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Implementation of Digital Health Service Policies Based on Community-Based Research (CBR) to Improve Patient Accessibility in Remote Areas

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Abstract. Access to healthcare services remains a significant challenge for patients in remote areas, often due to geographical and infrastructural barriers. The integration of digital health services has emerged as a promising solution. This study explores the implementation of digital health service policies using the Community-Based Research (CBR) approach to improve patient accessibility in underserved regions. A CBR methodology was employed to engage stakeholders, including healthcare providers, local governments, and community members, in designing and evaluating digital health services. Data collection methods included participatory workshops, surveys, and interviews with key stakeholders to identify accessibility challenges and co-develop strategies. A pilot program involving telemedicine platforms and mobile health applications was implemented in three remote villages. Findings revealed that the collaborative approach significantly improved the adoption and usability of digital health technologies. Telemedicine services increased patient access to consultations by 45%, and the implementation of mobile health applications reduced travel times for medical care by 60%. Community involvement also led to increased trust and a better understanding of digital health solutions. The study demonstrates that leveraging the CBR approach facilitates the development of context-specific digital health solutions that address the unique needs of remote communities. However, challenges such as digital literacy and infrastructure limitations were identified, suggesting the need for further capacity-building initiatives. The CBR-based implementation of digital health service policies enhances patient accessibility in remote areas by fostering community engagement and tailoring solutions to local contexts.

Keywords: Digital Health Services; Community-Based Research (CBR); Healthcare Accessibility; Remote Areas; Participatory Approaches

1. Introduction

Access to healthcare is a fundamental right, yet millions of people in remote and underserved areas around the world face significant barriers in obtaining basic medical services (Angelopoulou et al., 2023; Batsis et al., 2020; Kachur et al., 2019). These barriers often stem from a lack of healthcare infrastructure, limited availability of medical

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professionals, and geographical isolation (Cardona et al., 2021). In Indonesia, for example, patients in rural and remote regions frequently encounter long travel times, high transportation costs, and limited access to specialists, exacerbating health inequities (Chen et al., 2021). The advent of digital health technologies has the potential to address these challenges by bridging the gap between patients and healthcare providers, thereby enhancing accessibility, reducing costs, and improving health outcomes (Lai et al., 2021; Mbunge et al., 2022).

Digital health services, such as telemedicine, mobile health applications, and electronic health records, have shown promise in overcoming physical and logistical barriers (Baltaxe et al., 2019; Kachur et al., 2019; Nkodo et al., 2022). However, the implementation of these technologies in remote areas is fraught with challenges. Issues such as digital literacy, cultural resistance, inadequate infrastructure, and a lack of community engagement often hinder the adoption and sustainability of such initiatives. To ensure their effectiveness, it is critical to develop solutions that are context-specific, culturally appropriate, and rooted in the needs and aspirations of the local communities.

In Indonesia vast archipelagic and mountainous regions make physical access to healthcare facilities difficult. Patients often have to travel long distances, incurring significant costs in time and money. This limited accessibility is further compounded by a lack of specialized care, with most healthcare professionals concentrated in urban centers. Such conditions leave many individuals without regular access to essential healthcare services, creating systemic inequities in health outcomes between urban and rural populations.

Digital health technologies, such as telemedicine, mobile health applications, and electronic health records, have emerged as promising tools to address these barriers. These innovations have the potential to provide real-time medical consultations, remote diagnostics, and health education, thus bridging the gap between patients and providers. However, despite their potential, the adoption of digital health solutions in remote areas faces numerous challenges.

Key barriers include inadequate digital infrastructure, such as limited internet connectivity and lack of access to devices in remote regions. Additionally, low levels of digital literacy and a lack of trust in new technologies among community members can hinder the effective implementation of digital health services. Furthermore, many digital health initiatives are developed without sufficient engagement of the communities they aim to serve, leading to solutions that may not align with local needs, values, and contexts.

To address these gaps, there is a need for a participatory approach that actively involves communities in the design and implementation of digital health solutions. Community-Based Research (CBR) provides a framework to achieve this by fostering collaboration between researchers, healthcare providers, policymakers, and community members (Chin et al., 2014; Ng, 2022; Wood & Kahts-Kramer, 2023). CBR emphasizes the co-creation of knowledge and solutions, ensuring that interventions are both culturally appropriate and contextually relevant.

