation has been found to improve access to healthcare for rural veterans, offering remote monitoring, real-time communication between patients and healthcare professionals, and personalised intervention plans tailored to individual needs [43]. Despite these advancements, implementing digital rehabilitation in LMICs, particularly in rural areas, faces significant challenges. High costs, technical requirements, and the need for specialised skills often hinder adoption. For instance, a previous study on self-administered telerehabilitation indicated that a lack of experience or confidence with technology impeded access to these services [43]. Additionally, the design of digital health technologies has often disregarded socio-cultural realities of rural communities in favour of adapting technologies from developed contexts [97, 98].

Practical and realistic approaches are essential when delivering digital healthcare in LMICs, especially for patients, family caregivers, and VHVs who reside in low-resourced regions which may lack health and technology literacy [2, 59]. Mobile health (mHealth) solutions have been shown to increase access, reduce costs, and address socio-cultural barriers in rural healthcare [14]. However, barriers to mHealth adoption persist, as highlighted in a systematic review examining stroke patients' experiences with mHealth [65]. The review found that patient acceptance, particularly among those lacking confidence with technology, is a significant obstacle. Additionally, insufficient support systems, such as unclear guidelines and limited technical assistance, hinder the sustained use of mHealth services. Addressing these barriers is crucial for effectively implementing digital rehabilitation solutions that are meaningfully in underserved settings.

2.3 Social media for healthcare

Social media platforms are increasingly used in healthcare to enhance patient engagement, enable information sharing, and support peer-to-peer communication [12, 56]. Platforms like Facebook, YouTube, and TikTok allow healthcare providers to disseminate health information, collect patient feedback, and build trust, thereby strengthening the patient-provider relationship [72]. For healthcare professionals, social media facilitates knowledge exchange, improves communication with patients, and supports collaboration with colleagues, though privacy and security concerns persist [44].

For patients, these platforms provide increased access to medical knowledge, foster communication with healthcare providers, and encourage peer-to-peer support networks [91]. In low-resource settings, social media has shown positive impacts on infectious disease surveillance, health education, and mass communication, offering a cost-effective way to reach underserved populations [33].

While social media has been successfully applied in healthcare, its use in CBR remains underexplored, particularly in LMICs. Existing research demonstrates its potential to support health initiatives, enable telemedicine, and build peer support networks [19, 29, 42]. However, significant gaps remain in understanding how social media can be leveraged effectively for CBR interventions. There is limited understanding of which platforms are most suitable, what types of content resonate with target audiences, and how to address barriers such as digital literacy and access in resource-constrained contexts. Moreover, while social media can expand the reach of CBR by engaging diverse communities and disseminating resources, critical questions remain about content design and delivery. For example, how can culturally tailored and actionable rehabilitation materials be optimised for specific platforms? And what strategies best foster community engagement, trust, and sustained interaction? Addressing these questions is essential for unlocking the full potential of social media to support CBR in LMICs, where traditional healthcare services are often unavailable or insufficient. This study seeks to fill these gaps, offering insights into how social media can be employed to enhance the accessibility, inclusivity, and sustainability of CBR in resource-constrained settings.

2.4 Healthcare context in rural Thailand

2.4.1 Stroke burden in rural Thailand. Stroke stands as a significant health concern in Thailand, ranking as the leading cause of death and long-term disability. In 2023, the country reported 349,126 stroke cases, with a mortality rate of 10% and a disability rate of 60% [63]. In Northern Thailand, which includes Chiang Mai Province, stroke prevalence has been reported at 1.46% [34]. This figure is notably high compared to regional and global averages and likely reflects both a high incidence of stroke and the long-term impact on survivors. Many individuals continue to live with stroke-related disability, particularly in rural areas where access to specialised care and rehabilitation is limited. In 2024, Chiang Mai alone reported 22,967 cases of stroke and stroke-related complications, including diabetes and high blood pressure [35]. Based on national estimates that approximately 80% of stroke patients are discharged to home care [46], this suggests that over 18,000 patients in Chiang Mai are likely recovering at home, primarily under the care of family members.

2.4.2 System gaps and community response. Access to post-stroke rehabilitation services in Thailand, particularly in rural regions, remains limited and uneven. A 2019 study found that stroke survivors in rural Thai communities often face significant disparities in accessing formal rehabilitation services, with only a small proportion receiving training or direct support from physical therapists [40]. Nationally, fewer than 12 public hospitals offer inpatient rehabilitation services for stroke, and these provide fewer than 400 beds in total [51]. Moreover, stroke rehabilitation services in LMICs are frequently sporadic, low-skilled, and not sustained over time [5]. In these contexts, many patients are discharged from acute care with little or no follow-up rehabilitation, and families are left to manage complex recovery needs without adequate training or support.

To bridge these gaps, Thailand has implemented CBR programs often delivered through VHVs, a network of locally recruited and trained community members tasked with promoting public health, including aspects of post-stroke care [71]. VHVs receive approximately 70 hours of training and operate under constrained resources, which limits their ability to address the complex and often prolonged needs of stroke survivors [66].

In Chiang Mai Province, where the majority of stroke patients live in rural areas, home-based self-rehabilitation is the norm. Caregivers – typically family members – play a critical role in the recovery process. Their responsibilities often include assisting with physical therapy exercises, managing hygiene and infection prevention, preparing meals, and ensuring medication adherence [58]. These tasks are both physically and emotionally demanding, and when combined with financial pressure and lack of formal support, frequently lead to caregiver stress and burnout. Despite the efforts of CBR programs, existing community and institutional resources remain insufficient to meet the growing rehabilitation demand.

2.4.3 Digital infrastructure and social media use in Chiang Mai. The increasing availability of internet access across Thailand, including rural areas such as Chiang Mai, presents an opportunity to supplement CBR with digital tools. As of 2024, Thailand had approximately 63.21 million internet users, representing 88% of the total population, and 49.10 million social media users – equivalent to 68.3% of the population [18]. Mobile connectivity is also widespread, with over 97.81 million active cellular connections, exceeding the national population due to multi-device use.

In Chiang Mai specifically, mobile and broadband access have expanded rapidly through both public and private investments [105]. The provincial digital economy strategy has supported broadband expansion even in remote districts, making platforms such as Facebook, LINE, YouTube, and TikTok increasingly accessible in rural communities. These platforms are already widely used for health communication and informal caregiver support, offering scalable channels for delivering rehabilitation education, peer connection, and emotional support. Despite their widespread use and potential, these platforms have remained largely untapped in formal rehabilitation strategies, highlighting an urgent opportunity to integrate social media into scalable CBR efforts.

3 Methodology overview

This study investigates how digital interventions can support CBR in low-resource settings, focusing on rural areas of Chiang Mai, Thailand. The research followed a three-phase approach. In **Phase One**, need-gathering workshops were conducted with healthcare professionals, village health volunteers, and other stakeholders to identify challenges and opportunities in existing CBR systems. The workshops used a world café method to encourage open discussion and generate insights into the key needs of patients, caregivers, and healthcare providers. Data from the discussions were analysed thematically, uncovering seven areas for intervention: motivation, general knowledge, food, mental health care, equipment usage, hygiene, and rehabilitation exercises.

Phase Two centred on designing and producing social media content tailored to local needs. Three workshops with experts in healthcare, media, and communication informed the content creation process. Videos were developed for four popular platforms – Facebook, YouTube, TikTok, and LINE – based on their accessibility and relevance in Thailand. Scripts were crafted collaboratively with healthcare experts to ensure accuracy and cultural appropriateness, and videos underwent multiple rounds of review to optimise clarity and engagement. The content was then distributed through a coordinated dissemination strategy, including social media influencers, local media channels, and direct outreach to healthcare networks. In **Phase Three**, we assessed the effectiveness of our intervention by analysing social media usage.

Ethical considerations were integral throughout the study. Participants were recruited voluntarily through the Chiang Mai Public Health Office, and all received detailed information about the study before providing written consent. The research protocol was approved by the Human Research Ethics Committee of the Chiang Mai Provincial Public Health Office (Ref: CM 37/2565). To ensure participant confidentiality, personal data were anonymised, and all recordings were securely stored. Additionally, the study prioritised the inclusion of participants with diverse roles and experiences, ensuring a comprehensive understanding of the needs and challenges in CBR delivery.

