https://doi.org/10.62585/sigh.v1i1.63

Volume and Issues Obtainable at Centeriir.org
Journal of Social Informatics and Global Health
ISSN (Print): 3006-9424 ISSN (Online): 3006-9432
Journal of Social Informatics and Global Health

Volume 1, No.1, 2022
Journal Homepage: https://journals.centeriir.org/index.php/sigh

Bridging the Digital Divide in Healthcare: Addressing Inequities for Improved Access and Outcomes

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ABSTRACT

The digital divide in healthcare is a formidable barrier, perpetuating disparities in access to essential information and services. This chasm, evident in the uneven distribution of digital technology, impedes health literacy, access to medical records, and participation in telehealth services, exacerbating healthcare inequities. Amidst the COVID-19 pandemic, the significance of telehealth services in disease control underscores the impact of this divide on healthcare access and outcomes. This research delves into the consequences of the digital gap in healthcare, emphasizing its disproportionate effects on marginalized communities. The research study emphasizes the need for immediate action to narrow this gap by implementing inclusive technology use, developing infrastructure, and implementing specific policy initiatives. By supporting fair access to healthcare resources, stakeholders can progress towards a healthcare system marked by universality and fairness, ultimately enhancing health outcomes and advocating for social justice for all individuals.

Article History: Received: September 12, 2022: **Accepted**: November 02, 2022: **Published**: December 20, 2022
Keywords: ehealth, digital health, healthcare, digital information

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https://doi.org/10.62585/sigh.v1i1.63

1. Introduction

The digital divide looms as a formidable obstacle in modern healthcare, carving a stark disparity between those equipped with digital technology and those left without. This chasm not only impedes access to healthcare information but also erects barriers to medical records, exacerbating healthcare disparities (Pujolar et al., 2022). It is crucial to comprehend the various consequences of this digital divide, as it highlights the unequal access to healthcare and emphasizes the need for immediate action. The digital divide refers to the gap between people with access to digital technology and those without, evident in various healthcare aspects (Lythreatis Singh & El-Kassar, 2022). The limited access to important health information and restricted availability of medical records have widespread effects on healthcare access, influencing the health outcomes of both people and communities.

A cornerstone of health literacy, access to health information is indispensable for informed decision-making and proactive health management. In today's digital age, where technology permeates every facet of daily life, digital tools play a pivotal role in disseminating health information. The unequal distribution of digital knowledge and access creates significant obstacles for individuals who lack access to technology. People without digital literacy or access to digital devices find it difficult to navigate online health information, which hinders their ability to make informed health decisions and participate in preventive care (Estacio, Whittle & Protheroe, 2019). Implementing patient portals and digital medical records signaled the start of a new era in healthcare accessibility, providing enhanced communication and greater patient engagement. Yet, vulnerable people trapped in the digital abyss cannot access these technologies, leading to ongoing gaps in healthcare access. The presence of misinformation online worsens the situation for those already struggling in the digital world by making it difficult to find trustworthy health information. This leads to making unhealthy choices and worsening health inequalities (Kozyreva, Lewandowsky & Hertwig, 2020)

Amidst the burgeoning popularity of telehealth services, disparities in digital access emerge as a formidable barrier to healthcare access (Salmon et al., 2021). While telehealth promises to revolutionize healthcare delivery, individuals devoid of reliable internet access or digital devices find themselves stranded on the sidelines, bereft of access to vital medical care. In rural enclaves and underserved communities, where the digital divide looms largest, accessing telehealth services morphs into an insurmountable hurdle, leaving individuals grappling with chronic health conditions stranded in a healthcare desert.

The COVID-19 pandemic has highlighted the crucial role of telehealth services in controlling the spread of infectious diseases, emphasizing the significant impact of the digital divide (Wood et al., 2021). Restricted by limited telehealth options, people are pushed to the outside of healthcare access, leading to delayed diagnosis and worsened health consequences. These differences impact individual health and burden healthcare systems that are already struggling.