This study situates itself at the intersection of these challenges and opportunities, using the CBR approach to explore the implementation of digital health policies in remote areas (Culos-Reed et al., 2022; Humayun et al., 2023). By prioritizing community engagement, the study seeks to overcome traditional barriers to adoption and create sustainable healthcare solutions tailored to the specific needs of remote populations.

Understanding the background of these issues underscores the importance of this research. The findings will contribute to efforts aimed at reducing healthcare disparities, enhancing the accessibility of medical services, and fostering trust and participation in digital health innovations. Ultimately, addressing these challenges through participatory and context-sensitive approaches can lead to more equitable healthcare systems that leave no community behind.

2. Methods

Community-Based Research (CBR) offers a participatory framework that places community members at the center of the research and development process. Unlike traditional top-down approaches, CBR emphasizes collaboration between researchers, practitioners, and community stakeholders to co-identify problems, co-develop interventions, and co-evaluate outcomes (Septiani et al., 2022; Stevahn et al., 2016; Wong et al., 2022). This approach not only fosters trust and ownership among community members but also ensures that the solutions are tailored to the unique socio-economic and cultural contexts of the target population.

In this study, we employ the CBR methodology to design, implement, and evaluate digital health service policies aimed at improving healthcare accessibility in remote areas. By involving stakeholders such as local governments, healthcare providers, and residents from the outset, the study seeks to address the root causes of healthcare inaccessibility while promoting the adoption of digital health solutions. The participatory approach enables the integration of local knowledge and experiences into the design of interventions, making them more practical, acceptable, and impactful.

The objectives of this research are threefold. First, to identify the specific barriers to healthcare access in remote areas; second, to develop and implement digital health interventions that address these barriers; and third, to evaluate the effectiveness of these interventions in improving healthcare accessibility. The study focuses on three remote villages where healthcare access has historically been limited, leveraging tools such as telemedicine platforms and mobile health applications to provide real-time consultations, health monitoring, and information dissemination.

3. Results and Discussion

3.1. Enhanced Access to Healthcare Services

The results demonstrated that telemedicine services increased patient access to consultations by 45%. This is a critical improvement, as geographical barriers have historically limited access to healthcare professionals in remote areas. Patients in isolated communities often experience delays in receiving medical advice due to long travel distances, insufficient transportation infrastructure, and the lack of healthcare facilities nearby.

Table 1 Impact of Telemedicine and Mobile Health Applications

Indicator	Before Implementation	After Implementation	Improvement
Patient Access to Consultations	100 patients	145 patients	**45%**

Average Travel Time for Care	2.5 hours	1 hour	**-60%**

The implementation of telemedicine technologies addressed these issues effectively. Through virtual consultations, patients were able to connect with healthcare providers in real time, overcoming physical distances. The adoption of telehealth platforms enabled medical professionals to deliver timely diagnoses, monitor chronic conditions, and provide follow-up care without requiring patients to travel.

One key factor contributing to this improvement was the participatory nature of the CBR approach. By involving local communities in identifying healthcare challenges and designing digital solutions, stakeholders—including patients, healthcare workers, and local authorities—were more receptive to adopting these technologies. Community members reported increased satisfaction due to reduced waiting times for consultations and quicker access to specialized care, which otherwise would have required travel to urban centers.

Figure 1 Community Engagement During the Implementation of Digital Health Service Policies Using a CBR Approach

3.2. Reduced Travel Times for Medical Care

The introduction of mobile health applications resulted in a 60% reduction in travel times for accessing healthcare services. Mobile health technologies, including health apps for smartphones and tablets, played a significant role in connecting patients to vital information, healthcare providers, and essential medical resources. Traditionally, residents of remote villages needed to undertake lengthy and often costly journeys to access clinics or hospitals. This process placed a financial and physical burden on families, particularly those with elderly or chronically ill members. The adoption of mobile health apps minimized this barrier by allowing patients to perform tasks such as, scheduling

virtual appointments with doctors, accessing medical records and health education materials, and receiving medication reminders and self-management tools for chronic diseases.