4 Phase One: Need gathering

The initial phase of our study focused on conducting design workshops with two primary objectives: understanding the challenges faced within Chiang Mai's CBR systems and identifying opportunities for digital media interventions to address these issues effectively. Using a collaborative approach, the workshops served as a step towards finding ways to align digital strategies with the practical needs and barriers encountered in that area.

4.1 Methodology

Workshop participants We recruited participants for the design workshops via Public Health Chiang Mai which included 39 participants from 25 districts. These were three doctors, 13 professional nurses, nine physical therapists, six occupational therapists, one nutritionist, one traditional Thai medicine doctor, and six VHVs. The participants' experience in rehabilitation care ranged from less than a year (10.3%) to over three years (41.0%). Specifically, 15.4% had one year of experience, 25.6% had two years, and 7.7% had exactly three years. The mix of expertise and experience provided valuable insights into the challenges and opportunities within Chiang Mai's CBR systems.

Workshop objectives and process The workshop began with an overview of the research project, followed by the division of participants into five subgroups, each comprising 7–8 people. The subgroups engaged in a "world café" style focus group discussion [57], a dynamic and participatory method designed to encourage collaborative dialogue. Each subgroup addressed one of five guiding questions per round, facilitated by moderators and assistants at each station to ensure a productive discussion. The questions were: (i) What healthcare information is critical for rehabilitation phase care?; (ii) What attitudes are necessary for effective patient care during rehabilitation?; (iii) What do caregivers need to understand about patients in the rehabilitation phase?; (iv) What media and technology can assist in CBR?; (v) What additional insights or suggestions do you have?

Participants were encouraged to express their opinions by writing on paper, boards, or sticky notes. After 30 minutes per round, participants rotated to the next station, allowing each group to contribute to all questions. The entire workshop spanned 180 minutes. Upon completing the discussions, each subgroup presented their key findings to the larger group to exchange insights and consolidate ideas. Audio recordings of the discussions were made for subsequent analysis.

Workshop data collection & analysis Data from the workshops was transcribed, translated from Thai to English and organised using Miro, which allowed for efficient categorisation and visualisation of participant contributions. This included audio recordings, written notes, and visual materials created during the discussions. Reflexive thematic analysis was employed following the framework established by Braun and Clarke [9], which involved familiarising ourselves with the data, coding it, identifying patterns through discussions and rounds of iteration, and refining themes to capture the core challenges and opportunities discussed. This process revealed six key areas requiring support within CBR systems, reflecting the insights and priorities of workshop participants.

4.2 Results – Core needs in CBR

Through our analysis, we aimed to address RQ1 by uncovering the core needs of stakeholders involved in CBR in Chiang Mai – which we outline as Stakeholder Needs (SN1 to SN6).

4.2.1 SN1: Overcoming misconceptions for balanced caregiver support. A key challenge identified in the workshops was the range of misconceptions about caregiving in the rehabilitation phase, from beliefs that patients are entirely dependent on professional medical care to tendencies for caregivers to either over-rely on patients' self-sufficiency or take over all tasks, affecting both recovery and autonomy. As one participant noted: *" due to a lack of knowledge, many believe that patients in the rehabilitation phase are bedridden and that they cannot help because they are not doctors. "* This misunderstanding often results in delays in rehabilitation, insufficient care, and neglect, severely hindering patient recovery. Participants emphasised the need to educate caregivers about their important role in the recovery process, particularly during the first six months post-incident – referred to as the "golden period" – where active involvement can significantly improve outcomes. As one participant remarked *"Family caregivers are the most important people in a patient's recovery, even more so than doctors and nurses."*

However, cultural and societal dynamics in rural Thailand often exacerbate caregiving challenges. Participants highlighted that caregiving responsibilities tend to fall disproportionately on women due to traditional gender roles: *"Mothers often provide exceptional care for their child patients, much like wives do for their husbands. However, sons are less inclined to focus on caring for their mothers, and husbands tend to neglect their wives as patients, offering less adequate care."* This finding aligns with broader research on gendered caregiving burdens, driven by societal expectations and the perception of care work as an extension of women's domestic roles

[107]. Participants suggested that involving all family members in caregiving – not just women – is essential to preventing caregiver burnout and ensuring consistent patient support. Another critical challenge is the tendency for caregivers to either overly rely on patients' self-sufficiency or, conversely, take over all caregiving tasks, leaving patients with few opportunities to regain autonomy: *" Relatives often expect patients to be somewhat self-sufficient, but they may not fully understand the severity of the illness, which can make them hesitant to provide the necessary care."* Meanwhile, another participant pointed out the opposite tendency: "some family caregivers tend to take over all tasks, leaving patients without opportunities to do anything on their own." Such imbalances can create a cycle of dependence, where patients are not empowered to rebuild their functional abilities, undermining rehabilitation goals.

4.2.2 SN2: Emotional and psychological struggles in rural rehabilitation centres. The workshops revealed significant emotional and psychological challenges for patients and caregivers in rural rehabilitation settings, highlighting the urgent need for tailored mental health support. Many patients struggle to accept their medical conditions, leading to denial and resistance to treatment. For heads of households in rural areas, the potential loss of independence and financial stability exacerbates feelings of despair, with questions like, *"When will I recover?"* and *"How will I support my family?"* frequently voiced. Those living alone face heightened isolation and sadness, with community support often falling short of their needs. Caregivers also endure severe emotional strain, particularly those providing care alone. The long and gradual recovery process leads to burnout, with one participant noting: *"Relatives burn out during rehabilitation because it's a long process, and patients improve gradually. They lose hope, especially without help from other family members."*

4.2.3 SN3: Navigating complex systems and financial burdens post discharge. Preparing family caregivers and relatives for a patient's return home is critical to ensuring a successful rehabilitation journey. Participants talked about the need for thorough preparation, which involves understanding the patient's specific needs, managing potential risks, and navigating available support systems, such as government-provided medical benefits. However, the complexity of these systems often creates confusion and leaves caregivers feeling unsupported. One nurse shared *" Many family caregivers and patients are very worried about expenses. They don't know what rights they have. In reality, the government offers a lot of assistance, including the ability to claim equipment. However, even I, as a nurse, don't know everything. The details are extensive, and our hospital doesn't have a social worker. "* This reflects a broader issue in LMICs, where limited access to information about entitlements and benefits exacerbates financial strain. Research has shown that distress related to health financing is common in LMICs, and state governments play a vital role in reducing this burden by ensuring better access to resources and financial protections [45]. Participants consistently highlighted the importance of providing clear, accessible information about available rights and benefits to caregivers and patients.

4.2.4 SN4: Equipment use. From the perspectives of our participants, the importance of rehabilitation and patient care cannot be overstated. Preventing disabilities and complications requires correct positioning, exercise, pain management, and the appropriate use of medical equipment. As one participant noted, *"There should be instruction on suitable equipment for each stage of a patient's physical rehabilitation, as well as on modifying household items to serve as simple exercise tools, making the process more cost-effective."* A recurring issue raised by participants is the management of medical devices, such as NG tubes which are critical for patients who have difficulty with their mouth, esophagus, or stomach and require tube feeding [81]: *" The NG tube is very bothersome for patients, who always want it removed. Relatives often bring patients back to the doctor because the tube frequently comes out. They are reluctant to handle it themselves, even after being taught, because it looks intimidating, and they lack confidence."* This aligns with previous research, which found that caregivers face significant challenges in managing NG tube feeding due to prescribed regimens conflicting with their daily routines and insufficient training, leaving them feeling unprepared for the practical aspects of care [10, 88].