In light of these challenges, bridging the digital chasm in healthcare access emerges as an imperative task, underscoring the urgent need for concerted efforts to dismantle digital literacy and access barriers. By fostering equitable access to healthcare information and services, stakeholders can pave the way for a healthcare landscape of universality and equity. We can create a future where everyone has equal access to healthcare by working together and implementing new solutions. This will ensure everyone has the necessary resources to protect their health and overall wellness. This study article aims to assess the

extent and consequences of the digital divide in healthcare information access and to suggest efficient methods for narrowing this gap and fostering fair access to crucial healthcare resources.

2. Understanding the Digital Divide: Perspectives and Dimensions

The concept of the digital divide, popularized in the late 1990s, encompasses the gap between those with access to information and communication technologies (ICTs) and those without. Initially, discussions on the digital divide leaned towards technological determinism, emphasizing technology as the primary driver of social change (Srinuan & Bohlin, 2011). However, subsequent research revealed a more nuanced picture, acknowledging socio-economic factors alongside technological ones. Various theoretical frameworks have been applied to study the digital divide, including technological determinism, diffusion of innovation theory, knowledge gap hypothesis, and public-private spheres. These frameworks shed light on the complex interplay between technology adoption and socio-economic status, challenging the simplistic view of technology as the sole determinant of societal change (Srinuan & Bohlin, 2011).

While earlier studies focused on physical access to ICTs, recent research emphasizes access and use as key components of the digital divide. Scholars argue that technology adoption disparities exist at individual levels and among different demographic groups, regions, and countries (Salemink, Strijker & Bosworth, 2017). Quantitative measures, such as digital divide indices, have been developed to assess these disparities comprehensively.

At regional and global levels, digital divide indices highlight multifaceted dimensions of the divide, encompassing factors like markets, diffusion, infrastructure, human resources, competitiveness, and competition (Mubarak, 2018). The indices offer insights into the socio-economic and institutional aspects of the digital divide, highlighting that access to technology alone does not resolve fundamental inequalities. Simply put, the digital gap refers to disparities in the availability and utilization of ICTs among different socio-economic and institutional groups. Comprehending the various aspects of this issue is crucial for developing successful plans to narrow this divide and enhance fair access to technology and information.

3. The Impact of the Digital Divide on Healthcare Services

In today's digitally driven world, access to healthcare services is increasingly intertwined with access to digital technologies. However, the pervasive digital divide issue presents formidable challenges to equitable healthcare access and delivery, particularly for marginalized communities. The ramifications of limited access to digital technologies reverberate across various dimensions of healthcare, exacerbating disparities and impeding efforts to improve health outcomes.

Limited Access to Healthcare Information

Timely and accurate healthcare information is crucial for preventive care and early intervention. People use digital platforms, including health websites, online forums, and mobile applications, to access various health-related information, including preventive actions and symptom recognition (Saini, 2022). People without access to digital technologies miss out on important health resources that are available online. This encompasses disease prevention, lifestyle adjustments, and early indicators of medical issues. The repercussions of this information gap are significant, resulting in delayed diagnosis, insufficient preventive interventions, and increased risks of drug errors. Individuals may fail to notice symptoms, misinterpret treatment plans, or ignore preventive checks without credible information. Marginalized groups, like low-income families and the elderly, experience the most severe effects of this inequality, dealing with

worsened health conditions and higher healthcare expenses since they have restricted access to healthcare information (Kim, et al., 2015).

Limited Access to Telemedicine

Telemedicine is a revolutionary option for providing healthcare remotely, overcoming geographical constraints and increasing access to healthcare services. Patients can obtain medical knowledge remotely through video consultations, remote monitoring devices, and mobile health applications (Smith et al., 2020). The uneven allocation of telemedicine resources worsens inequalities, resulting in rural and underdeveloped areas lacking sufficient access to virtual healthcare (Whaibeh, 2022). Challenges such as limited broadband infrastructure, technology knowledge, and reimbursement regulations exacerbate these inequities, impeding fair access to telemedicine services. This discrepancy not only increases the imbalance in healthcare access but also weakens patient involvement and the effectiveness of healthcare professionals. Patients without telemedicine access may face delayed diagnoses, worse treatment adherence, and higher healthcare utilization, which can worsen gaps in healthcare delivery and outcomes.