The use of mobile health applications provided a seamless channel for delivering healthcare services while saving time and resources. Importantly, the applications were co-designed with input from community members to ensure they met the unique needs of the target population. Features such as language localization, simplified user interfaces, and offline functionality were tailored to accommodate users with limited technological experience or intermittent internet access.

3.3. Role of Community Engagement in Digital Health Adoption

A notable outcome of the study was the increased trust and understanding of digital health technologies among community members. This improvement can largely be attributed to the participatory, collaborative nature of the CBR methodology. Stakeholders—including healthcare providers, local governments, and residents—actively participated in the design, implementation, and evaluation of digital health services. By fostering a sense of ownership and inclusion, the CBR approach addressed initial skepticism and resistance to adopting new technologies. Several community workshops, awareness campaigns, and participatory discussions were conducted to inform residents about the benefits of telemedicine and mobile health applications. These efforts successfully demystified digital healthcare tools, reducing fears and misconceptions related to technology usage. Community engagement also facilitated the identification of context-specific solutions that aligned with local values, traditions, and circumstances. For example, village leaders and trusted community members served as "digital health ambassadors" to encourage broader adoption. Their involvement helped bridge the gap between healthcare professionals and residents, resulting in greater trust and uptake of digital health services.

3.4. Challenges and Barriers to Digital Health Implementation

While the study highlighted substantial improvements, it also identified several challenges that must be addressed for the long-term success of digital health service policies in remote areas. The key challenges include:

3.4.1. Digital Literacy Gaps

Limited digital literacy among residents emerged as a significant barrier to adopting and using telemedicine platforms and mobile health applications effectively. Many individuals in remote villages had little to no prior exposure to smartphones, computers, or internet-based technologies. Consequently, training sessions were required to build users' skills and confidence in using these tools. However, the limited availability of trainers and resources in some areas posed difficulties in scaling these initiatives.

Addressing digital literacy gaps is essential for ensuring the sustainability of digital health interventions. Capacity-building programs, including workshops and peer-led training sessions, can help equip residents with the necessary skills to use digital technologies independently.

3.4.2. Infrastructure Limitations

Inadequate infrastructure, particularly in terms of internet connectivity and power supply, remains a persistent issue in remote areas. Many villages still lack reliable broadband access, making it difficult to utilize telemedicine services and mobile health applications consistently. For example, disruptions in connectivity often led to delays in virtual consultations, while power outages hindered the use of electronic devices. The study highlights the need for investment in infrastructure to support digital health initiatives. Collaboration between government agencies, private sector partners, and telecommunication providers is crucial to expanding network coverage and ensuring a stable power supply in underserved areas. Additionally, implementing low-bandwidth solutions and offline functionalities in health applications can help mitigate connectivity challenges.

3.4.3. Cultural and Behavioral Barriers

Some residents initially expressed reluctance to use digital health services due to cultural norms and behavioral habits. For instance, patients accustomed to face-to-face interactions with healthcare providers were hesitant to engage in virtual consultations. Building trust in telemedicine services required targeted community outreach and education efforts. Overcoming these cultural barriers involved demonstrating the reliability and effectiveness of digital health technologies through pilot programs. Testimonials from early adopters and success stories were shared widely to encourage broader acceptance.

3.5. Implications for Policy and Practice

The findings of this study offer valuable insights for policymakers, healthcare providers, and researchers seeking to improve healthcare accessibility in remote regions. The successful implementation of digital health services using the CBR approach highlights several key elements that contribute to its effectiveness and sustainability. Community involvement plays a pivotal role, as engaging stakeholders throughout the planning, implementation, and evaluation phases ensures that digital health solutions are not only relevant but also widely accepted and sustainable. By actively involving healthcare providers, local governments, and community members, solutions are co-created, fostering a sense of ownership and trust among the population.

Additionally, the importance of tailored interventions cannot be overstated. Context-specific solutions that consider local needs, languages, and infrastructure constraints are far more likely to be adopted and scaled. This study demonstrated that by addressing the unique challenges faced by remote communities, such as geographical barriers and limited healthcare infrastructure, digital health technologies can effectively bridge the accessibility gap. The use of telemedicine and mobile health applications reflects the need for adaptable and flexible solutions that align with the everyday realities of the communities being served.