4.2.5 SN5: Sustained effort for rehabilitation. Our participants emphasised the importance of physical rehabilitation, noting that proper positioning, exercise, and pain management are essential to preventing disabilities and complications. One participant highlighted the routine challenges they face, stating, *"I always have to instruct family caregivers and patients. With basic rehabilitation teaching guides, especially videos, we can reduce repetitive teaching, particularly when many relatives are involved. My role would then be to just assess if they're doing it correctly."* In addition to physical care, addressing communication difficulties is essential as participants pointed out: *"According to the disease, patients often have difficulty speaking and may be unable to speak at all. It is essential to practice speaking extensively at home."* A previous study aimed to assess the technical usability and user opinions of an SMS-based reminder system for stroke clients to aid in daily rehabilitation activities [27] found that the system was beneficial for rehabilitation, despite some technical limitations, such as international messaging issues. Such findings further point towards the importance of reminders for daily rehabilitation and for keeping patients and caregivers motivated, addressing both the physical and communication challenges patients face.

4.2.6 SN6: The role of nutrition and hygiene in rehabilitation. Rehabilitation extends beyond physical therapy. Nutrition plays a vital role, providing the necessary nutrients and minerals to build muscle and support recovery [95]. One participant highlighted the importance of food, noting *" Family caregivers often see food as a minor issue, even though patients frequently need to return to the hospital due to food-related problems. These include choking, difficulty swallowing, dislodged NG tubes, and infections."* Another participant added, *"Food considerations, including the nutrients for patients in the intermediate stage, are essential for building muscle mass and replenishing minerals."* Daily self-care, including personal hygiene, is equally crucial with one participant emphasising *"Patient hygiene is very important, especially oral hygiene. If not done properly, the patient can aspirate, leading to lung infections. Relatives need to understand this. However, many hospitals don't have dentists available to provide guidance on this matter.* Our findings align with previous research that emphasises the importance of nutrition, noting that

it should be considered an integral part of stroke treatment due to its impact on caregiver burden and depression [23].

5 Phase Two: Social media content design

In this stage we developed video content tailored to the needs of Chiang Mai's CBR stakeholders we identified in Phase One. Video was selected for its ability to convey complex information visually and audibly, making it accessible and practical in rural areas with limited literacy and digital skills. Participants in Phase One highlighted the need for clear, repeatable instructions on tasks such as rehabilitation exercises, equipment use, and self-care routines. Videos provide an engaging medium that allows caregivers and patients to learn at their own pace, revisit content as needed, and gain confidence in managing rehabilitation leading to self sufficiency [76]. The choice of video was also driven by its scalability. Healthcare professionals in Phase One noted the strain of repetitive teaching in resource-constrained settings. Culturally relevant video guides could address this challenge by delivering consistent and accurate information, reducing the burden on healthcare workers while improving support for caregivers and patients [21, 76].



Figure 2: The sample video designs include:*(1) What is the Rehabilitation Phase?*; *(2) Demonstrating the Administration of Liquid Food Through Rubber Tubing*; and *(3) 6 Months: The Golden Period of Patient Recovery*

Video content development To ensure the videos addressed the needs identified in Phase One, the development process involved collaboration with experts and stakeholders. We conducted three face-to-face design workshops with 20 experts, including professionals from various fields: healthcare (nurses, doctors, occupational therapists, physical therapists, and a dental assistant), mass communication, media production, and HCI. The workshops aimed to define the details of the social media content (i.e., videos, photos, text, links), such as the storytelling approach, production specifics, and platform strategies. During these workshops key themes from the need-gathering phase (e.g., balanced caregiving, emotional struggles, navigation of financial systems, and proper equipment use) were translated into actionable and video ideas. Stakeholders also identified the most effective social media platforms (i.e., Facebook, YouTube, LINE, and TikTok) based on their popularity and cost efficiency in Thailand (see Figure 1 for first-page previews of the Facebook, YouTube, TikTok, and LINE platforms). Experts in media production and communication played a central role in shaping the content's storytelling approach and production details to ensure cultural relevance and clarity. This process ensured that the content aligned with stakeholder needs while remaining engaging and accessible. Through the workshops, four distinct video production styles were developed, each corresponding to different communication needs and production contexts, as detailed in Table 1, which outlines their formats, aligned stakeholder needs, and practical production considerations.

Video production. The video production process was tailored to reflect stakeholder needs and priorities. Scripts for videos were carefully further developed through additional research and interviews with subject matter experts, many of whom also served as video presenters. The scripts included detailed elements to guide the production process, such as: structured dialogue, storylines, visuals, props, camera angles, and location details (see Figure 2 for examples of video designs).

Presenter preparation and filming. Presenters were provided with scripts in advance, allowing time for preparation and adjustments to ensure the language was clear, simple, and concise. For healthcare professionals with limited on-camera experience, practice sessions were encouraged to help them deliver content confidently and naturally. Filming was conducted with stakeholder needs in mind, prioritising clarity and accessibility of the content delivered. During this process, photos and text were also created.

Multi-format content production. In addition to videos, we produced text, photos, and links to provide a well-rounded content package. Text posts summarised key information, while photos illustrated healthcare practices visually. Links to trusted resources were curated to provide audiences with additional learning opportunities. This multi-format approach ensured that stakeholders could access information in their preferred formats, enhancing overall accessibility and engagement.

Content approval process. In total, 30 videos were produced, grouped into four thematic categories, and accompanied by additional social media posts. All materials underwent a rigorous review process by the expert group from the design workshops, passing through several rounds of iterations to ensure they met the highest standards of accuracy, clarity, and relevance before final publication. This ensured consistency and maximised the impact of the content on diverse audiences.

6 Phase Three: CBR social media deployment and usage

6.1 Methodology

The deployment phase of our intervention ran for **five months** and aimed to actively engage users, provide relevant healthcare information, and address all stakeholder needs. This was achieved through a robust social media strategy and five promotional strategies that leveraged both online and offline media.

6.1.1 Social media deployment. We used the four primary platforms identified by experts in Phase Two (i.e., Facebook, YouTube, LINE, and TikTok) to share diverse content and interact with users:

- **Facebook:** A total of **86 original posts** were shared, including **30 video posts**, **27 text posts**, **22 photo posts**, and **7 link posts**. An additional **39 curated posts** featuring relevant content from government health pages and hospitals were shared. Posts were published **4–5 times per week** to maintain consistent engagement. The page was managed by a team comprising **one mass communication expert, one HCI expert, and two social media experts**. Questions

Table 1: Video production styles and stakeholder needs

Group	Production style	Aligned stakeholder needs	Details
Group 1	A healthcare professional explaining concepts, interspersed with video and photo footage, as well as stock footage.	SN2, SN3, SN4, SN6	This style focused on simplicity and efficiency. Filming was conducted in presenters' offices to avoid travel or complex setups, with production completed in 3–4 hours per video. Post-production added visuals to enhance engagement.
Group 2	A healthcare professional explaining and demonstrating with real patients.	SN4, SN5	These demonstration videos were more resource-intensive, requiring precise camera work and continuous filming with patients or actors. They provided hands-on guidance and practical knowledge but took 1–2 days to produce per video.
Group 3	Narrative voiceover with demonstration footage.	SN5	This style combined a narrative voiceover with video clips, stock footage, and images. It reduced production complexity and costs, but it lacked the personal touch of having a presenter on screen.
Group 4	Storytelling based on real-life patient experiences.	SN1, SN2	These videos used dramatic storytelling to inspire and educate. They required significant pre-production (e.g., story development, casting, and location scouting) and took 1–2 weeks per video to complete.

Table 2: Key performance indicators and feature available per platform

Metric	Facebook	YouTube	TikTok	LINE*
Impression (Number of times a piece of content was displayed to a target audience)	✓	✓	N/A	✓
Reach (Number of users exposed to a piece of content)	✓	✓	✓	✓
Engagement Number of interactions the piece of content received from user, including reactions, comments and shares)				
• Reaction (Like)	✓	✓	✓	N/A
• Comments	✓	✓	✓	N/A
• Shares	✓	✓	✓	✓
Other clicks (Information on how many times users clicked other elements of Facebook post, including Page title, links to 'See More')	✓	N/A	N/A	N/A

**LINE application uses different metrics: 'Impressions' refer to the number of times the menu was shown to users, while 'Reach' indicates the number of times the menu was clicked. So, there are no video analytics available to explain how users watch videos on LINE.*

received in comments or the inbox were addressed within **24 hours** by forwarding them to healthcare professionals via group chat.