Limited Access to Health Records

Electronic health records (EHRs) are crucial in contemporary healthcare since they enable smooth communication between patients and healthcare professionals and maintain the consistency of service (Kohli & Tan, 2016). Patients can safely access their medical history, laboratory data, and treatment plans via online portals. Due to digital obstacles, individuals who lack access to their health records have numerous challenges. Patients may face challenges in obtaining crucial health information during medical sessions if they lack digital access, potentially resulting in misdiagnosis, improper treatment choices, and jeopardized patient safety (Jerofke-Owen & Dahlman, 2019). Redundant treatments and less patient engagement lead to financial consequences, worsening healthcare costs and inefficiencies. Patients may face increased costs from redundant tests, unneeded appointments, and preventable hospital stays, leading to financial burdens and limited access to vital healthcare services.

Limited Access to Healthcare Services

Accessing healthcare services online has become more common in the digital age, providing convenience and efficiency to patients. Patients can optimize their healthcare interactions and remotely access services by utilizing online appointment scheduling, prescription refills, and electronic health portals (Mubarak, 2018). However, people without digital access have challenges while using these digital venues. Individuals may have challenges properly using online healthcare services due to limited computer literacy, linguistic limitations, and socioeconomic limits. Marginalized communities living in isolated regions and experiencing economic difficulties have multiple obstacles that worsen inequities in healthcare access and results. Restricted access to digital technologies exacerbates the marginalization of these groups, continuing cycles of ill health and socioeconomic inequality (Kohli & Tan, 2016).

4. Case Studies: Technological Barriers to Accessing Healthcare Information

In Pakistan, the provision of healthcare facilities falls under the jurisdiction of provincial governments, with the federal government assuming a supportive role in coordination, technical assistance, policymaking, and seeking foreign aid (Nishtar et al., 2013). However, the rural healthcare infrastructure faces significant challenges, with basic health units (BHUs) and rural health centers (RHCs) forming the primary healthcare backbone. Despite the relatively extensive primary healthcare network, secondary and

tertiary healthcare facilities are lacking in rural areas, forcing patients to seek care in urban centers, often far away and in suboptimal conditions (Mashhadi et al., 2016). Access to healthcare information is essential for rural primary care physicians, yet they encounter numerous technological barriers in seeking up-to-date medical knowledge. The advent of evidence-based medicine (EBM) has underscored the importance of accessing current information for quality patient care. However, rural physicians face challenges due to limited access to medical libraries, health information resources, and reliable internet connectivity.

Studies have revealed that primary care physicians heavily rely on human sources such as colleagues and consultants for health information, followed by print sources like books and journals. While the internet and digital resources hold promise, barriers such as inadequate ICT infrastructure, lack of onsite libraries and health sciences librarians, and doubts about the reliability of online information hinder their effective utilization. Furthermore, time constraints due to high workload and professional isolation exacerbate these challenges. Physicians often struggle to keep pace with the rapid expansion of medical literature, leading to gaps in knowledge and potentially outdated clinical practices (Fernandez-Moure, 2016). Despite the increasing use of smartphones and digital devices for accessing health information, concerns about the credibility and accessibility of online resources persist.

Technological barriers to accessing healthcare information in rural areas are a pervasive challenge globally, as evidenced by case studies from various other regions. For example, In Sub-Saharan Africa, countries like Nigeria and Kenya grapple with inadequate internet connectivity, sporadic electricity supply, and a shortage of ICT infrastructure in rural healthcare settings (Okpe, 2022). This situation leaves primary care physicians reliant on outdated print materials and struggling to stay updated with the latest medical information. Similarly, in rural India, despite government efforts to improve digital literacy and internet access, healthcare providers face barriers such as limited access to online medical resources, insufficient training in information retrieval, and concerns about the reliability of digital information.

In the United States, rural areas like Alaska and Montana encounter technological challenges such as slow internet speeds and a scarcity of specialized medical resources, hindering the adoption of telehealth services and digital health initiatives (Mahn, 2015). Likewise, in Australia's remote regions such as the Northern Territory and Western Australia, poor internet connectivity and limited digital health literacy among healthcare professionals and patients impede the dissemination of medical knowledge and the delivery of quality care (Choudhry et al., 2019).