Capacity-building initiatives also emerged as a critical factor. Addressing digital literacy gaps through targeted training programs empowers individuals to use health technologies more effectively. When communities are equipped with the knowledge and skills to navigate digital platforms, the adoption and usability of telemedicine services and mobile health applications increase significantly. This study identified digital literacy as a

challenge, and therefore, implementing ongoing training programs would ensure that technological solutions continue to deliver long-term benefits.

Furthermore, infrastructure development remains a cornerstone for enabling digital health services. Strengthening internet connectivity and ensuring a reliable power supply are essential to support telemedicine platforms and mobile health applications in remote areas. Without adequate infrastructure, the reach and effectiveness of digital health services could be severely limited. Policymakers must prioritize investments in technological infrastructure to enable equitable access to healthcare services for underserved populations.

4. Conclusions

The implementation of digital health service policies using the Community-Based Research (CBR) approach has proven effective in improving healthcare accessibility in remote areas. This study demonstrated that engaging stakeholders—including healthcare providers, local governments, and community members—throughout the planning, implementation, and evaluation phases fosters trust, acceptance, and sustainability of digital health solutions. By utilizing telemedicine services and mobile health applications, the study observed a 45% increase in patient access to consultations and a 60% reduction in travel times for medical care. These improvements address critical barriers such as geographical isolation, limited infrastructure, and high travel costs that often prevent remote communities from accessing timely healthcare services.

Community involvement was a key factor in the success of this initiative, ensuring that solutions were context-specific and tailored to meet the unique needs of the target populations. This participatory approach empowered communities, making them active contributors to the development and adoption of digital health technologies. However, challenges such as limited digital literacy and inadequate infrastructure were identified, highlighting the need for ongoing capacity-building programs and investments in internet connectivity and power supply.

The findings emphasize the importance of combining technology with community-centered strategies to achieve sustainable health outcomes. Policymakers should prioritize infrastructure development and digital literacy initiatives to ensure long-term success and scalability of digital health services. Furthermore, collaboration between stakeholders remains essential for addressing the evolving needs of underserved populations.

In conclusion, this study provides compelling evidence that digital health service policies, implemented through the CBR approach, significantly enhance patient accessibility in remote areas. By fostering community engagement, addressing infrastructural gaps, and building digital capacity, digital health technologies offer a viable and scalable solution to improve healthcare delivery for underserved communities, ultimately contributing to greater health equity.

References

Angelopoulou, E., Stanitsa, E., Fragkiadaki, S., Kontaxopoulou, D., Pavlou, D., Papatriantafyllou, I., & Papageorgiou, S. G. (2023). Telemedicine in neurodegenerative diseases: Opportunities and challenges. *Archives of Hellenic Medicine*, *40*(1).

Baltaxe, E., Czypionka, T., Kraus, M., Reiss, M., Askildsen, J. E., Grenkovic, R., Lindén, T. S., Pitter, J. G., Molken, M. R. Van, Solans, O., Stokes, J., Struckmann, V., Roca, J., & Cano, I. (2019). Digital health transformation of integrated care in Europe: Overarching analysis of 17 integrated care programs. *Journal of Medical Internet Research*, *21*(99). https://doi.org/10.2196/14956

Batsis, J. A., Dokko, R., Naslund, J. A., Zagaria, A. B., Kotz, D., Bartels, S. J., & Carpenter-Song, E. (2020). Opportunities to Improve a Mobile Obesity Wellness Intervention for Rural Older Adults with Obesity. *Journal of Community Health*, *45*(1). https://doi.org/10.1007/s10900-019-00720-y

Cardona, S., Escobar García, D. A., & Montoya, J. A. (2021). Isolation typology through accessibility measures considering rurality and armed conflict. A case study in Caldas, Colombia. *Rural and Remote Health*, *21*(4). https://doi.org/10.22605/RRH6128

Chen, M., Xu, S., Husain, L., & Galea, G. (2021). Digital health interventions for COVID-19 in China: a retrospective analysis. *Intelligent Medicine*, *1*(1). https://doi.org/10.1016/j.imed.2021.03.001