- **YouTube:** We posted **30 videos** without a fixed schedule due to the production process, which required **1–2 weeks per video**. Videos were posted as soon as they were completed.
- **TikTok:** A total of **21 short videos** were shared, targeting a younger, mobile-savvy audience. Questions in comments were addressed in the same manner as on Facebook.
- **LINE:** A **menu** was created on the chat screen, providing: categorised video content, downloadable videos from other platforms, QR codes for each video, and a feature for locating nearby rehabilitation centres. Using LINE's **broadcast function**, push notifications were sent **three times a week** to promote new video content or remind users of existing content.

While the types of engagement and post formats varied across platforms, the core video content was largely consistent. The same 30 videos were shared across Facebook, YouTube, and LINE. TikTok featured shortened and edited clips from these same videos to match the platform's fast-paced, mobile-first style.

6.1.2 Promotional strategies. To expand our reach and encourage engagement, we implemented **five promotional strategies** using both online and offline approaches:

(1) **Hospital visits:** A mass media expert visited **six hospitals** and collaborated with healthcare professionals from **24 hospitals** specialising in CBR across Chiang Mai. During these visits, the social media intervention and its guidelines were presented, and **posters with QR codes** linking to our platforms were distributed.
(2) **Conferences and training events:** A physiotherapist specialising in rehabilitation presented the intervention at a

conference and a **training event** for healthcare professionals. The QR codes were included on presentation slides, accompanied by an explanation of the intervention's goals and content.

(3) **TV interview:** A physiotherapist and a mass media expert appeared on a **local TV channel**, providing a **one-hour interview** discussing the intervention. The **QR code** was displayed at the bottom of the screen throughout the broadcast.
(4) **Radio broadcasts:** Mass media experts participated in **radio interviews**, discussing the intervention and repeatedly mentioning its name. These interviews were also streamed on the radio station's **Facebook page**, which included direct links to the intervention's social media platforms.
(5) **Social media influencers:** Local social media influencers were hired to extend the reach of the intervention. **Facebook influencers** shared posts across platforms, and a **TikTok influencer** created a video highlighting the intervention.

6.1.3 Data collection and analysis. The deployment phase included systematic collection and analysis of performance data from all social media platforms. Metrics were extracted from the platforms' built-in analytics tools: Facebook Meta Business Manager, YouTube Analytics, TikTok Account Manager, and LINE Insights at the end of the deployment. Table 2 summarises the key performance indicators and their availability across platforms. Metrics like impressions, reach, engagement (reactions, comments, shares), and other clicks provided actionable insights into the impact of the intervention.

The data were analysed using descriptive statistics, offering a detailed breakdown of platform performance and user engagement. This analysis focused on three key areas: demographics, platform usage patterns, and cumulative metrics. Demographic analysis examined the age and gender distribution of platform users, providing insights into audience composition. Platform usage patterns were compared across Facebook, YouTube, TikTok, and LINE, including impressions, reach, engagement, and traffic sources, were assessed to evaluate the overall effectiveness of the intervention and its impact across platforms.

6.2 Results

6.2.1 Performance insights across social media platforms. An overview of our social media performance highlights key metrics across Facebook, YouTube, TikTok, and LINE, showcasing the platforms' distinct strengths in engaging audiences (Table 3). Facebook, with 731 followers, achieved 110,772 impressions, 94,658 reach, and 21,656 video views, accompanied by 3,362 reactions, 464 comments, and 716 shares. YouTube, with 959 subscribers, delivered 1,053,537 impressions, 54,943 views, 25 comments, and 1,728 shares. TikTok, with 567 followers, generated the highest total video views at 86,092, along with 43 comments and 341 shares. LINE, primarily focused on targeted engagement, recorded 16,211 impressions and 4,770 menu clicks.

Key metrics and engagement insights TikTok led in total video views (Table 3), demonstrating its strength in capturing quick, wide-reaching attention, while YouTube excelled in shares, reflecting its focus on video-centric content designed for wider distribution (Table 4). Facebook, despite the lowest video views, maintained the highest number of reactions (3,362) and comments (464), showcasing its ability to foster interactions between the community members. LINE recorded significant menu clicks (4,770) (Table 4), indicating targeted content consumption despite its limited visibility to broader audiences. Its focus on privacy and specific community outreach aligns with its role as a tool for direct communication rather than mass engagement.

Table 3: Total video views and LINE menu clicks

Metric	Facebook	YouTube	TikTok	LINE
Video views	21,656	54,943	86,092	N/A
Menu clicks	N/A	N/A	N/A	4,770

Table 4: Engagement (Facebook, YouTube and TikTok)

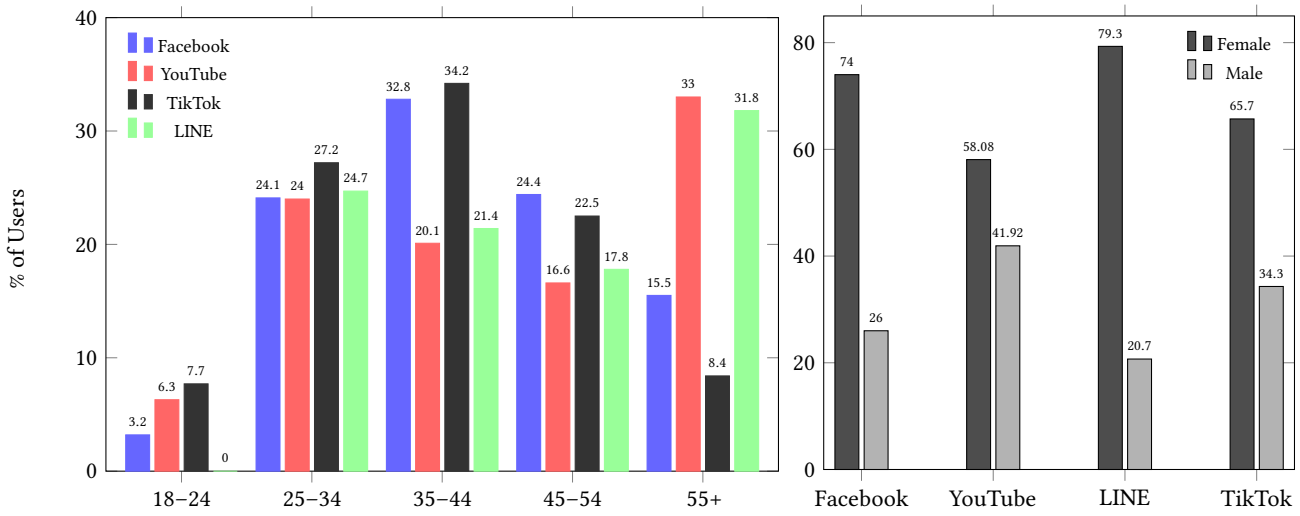
Metric	Facebook	YouTube	TikTok
Reactions	3,362	980	1,871
Comments	464	25	43
Shares	716	1,728	341

Reaching key audiences through multiple platforms

The results of our social media analysis highlight that our campaign reached and engaged key demographic groups (i.e., family caregivers, VHVs, and younger advocates), which aligns with the goals of CBR (see Figure 3). Importantly, women dominated engagement across all platforms, a significant deviation from global trends where men often represent a larger share of social media users, particularly on platforms like YouTube and Facebook [22, 54]. This suggests that our campaign resonated strongly with female stakeholders, who play critical roles in CBR.

LINE and YouTube were particularly effective in reaching older users, with 31.8% and 33.0% of their audiences, respectively, aged 55 and above (see Figure 3). This made them especially suitable for engaging middle-aged and older women. LINE's hyper-local focus, with 91.6% of users based in the region (see Figure 4), further strengthened its role in connecting caregivers and VHVs within local networks. Facebook, while more evenly distributed across age groups, maintained a strong presence among users aged 35–44 (32.8%), complementing the reach of LINE and YouTube. TikTok was also most popular among users aged 35–44 (34.2%). In contrast to the more locally focused platforms, TikTok expanded the campaign's reach to younger, urban audiences, disseminating educational content and raising awareness of CBR initiatives on a national scale.