5. Gender Disparities in Digital Access and Healthcare Information Divide

The digital divide, emblematic of global disparities, presents a multifaceted challenge exacerbated by gender inequities, notably affecting women in impoverished and rural areas. Across developing nations such as India and South Africa, socio-economic conditions significantly influence digital access, with households from lower economic strata often failing to perceive the relevance of internet usage due to their circumstances (Helsper, 2021).

This underscores the intricate interplay between economic status and technological adoption, where the inability to afford digital technologies or perceive their utility perpetuates the digital divide. Moreover, within educational settings, learners from economically disadvantaged backgrounds display heightened levels of apprehension when engaging with digital tools, a phenomenon colloquially termed as "computer anxiety" or “technophobia” (Lindsey-Smith, 2017). Such apprehension stems from the novelty of digital

experiences and the lack of exposure to technological environments, further widening the gap in digital literacy between economically privileged and underprivileged individuals.

Despite efforts to bridge the digital divide through infrastructural investments, studies reveal that mere access to digital infrastructure does not translate into enhanced digital skills or widespread technology adoption. In Brazil, for instance, despite substantial infrastructure improvements, large segments of the population still fail to recognize the need for digital access, highlighting the inadequacy of infrastructure-focused interventions in addressing underlying skill deficiencies (Robinson et al., 2020). However, beyond economic constraints, socio-cultural factors significantly impede women's access to digital tools and information. In countries like India, entrenched gender roles, cultural norms, and discriminatory attitudes limit women's participation in the digital sphere. Prevailing gender biases often discourage women from pursuing education or careers in STEM fields, further exacerbating the digital gender gap (Bloodhart et al., 2020). In rural areas, where traditional gender roles are more pronounced, women face additional barriers such as limited access to communication assets and restrictive social norms that discourage their engagement with ICTs (Pokpas, 2019).

6. Recommendations

To effectively address the digital divide in access to healthcare information, governments, and healthcare organizations must prioritize infrastructure development in rural and underserved areas. This includes expanding broadband internet and wireless networks to improve connectivity and facilitate access to digital healthcare resources for healthcare providers and patients. Additionally, increased government investment in rural healthcare infrastructure is essential. This funding should support establishing telecommunication networks, telemedicine centers, and subsidies for ICT equipment in healthcare facilities (Salemink, Strijker & Bosworth, 2017). Education and training programs are crucial. al to empower healthcare professionals and community members with digital literacy skills. Training initiatives should focus on effective information retrieval, critical appraisal of online health information, and the use of telemedicine platforms. Furthermore, fostering collaboration between government agencies, non-profit organizations, and the private sector is vital. Public-private partnerships can drive the development and implementation of innovative solutions such as mobile health clinics, telemedicine services, and community health worker training programs.

Promoting telehealth services is key to overcoming geographical barriers to healthcare access. Governments and healthcare organizations should raise awareness among providers and patients about the benefits of telehealth and ensure equitable access to telecommunication technologies. Providing subsidies or incentives for adopting digital health resources can encourage investment in digital infrastructure by healthcare facilities. This includes electronic medical records systems, mobile health applications, and online health education platforms. Continued research and evaluation of digital health interventions are necessary to identify best practices and address gaps in healthcare access. Governments and healthcare organizations should invest in research studies to assess the impact of digital health initiatives on healthcare outcomes and identify areas for improvement. By implementing these measures, stakeholders can work towards reducing the digital divide in access to healthcare information and improving health outcomes for rural and underserved populations.

In many rural areas globally, including Pakistan, technological barriers pose significant challenges to accessing healthcare information. Insufficient internet infrastructure is widespread, with many remote regions lacking reliable connectivity (Ashfaq et al., 2020). This limitation restricts healthcare providers and patients from accessing online resources, including medical journals, databases, and telemedicine

services. Moreover, the absence of digital literacy among healthcare professionals and community members further exacerbates these challenges. Without adequate training and education on utilizing digital tools for healthcare, individuals may struggle to access and interpret critical health information (Nishtar et al., 2013). Several case studies from other countries corroborate these findings. For instance, healthcare providers face similar hurdles in rural areas of India due to inadequate internet connectivity and limited access to digital resources. Despite efforts to implement telemedicine initiatives, the lack of robust infrastructure impedes the widespread adoption of such services, limiting healthcare access for remote populations.