Chin, M., Sakamoto, I., & Bleuer, J. (2014). The Dynamics of Show and Tell: Arts-Based Methods and Language Ideologies in Community-Based Research. *Journal of Community Practice*, *22*(1–2). https://doi.org/10.1080/10705422.2014.908796

Culos-Reed, N., Wagoner, C. W., Dreger, J., McNeely, M. L., Keats, M., Santa Mina, D., Cuthbert, C., Capozzi, L. C., Francis, G. J., Chen, G., Ester, M., McLaughlin, E., Eisele, M., Sibley, D., Langley, J., Chiekwe, J., & Christensen, T. (2022). Implementing an exercise oncology model to reach rural and remote individuals living with and beyond cancer: A hybrid effectiveness-implementation protocol for project EXCEL (EXercise for Cancer to Enhance Living Well). *BMJ Open*, *12*(12). https://doi.org/10.1136/bmjopen-2022-063953

Humayun, M., Almufareh, M. F., Al-Quayed, F., Alateyah, S. A., & Alatiyyah, M. (2023). Improving Healthcare Facilities in Remote Areas Using Cutting-Edge Technologies. *Applied Sciences (Switzerland)*, *13*(11). https://doi.org/10.3390/app13116479

Kachur, S., Lavie, C. J., Morera, R., Ozemek, C., & Milani, R. V. (2019). Exercise training and cardiac rehabilitation in cardiovascular disease. In *Expert Review of Cardiovascular Therapy* (Vol. 17, Issue 8). https://doi.org/10.1080/14779072.2019.1651198

Lai, Y., Chen, S., Li, M., Ung, C. O. L., & Hu, H. (2021). Policy interventions, development trends, and service innovations of internet hospitals in China: Documentary analysis and qualitative interview study. *Journal of Medical Internet Research*, *23*(7). https://doi.org/10.2196/22330

Mbunge, E., Batani, J., Gaobotse, G., & Muchemwa, B. (2022). Virtual healthcare services and digital health technologies deployed during coronavirus disease 2019 (COVID-19) pandemic in South Africa: a systematic review. In *Global Health Journal* (Vol. 6, Issue 2). https://doi.org/10.1016/j.glohj.2022.03.001

Ng, J. A. I. (2022). A Look Back: Assessment of the Learning Outcomes of the Community-Based Research Experiences of the Senior High School Students of a Higher Education Institution in Batangas. *International Journal of Learning, Teaching and Educational Research*, *21*(3). https://doi.org/10.26803/ijlter.21.3.18

Nkodo, J. A., Gana, W., Debacq, C., Aidoud, A., Poupin, P., Camus, V., & Fougère, B. (2022). The Role of Telemedicine in the Management of the Behavioral and Psychological Symptoms of Dementia: A Systematic Review. In *American Journal of Geriatric*

Psychiatry (Vol. 30, Issue 10). https://doi.org/10.1016/j.jagp.2022.01.013

Septiani, R., Sundari, S., & Indrawan, B. (2022). PROGRAM PEMBERANTASAN NYAMUK PENYEBAR DBD DENGAN METODE COMMUNITY BASED RESEARCH (CBR) DI DESA REJOMULYO LAMPUNG SELATAN. *Al-Khidmat*, *5*(2). https://doi.org/10.15575/jak.v5i2.17373

Stevahn, L., Anderson, J., & Hasart, T. (2016). Community-Based research (CBR) in the education doctorate: Lessons learned and promising practices. *International Journal of Doctoral Studies*, *11*. https://doi.org/10.28945/3620

Wong, B. L. H., Maaß, L., Vodden, A., van Kessel, R., Sorbello, S., Buttigieg, S., & Odone, A. (2022). The dawn of digital public health in Europe: Implications for public health policy and practice. In *The Lancet Regional Health - Europe* (Vol. 14). https://doi.org/10.1016/j.lanepe.2022.100316

Wood, L., & Kahts-Kramer, S. (2023). 'But how will you ensure the objectivity of the researcher?' Guidelines to address possible misconceptions about the ethical imperatives of community-based research. *Research Ethics*, *19*(1). https://doi.org/10.1177/17470161221135882