6.2.2 The CRB social media ecosystem. To illustrate the complementary roles of different social media platforms in our CBR initiative, we propose an ecosystem metaphor. Each platform represents a distinct part of this system, contributing in different ways to the circulation of content and forms of participation. LINE serves as the root system, enabling trust-based, hyper-local engagement with caregivers and VHVs. Facebook acts as the trunk, connecting local



(a) Platform usage by age group. **(b) Platform usage by gender.**

Figure 3: Comparison of platform usage by age group (left) and gender (right).

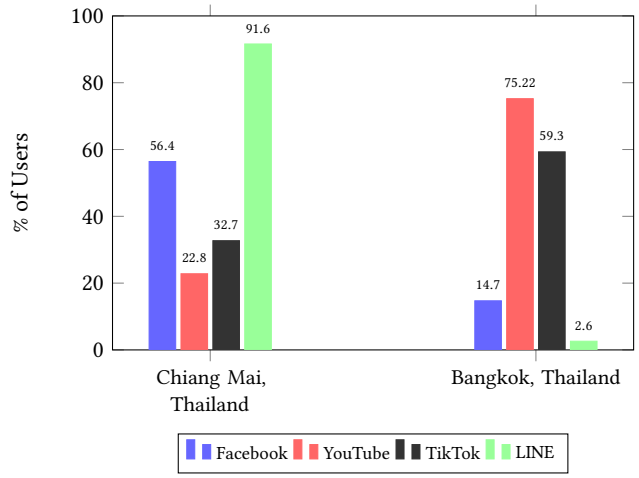


Figure 4: Comparison of platform usage in Chiang Mai and Bangkok, Thailand.

interactions with broader networks, while YouTube and TikTok function as branches and canopy, extending reach to wider audiences. TikTok captured quick attention through short-form content, while YouTube supported longer-form, instructional material more likely to be shared.

We use a tree metaphor to visualise the roles and relationships across the digital ecosystem supporting community-based rehabilitation. This framing highlights how different platforms contribute distinct forms of engagement – from trust-building at the roots to viral reach at the canopy – and how these layers connect stakeholders from caregivers to patients. We illustrate this conceptual model in Figure 5.

LINE as a root system for local support. LINE served as the root system of the CBR healthcare ecosystem, deeply embedded within the local community and enabling trust-based interactions. The platform's **hyper-local focus** (see Figure 4) ensured a robust connection to families, caregivers, and VHVs in Chiang Mai. LINE acted as a conduit for vital healthcare information, much like roots channel nutrients to sustain a tree's health. Through its ability to encourage **direct and immediate communication**, the platform informed local networks and strengthened the ties between community members and healthcare resources. This foundational role supported the dissemination of essential health knowledge while enabling a resilient, trust-based community network that upheld the broader goals of CBR.

In the context of Chiang Mai's rural population, LINE played a critical role in bridging modern healthcare practices with traditional beliefs and local values. The platform's success lay in its ability to deliver culturally embedded content, addressing the community's specific health concerns while respecting deeply rooted traditions. For instance, videos showcasing traditional *Thai medicine practices* were the most popular among users, reflecting the alignment between the community's health priorities and the information shared. This outcome echoes recommendations by the WHO to integrate culturally appropriate practices into health interventions, particularly in LMICs, where traditions and norms significantly influence health behaviours [69]. Furthermore, the high engagement with such content on LINE reflects findings by James et al. [41], who pointed towards the effectiveness of culturally tailored health interventions in LMICs. Their review illustrates how interventions adapted to local contexts, such as cognitive stimulation therapies in sub-Saharan Africa or multicomponent caregiver programs in Latin America, are more acceptable, feasible, and impactful. This alignment between community needs and the content shared on LINE is further evidenced by the platform's engagement patterns, as shown in Figure 6. LINE demonstrated steady engagement across

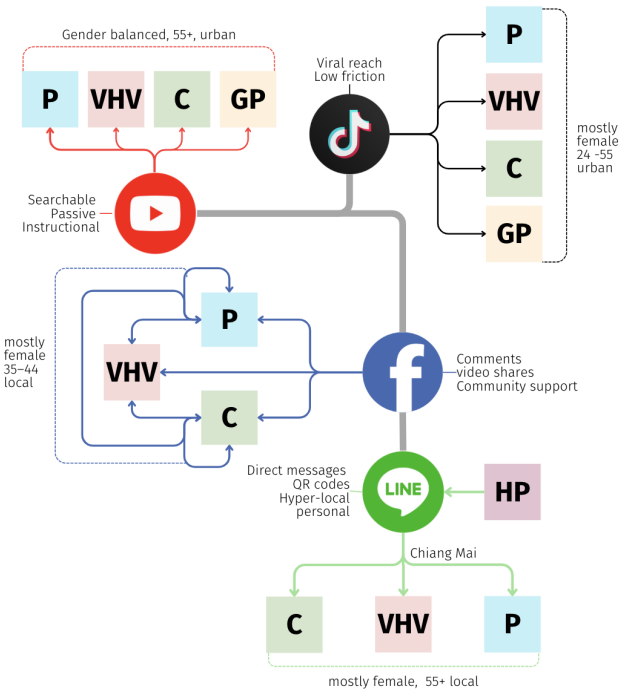


Figure 5: Diagram of the digital CBR ecosystem, illustrating platform-specific roles and flows of information among stakeholder groups in Chiang Mai. LINE (green) supports hyper-local, personal communication between healthcare professionals (HP), caregivers (C), village health volunteers (VHV), and patients (P). Facebook (blue) functions as a hub for community interaction and support through comments and video sharing. YouTube (red), with a gender-balanced and older urban audience, delivers long-form, instructional content accessed by caregivers, VHVs, patients, and the general public (GP). TikTok (black) provides short, viral content targeted at urban users aged 24–55, helping extend reach across all stakeholder groups. Arrows indicate primary flows of information and interaction across platforms and users.

a range of categories, with particularly high engagement in the *"General Knowledge"* category. This suggests that LINE was popular in delivering practical and culturally aligned health information that resonates with the local population. At the same time, its consistent presence across other categories reflects its versatility and capacity to meet a variety of health-related needs.

One of LINE's most effective strategies for linking healthcare resources with local communities involved **the use of QR codes**, which generated 55.91% of new followers (see Figure 7). This high rate of adoption can be credited to the Thai population's widespread familiarity with QR codes, as an outcome of government-led initiatives promoting digital payments and mobile services [13, 78]. By placing QR codes on hospital posters, displaying them at rehabilitation conferences, and incorporating them into mass media campaigns, LINE entered residents' daily routines. In addition, 35.48% of new followers joined through contacts shared by families and VHVs, highlighting the power of interpersonal networks in expanding LINE's user base. This trust-based word-of-mouth was highly effective at introducing new users to the platform (see Figure 8). Further analytics showed LINE's reliance on local, face-to-face interactions rather than purely digital promotion. These direct engagements leveraged the trust and credibility of healthcare professionals, aligning with findings that interpersonal skills and empathy significantly influence the uptake of healthcare recommendations [73]. Hospital visits further reinforced this approach, showing the importance of direct engagement in building trust. Meanwhile, external links from other social media accounted for only 6.18% of new followers, confirming that on-the-ground community outreach remained the primary driver of growth. Local television interviews also proved beneficial, allowing viewers to quickly scan on-screen QR codes and reinforcing the credibility of traditional media for healthcare communication [112]. By contrast, radio promotions saw limited success, suggesting that an audio-only medium did not effectively convert listener interest into actionable engagement. These findings align with research on the importance of trust, credibility, and personal connections in health interventions, where interpersonal networks amplify both the dissemination and impact of healthcare messages [75, 94].

Facebook: The trunk of the CBR healthcare ecosystem. If LINE served as the root system of the CBR ecosystem in Chiang Mai, Facebook acted as a trunk, connecting the grounded local engagement enabled by LINE with broader, more dynamic branches of interaction. As a platform, Facebook was instrumental in nurturing a sense of community, providing space for dialogue, and amplifying culturally resonant healthcare messages to a diverse audience. Its capabilities for video, text, photo, and interactive content positioned it as the central structure that supported and expanded the reach of our health communication initiative. For Facebook, traffic mainly came from page followers, followed by shares and recommendations on the home page. This result aligns with previous studies showing that social media followers often engage in interaction and support activities such as sharing [49].