In sub-Saharan Africa, countries like Kenya and Nigeria grapple with comparable issues concerning technology barriers in healthcare. Limited internet penetration and unreliable electricity supply hinder the effective use of digital health solutions, hindering efforts to improve healthcare access and delivery in rural areas. Efforts to address these challenges require multifaceted approaches. Government investment in rural healthcare infrastructure is essential, particularly in expanding broadband connectivity and establishing telecommunication networks. Additionally, educational programs to enhance digital literacy among healthcare professionals and community members can empower individuals to leverage technology to access and disseminate healthcare information effectively.

Public-private partnerships play a crucial role in overcoming technological barriers to healthcare access. Collaboration between government agencies, non-profit organizations, and private sector entities can facilitate developing and implementing innovative solutions tailored to the needs of rural communities. This may involve initiatives such as mobile health clinics equipped with telemedicine capabilities, community health worker training programs on digital health tools, and mobile applications providing health information and teleconsultation services. By addressing these technological barriers comprehensively, countries can bridge the gap in healthcare access between urban and rural areas, ultimately improving health outcomes and enhancing the overall well-being of underserved populations.

Addressing the digital gender gap necessitates tailored interventions that go beyond basic digital literacy training. Comprehensive programs should empower women with the skills and confidence to navigate digital spaces effectively, enabling them to leverage technology for socio-economic advancement and healthcare information access. Initiatives like the Internet Saathi campaign in India, which focuses on empowering rural women with digital skills through localized training programs, exemplify effective approaches to bridging the digital gender gap.

Furthermore, fostering an inclusive digital economy requires concerted efforts at the global level, with organizations like the G20 playing a pivotal role in shaping policies and initiatives to address the digital divide (Faugoo & Onaga, 2022). While previous G20 recommendations have underscored the importance of skills development, there remains a pressing need to prioritize the intersection of digitalization and gender equality. Stronger emphasis on inclusive digital skills training, coupled with policy interventions that dismantle sociocultural barriers, can pave the way for a more equitable digital future where women in rural and marginalized communities have equal access to healthcare information and opportunities for socio-economic empowerment.

7. Conclusion

In conclusion, the research underscores the critical importance of addressing the digital gap in healthcare to achieve equitable access to essential information and services. The persistent disparities based on race and socio-economic background underscore the urgent need to bridge this divide. Despite efforts to mitigate these discrepancies, inequities continue to impede the full potential of Health Information Technology (HIT) in improving healthcare access and outcomes, a reality further exacerbated by the COVID-19 pandemic. The study highlights the profound implications of the digital divide on healthcare access, particularly for marginalized communities. Those without access to digital technologies face significant challenges in accessing vital healthcare resources and services, perpetuating existing health disparities and compromising overall health outcomes.

To address these challenges, it is imperative to implement creative solutions such as alternative scheduling methods, community engagement initiatives, and digital literacy programs. Healthcare practitioners can play a pivotal role in promoting health equity and social justice in healthcare delivery systems by ensuring inclusive use of technology and addressing systemic barriers. Moreover, infrastructure development is a crucial strategy for bridging the digital divide. Collaboration between governments and the private sector is essential to expand broadband internet and wireless networks in underserved areas, facilitating access to healthcare information, education, and communication.

Policies also play a pivotal role in addressing barriers to healthcare access and reducing health disparities. Expanding Medicaid coverage, funding community health centers, and promoting social justice through equitable healthcare access can improve population health and foster a more equitable society. Our research emphasizes the urgent need to address the digital gap in healthcare through inclusive technology use, infrastructure development, and targeted policy interventions. By bridging this divide, we can advance towards a more equitable healthcare landscape, ultimately improving health outcomes and promoting social justice for all individuals, irrespective of their socio-economic status or digital literacy.

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