Short videos under three minutes dominated engagement on Facebook, with a weighted share of 41.7%, highlighting users' preference for concise, actionable health information. Most popular videos belonged to Group 1 (see Table 1), demonstrating that the strategic combination of professional expertise and visually engaging content resonated strongly with rural audiences, many of whom had varying levels of health literacy. A standout example was the video on traditional *"Thai medicine techniques to alleviate constipation and swelling"*, which reached nearly 6,000 users, gathered over 500 reactions, received 112 shares, and attracted 73 comments. This video's success lay in its culturally familiar subject matter and in its ability to evoke trust through relatable, empathetic communication.

Facebook's content also demonstrated varying levels of engagement across different formats. Video posts achieved the highest reach at 39.94%, followed by photo posts (34.28%), text posts (14.67%), and link posts (8.11%). Remarkably, engagement patterns for our campaign deviated from typical social media trends, which often show steep declines in interactions after 24 hours [31]. Instead,

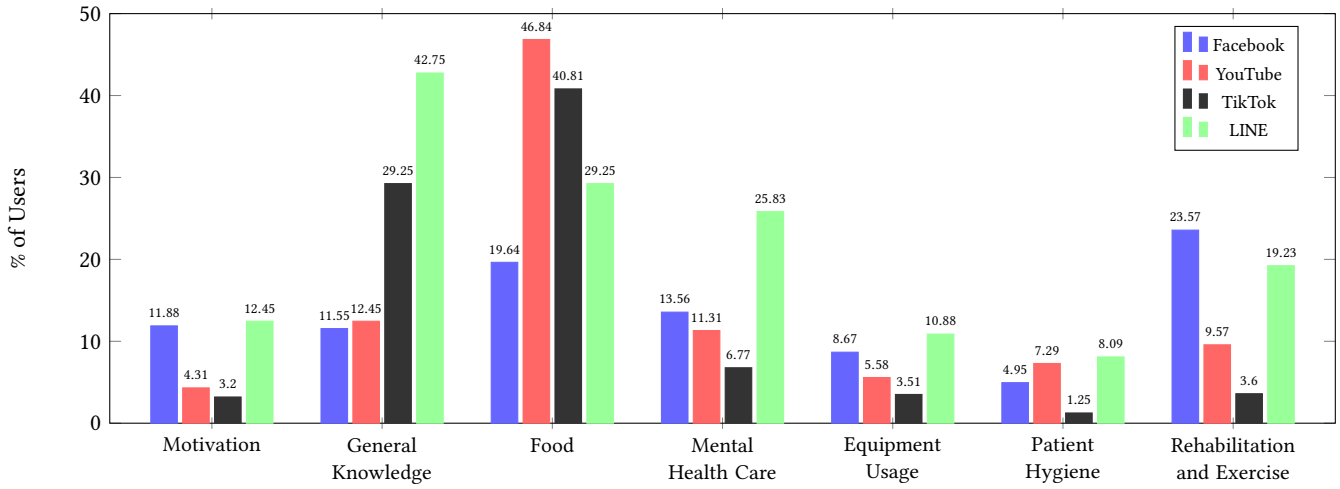


Figure 6: Comparison of user engagement across different categories and platforms.

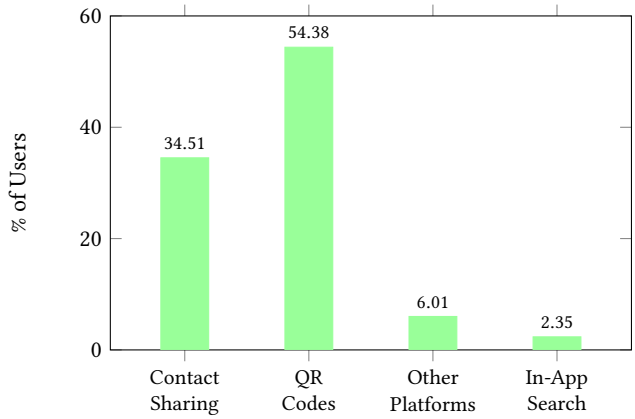


Figure 7: Distribution of methods used for adding friends on LINE.

posts on our Facebook page maintained consistent growth over time, with users continuing to discover and interact with older content well beyond its initial publication. This sustained engagement can be attributed to the alignment of content themes with audience needs through co-design, demonstrating Facebook's strength as a platform for enduring interaction. Furthermore, shorter videos under three minutes performed best, with a weighted share of 33.96%, showing the importance of concise, digestible formats.

Based on these findings, when resources are limited or video production is time-consuming, **photo posts could serve as an effective alternative for user communication**. This is particularly important in rural areas with constraints such as unreliable internet connections [8]. The rapid increase in reach within the first few hours, coupled with sustained engagement over several days, makes photo posts a time-efficient and practical strategy. Visual content like infographics on swallowing and speech exercises, for instance, reached over 6,500 users, often being saved and shared for offline use, highlighting the demand for visually accessible and practical resources that users could easily refer to.

Beyond the content itself, **Facebook enabled users to interact**. Videos addressing emotionally sensitive topics, such as mental health care, which accounted for 25.83% of user engagement, illustrated the platform's potential to build community support. For instance, *"Understanding the 5 Stages of Grief When Facing Loss"* resonated deeply, reaching over 5,000 users and generating 204 reactions, 32 shares, and 24 comments. A deeper look into Facebook's comment sections confirmed its unique strength in fostering supportive and interactive spaces for users. Among Facebook comments, 44.14% were long text comments where users shared personal experiences, expressed gratitude, or sought advice. Positive comments, making up 55.1%, often reflected appreciation for the content or motivational stories intended to inspire others. Conversely, 36.7% of comments expressed frustration with conditions or caregiving challenges, indirectly seeking community comfort and solidarity. Additionally, sticker comments (32.43%) and short text comments (19.82%) provided quick and accessible ways for users to engage. This created a ripple effect, where the video not only served as a source of guidance but also as a catalyst for collective healing and shared understanding. This level of interaction amplified the platform's role in disseminating information but also fostering an inclusive environment of mutual support, reflecting a key dynamic of community-based rehabilitation: the blending of professional guidance with grassroots support networks, which supports findings from the literature [80, 82].

YouTube: Wide-scale learning in the CBR framework. YouTube functioned as the canopy of the CBR healthcare ecosystem, offering a platform for expansive reach and in-depth, educational content. It excelled in delivering **detailed instructional material** tailored to the needs of caregivers and patients, particularly through its capacity for long-form videos. Food-related content dominated on YouTube, capturing 46.84% of engagement (Figure 4). Tutorials

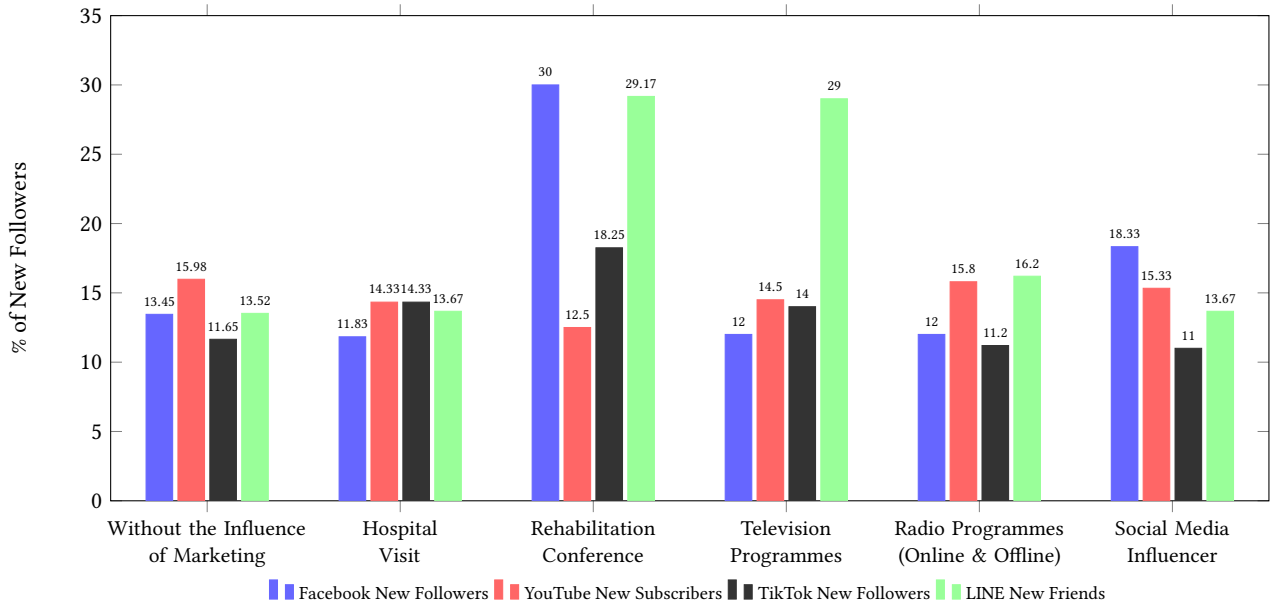


Figure 8: Comparison of new followers/subscribers gained through different marketing channels across platforms.

like *"Feeding Through a Tube"* were particularly popular, addressing practical challenges caregivers face through clear, step-by-step guidance.

The platform's ability to meet user needs was evident in the high viewership of videos on muscle weakness and nutrition. For instance, *"Food for Patients with Muscle Weakness"* getting over 21,000 views, providing dietary advice for individuals with low muscle mass, while *"How Does Muscle Weakness Occur? Who Is at Risk?"* attracted 8,152 views, offering insights into symptoms, risks, and recovery strategies. These examples highlight YouTube's role in addressing general health concerns with actionable and accessible information, extending the reach of CBR initiatives beyond culturally specific contexts.

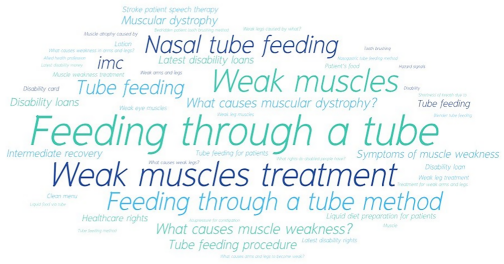


Figure 9: YouTube search keywords word cloud

YouTube's algorithm also played a critical role in driving engagement, with 90.5% of views originating from recommendations and homepage suggestions. Only 5.49% of views came from subscribers, illustrating how **YouTube's personalised discovery features amplify content visibility to new audiences**. External traffic sources, such as LINE (47.42%) and Facebook (20.44%), also funnelled viewers to YouTube. Google searches accounted for 22.35% of views, benefiting from Thailand's widespread use of the search engine [47]. Interestingly, **viewers arriving through Google demonstrated high retention rates** (70.41%), suggesting that search-based discovery aligns well with user intent for specific healthcare topics. YouTube analytics revealed that users often discovered videos through simple, layman-friendly search terms rather than medical jargon, as seen in the word cloud analysis (Figure 9). This aligns with previous studies suggesting that healthcare information is more accessible and engaging when presented in plain language [50]. For example, users searched for straightforward phrases like "feeding through a tube", showing the importance of tailoring content and hashtags to the linguistic and cognitive preferences of a general audience.

TikTok: Engaging the next generation of health advocates. TikTok served as the sprouting element of the CBR healthcare ecosystem, leveraging its dynamic and engaging format to introduce healthcare content to younger, urban audiences. With its emphasis on short-form videos, TikTok became an effective platform for simplifying complex health topics and driving immediate user engagement.

TikTok excelled in *general knowledge* and *food-related content*, which accounted for 47.81% and 43.81% of engagement, respectively (Figure 6). For example, a video titled *"If you have these symptoms, check immediately – they may be warning signs of a stroke"* achieved significant traction, with 29,494 views, 697 likes, and 139 shares. This highlights TikTok's strength in **delivering urgent, bite-sized health messages** that resonate with its fast-paced audience. Similarly, videos addressing muscle maintenance and nutrition performed well, with one video reaching 22,256 views. This shows TikTok's ability to distil actionable healthcare information into concise, engaging formats.

The platform's user-driven discovery mechanisms was also important in engagement. Unlike YouTube and Facebook, TikTok's search functionality was a key traffic source, with users actively seeking health-related information despite healthcare not ranking among the top 100 search terms in Thailand [96]. This suggests a **growing demand for accessible healthcare content** tailored to TikTok's short, visually compelling style. Videos that adapted longer educational content from other platforms into TikTok-friendly formats, such as quick tips or summarised tutorials, captured audience attention and broadened the reach of CBR initiatives. TikTok was also suited for informal learning and quick sharing amplified its impact. Users frequently interacted with content through likes, shares, and comments, creating a ripple effect of awareness. The platform's focus on ultra-short videos (**58.3% of engagement for videos under 45 seconds**) underscores the importance of brevity and clarity in capturing user interest.

7 Discussion

This study explored how a multi-platform social media intervention can support CBR for stroke survivors and their caregivers in a low-resource setting. Through the co-design and distribution of culturally resonant health content across LINE, Facebook, YouTube, and TikTok, we engaged diverse audiences and demonstrated how different platforms can play complementary roles in caregiver support and health communication. While engagement metrics provided insight into reach and uptake, they also highlighted the need for more inclusive, adaptable, and sustained approaches to digital health delivery.

Based on these findings, we present a set of design opportunities aimed at supporting future interventions that are accessible, community-led, and embedded in local contexts. These directions emphasise the importance of platform specificity, stakeholder involvement, and long-term sustainability in the development of inclusive digital health ecosystems.

7.1 Designing for reach, inclusion, and long-term engagement

In 2024, over 18,000 patients with stroke were discharged for home-based rehabilitation in Chiang Mai Province (see data in Section 2.4.1), each likely supported by at least one informal caregiver. While our intervention generated over 240,000 interactions across LINE, Facebook, YouTube, and TikTok, these analytics – views, reactions, and clicks reflect platform engagement rather than individual reach or impact. From a design perspective, this highlights the need to critically evaluate what digital metrics can (and cannot) reveal about caregiver participation, confidence, or behaviour change. These figures offer useful signals of attention and interaction, but do not capture outcomes. While our study focused on platform metrics, research in adjacent domains such as remote music performance has combined analytics with interviews to better understand how users create meaning and connection through digital interactions [79]. These findings highlight the need for rehabilitation platforms not only to measure engagement, but to support more expressive, socially meaningful forms of participation.

To support low-connectivity contexts, we enabled the use of LINE's offline video download feature, allowing both family caregivers and VHVs to access content without requiring constant internet access. Facebook materials were also adapted into printed infographics and distributed through local health networks. In many households, younger family caregivers or VHVs supported older adults in navigating digital content. However, it remains unclear how many users accessed materials offline or shared them informally. This underscores a persistent design challenge: ensuring digital inclusivity not just at the interface level, but across infrastructural, social, and economic divides. Future design work must account for these layers if it hopes to reach those most in need.

Sustainability also emerged as a key consideration in designing for long-term engagement. Rather than viewing our intervention as a one-time deployment, we aimed to seed tools and practices that could be adapted and sustained locally. Our ongoing collaborations with health authorities and hospitals reflect this intent: several institutions now actively promote the content within their networks, and some have begun developing their own digital materials inspired by our approach. These forms of distributed stewardship, where ownership is shared across communities and institutions, suggest promising directions for designing resilient, adaptable ecosystems for community-based care.

7.2 Design with and for local trust networks

Our findings underscore the importance of designing CBR interventions that are grounded in local trust networks, especially in resource-limited settings. Insights from our design workshops reaffirm the value of participatory, user-centred approaches that adapt interventions to culturally embedded caregiving structures. This goes beyond cultural and socioeconomic sensitivity; it involves recognising the deeply relational nature of caregiving and understanding how trust is distributed among family members, VHVs, and community leaders. The six core needs (SN1–SN6) identified in our study illustrate how trust intersects with caregiving dynamics, financial stress, and social norms (SN1, SN3), particularly for women, who shoulder a disproportionate burden of care. These findings support broader calls for co-creation models that integrate traditional, interpersonal practices and local health actors [62, 89]. Recognising family structures and prevailing attitudes toward disability can foster community buy-in and build the trust necessary for long-term intervention uptake. Participants also highlighted psychological and emotional challenges (SN2), pointing to the need for care infrastructures that support not just physical rehabilitation but also emotional well-being. This aligns with Community-Based Participatory Research approaches that prioritise stakeholder voice and trust as foundations for sustainable, locally relevant solutions [1].

7.3 Design for cultural resonance

The engagement with our campaign shows the importance of embedding cultural relevance in the design of CBR content, extending beyond language to encompass traditions, values, and local practices. During the needs gathering workshops, stakeholders expressed a strong connection to materials that reflect their cultural identity, such as Thai Traditional Medicine, a holistic system

rooted in Buddhist principles, indigenous knowledge, and supernatural beliefs. Culturally resonant videos, particularly those featuring traditional health practices, proved highly effective in capturing attention and sustaining engagement – especially on LINE and Facebook, where they drove higher levels of exploration (e.g., "Other Clicks").

To ensure inclusivity and accessibility, our approach prioritised simple, clear language while embedding cultural familiarity through content design. For instance, while Chiang Mai's linguistic diversity includes the Northern Thai dialect, we opted for a simplified language approach tailored to the audience's comprehension levels. This decision aligns with studies showing that straightforward, culturally adapted communication improves health literacy and engagement, particularly in rural or resource-limited settings [17, 97].

Cultural resonance also extended to narrative structure and emotional tone. Videos framed with empathy and respect for local traditions resonated more deeply, reinforcing prior findings that content grounded in core community values is more likely to engage and sustain attention. These insights point to the importance of culturally inclusive design in building trust, relevance, and emotional connection with diverse users.

7.4 Design for gender equity in caregiving

Our findings highlight the disproportionate role of women as primary caregivers in rural Thailand, aligning with broader caregiving norms in similar contexts [106]. While this gendered caregiving dynamic has been extensively studied in maternal health [52, 90], it is often overlooked in rehabilitation. Women caregivers face multifaceted challenges, including financial constraints, societal expectations, and limited access to healthcare services [30]. To address these disparities, CBR interventions must provide resources that specifically support female caregivers, offering practical tools to ease their burden and strategies to manage the physical and emotional demands of caregiving.

At the same time, our content analysis revealed gaps in addressing gender dynamics within caregiving roles. For example, a video featuring a male caregiver received low engagement, reflecting the cultural norm that caregiving is primarily a female responsibility. This suggests that interventions must not only cater to women's needs but also challenge entrenched gender roles. Evidence shows that designing culturally relevant programmes tailored for men can increase their participation, particularly when interventions highlight practical benefits and leverage social endorsement [37, 92]. Incorporating men into caregiving practices requires thoughtful content design, such as narratives that normalise male involvement and promote equitable caregiving responsibilities. Additionally, government and community-led initiatives can play a critical role in fostering male participation [84]. Collaborating with women-led organisations to advocate for shared caregiving responsibilities and integrating such messages into digital content could encourage more inclusive caregiving practices. For example, featuring stories of male caregivers successfully managing rehabilitation tasks or emphasising the collective benefits of shared responsibilities may help shift cultural perceptions and reduce the caregiving burden on women.

7.5 Tailored social media platforms and marketing strategies to disseminate CBR content

In line with broader work on cross-platform engagement for healthcare [19, 29, 42, 91], our findings show that each platform serves a distinct purpose in supporting CBR. By strategically pairing communication methods with user needs, we were able to expand reach and nurture meaningful community involvement. This approach aligns with evidence that platforms differ substantially in their audience characteristics, content formats, and interaction styles [12, 56].

LINE and Facebook for localised communication. In Thailand, LINE's menu-based design and private chat channels provided an approachable way to engage caregivers, VHVs, and patients. Our data suggest that these trust-based networks are crucial in underserved regions, as they encourage personal connections and enhance credibility. Facebook supports a broader discussion-based model, enabling users to share experiences, pose questions, and offer emotional support –important for countering caregiver isolation [91].

YouTube and TikTok for broader and rapid engagement. While LINE and Facebook anchor local interactions, YouTube and TikTok offer additional advantages. YouTube allows for comprehensive instructional videos (e.g., on exercises and tube-feeding techniques), easing the shortage of on-site professionals in low-resource settings [67]. TikTok, meanwhile, caters to rapid and visually dynamic messages, which can spark awareness among younger or tech-savvy audiences. Brief, compelling clips may motivate preventative or rehabilitative actions, even with minimal initial investment in time or data [19].

Beyond platform selection, our experiences underscore the importance of matching content complexity to format, so that shorter, direct messages are used on fast-paced channels (e.g., TikTok) while more comprehensive demonstrations appear on YouTube. This range of content can be reinforced through a blend of offline strategies, such as health fairs or clinic visits, ensuring that people with limited digital access are still reached. Bringing local stakeholders on board, by displaying QR codes, offering in-person demos, and inviting healthcare workers to validate the intervention, helps tackle concerns about content reliability and fosters grassroots endorsement [29, 75].

Through elements of local culture, such as traditional Thai practices, one can further strengthen acceptance, encouraging word-of-mouth sharing in private or semi-private spaces (e.g., LINE chat groups) and complementing broader online discussions on Facebook [91]. Continual adaptation is also pivotal: collecting feedback from community members and examining user engagement metrics (e.g., viewing duration) can reveal areas where additional content or clarification is required. Although our approach was shaped by experiences in rural Thailand, the core principles, carefully chosen platforms, locally relevant content, and the union of digital and offline outreach remain highly adaptable across different LMIC contexts with comparable resource constraints and cultural norms.

7.6 Limitations

While our study demonstrates the potential of social media to enhance CBR, it also has several limitations that should be considered when interpreting the findings and planning future work.

Generalisability. This study was conducted in rural Chiang Mai, Thailand, and its findings reflect the cultural, infrastructural, and platform-specific dynamics of that setting. Differences in digital habits, health systems, and caregiving structures may limit direct transferability to other contexts. Rather than aiming for broad generalisability, the study offers situated insights that can inform adaptation and design in comparable low-resource settings.

Metrics focused on engagement. Our evaluation relied on platform analytics such as impressions, reach, and engagement (e.g., comments and shares). While these metrics provide insights into user activity, they do not measure behavioural changes, caregiving improvements, or patient outcomes. Future work should include longitudinal studies, surveys, or interviews to assess the intervention's broader and long-term impact.

Digital accessibility. Although the intervention was delivered via widely adopted platforms and included options for offline access (e.g., downloadable content via LINE), the study could not assess how effectively these features addressed access barriers. It remains unclear how many caregivers used offline materials or whether digital disparities like limited connectivity or low digital literacy still excluded some participants.

Deployment period. The intervention was deployed over five months, which limited our ability to assess its long-term impact. Sustained behavioural changes and the scalability of the intervention require further evaluation over an extended period. Longer deployment and follow-up studies could provide a clearer picture of the intervention's lasting effects.

8 Conclusion

This study illustrates how social media can be used to support CBR in low-resource settings by aligning with stakeholder needs through accessible, culturally grounded, and community-driven content. By adapting widely used platforms like Facebook, YouTube, TikTok, and LINE, we engaged diverse audiences and extended the visibility of essential rehabilitation resources. Our approach demonstrates how existing tools can be creatively repurposed to complement traditional CBR systems. The findings highlight the importance of co-design, cultural relevance, and local health infrastructure in shaping effective digital interventions. Future work should explore how these strategies might be adapted across different contexts and assess longer-term outcomes. We offer this work not as a universal model, but as an example of how digital technologies, when grounded in local realities, can contribute to more inclusive and sustainable forms of community healthcare.

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