

REVIEW

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Advancing digital healthcare in Somalia: a review of modern technologies and their implications

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Abstract

Somalia faces many challenges in providing adequate and accessible healthcare to its population, particularly in rural and remote areas. Lack of infrastructure, resources, and security hinders the delivery of quality health services and the prevention and control of diseases. However, modern technologies such as mobile phones, the Internet, and telemedicine offer new opportunities to digitize health care and improve health outcomes in Somalia. This paper explores the current state of healthcare in Somalia, the potential benefits, and challenges of using modern technologies to digitize healthcare, and the best practices and recommendations for implementing such technologies in the Somali context. This paper examines a telemedicine project that connects remote healthcare facilities with urban specialists. We assess its effectiveness and sustainability, showing its potential to improve healthcare in rural areas of Somalia. The review concludes that modern technologies can play a vital role in digitizing healthcare in Somalia, but they require careful planning, coordination, and evaluation to ensure their effectiveness and suitability.

Keywords Somalia, Digital health technologies, eHealth

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Introduction

Digital health refers to the use of technologies such as software and digital platforms to facilitate healthcare provision and enhance health outcomes. These technologies include telemedicine, telehealth, mobile health, electronic health records, and other tools to enhance or advance health outcomes. Furthermore, digital health can reduce health inequalities while promoting health equality by boosting accessibility, quality, and efficiency of care [1, 2].

Digital health technologies can facilitate individualized healthcare, distant diagnosis and monitoring, drug delivery upon request, and integrated information and communication systems. Some important digital health technologies are sensors, 3D printing, robotics, and artificial intelligence [3]. Sensors can indicate and record many physical, chemical, and biological indicators in patients, thereby enabling prompt and precise identification and treatment. Sensors can be worn, swallowed, embedded, or integrated into other devices or platforms [4]. 3D printing can produce flexible and customizable dosage forms, medical devices, implants, and tissue engineering constructs. 3D printing can enable personalized medicine by allowing patients access whenever they require personalized therapeutics at the point-of-care [5]. Robots can automate and improve multiple medical tasks including surgery, disinfection, communication, and phlebotomy. Additionally, automation can be used for drug delivery and diagnosis using small robots that can be remotely controlled or programmed to execute specific actions inside the body [6]. Artificial intelligence can analyze massive and complex datasets derived from different origins, including sensors, medical records, imaging, and microbiology [7].

Somalia is one of the most fragile healthcare systems in the world as its infrastructure and human resources have been significantly affected by years of conflict and instability. With increased rates of infant and maternal mortality, malnutrition, and infectious diseases, health outcomes in Somalia rank among the lowest in the world [8]. Despite the challenging healthcare situation in Somalia, the development of internet and digital health can have the capacity to provide access to information that can improve healthcare conditions [9] in the country. The healthcare delivery challenges faced by Somalia are political and socioeconomic instability, lack of economic support, and an unstable healthcare workforce [10]. Therefore, the development of healthcare in Somalia can be improved using an expanding telecommunications network that provides access to the Internet and information that can benefit healthcare professionals [9]. For instance, the Istarlin Hospital in Somalia implemented an innovative strategy to support national staff and achieved

satisfactory standards of care for hospital patients. This strategy includes the use of telemedicine to aid national personnel [11].

Digital health landscape in Somalia

Digital health infrastructure and initiatives in Somalia face significant challenges due to the country's political and socioeconomic instability [9]. The country's healthcare system depends heavily on international aid, and funding designated for healthcare is inadequate to meet the demands of the population [10]. However, the emergence of the Internet and telecommunications infrastructure in Somalia holds promise for healthcare practitioners because it provides them with the opportunity to access valuable information that can enhance the quality of healthcare in the country, even though the lack of economic support and stability in the healthcare workforce hinders the development of digital health infrastructure [12].

Somalia is starting the process of nation building after years of war and has the potential to implement current Spatial Data Infrastructure (SDI) best practices [13]. Hence, efforts are required to enhance the healthcare system and prioritize digital health initiatives to enhance healthcare delivery in the wake of inadequate access to clean water and proper sanitation, elevated rates of unemployment, inadequate levels of education, substantial population growth, and persistent malnutrition among children [14].

Benefits of advancing digital health in Somalia

Implementing digital health solutions in Somalia can yield numerous advantages such as enhanced accessibility to healthcare, efficient data handling, and superior patient care. These solutions possess the potential to address deficiencies in healthcare services by delivering specialized medical attention to underprivileged areas, such as Somalia [15].

By adopting the comprehensive "Treat and Teach" initiative bundle, medical teams can effectively identify and address a considerable number of cardiology and neurology conditions, thereby enhancing the availability of specialized medical services [15]. Digital health solutions have the potential to improve data management by providing secure and transparent storage of patient data [16]. The use of blockchain technology can guarantee the safe storage and convenient retrieval of thorough patient information, effectively meeting the requirements for dependable data management in the healthcare sector [17]. These solutions can enhance patient care quality by facilitating telemedicine, remote monitoring of patients, and the utilization of wearable technologies [18]. Overall, the implementation

of digital health solutions in Somalia has the potential to improve accessibility to healthcare, streamline data administration, and improve the quality of patient care.

There are several instances in which digital health initiatives have demonstrated promising results in Africa and beyond, and can be harnessed in Somalia through effective digital health advancement. For example, in Burkina Faso, a digital health initiative with the objective of enhancing the diagnosis of sick children below the age of five years has facilitated millions of consultations owing to factors such as interoperability, standardization, and stakeholder engagement [19]. In Ethiopia, a vast array of digital health technologies [DHTs] such as mHealth, electronic health records, telemedicine, and artificial intelligence have been implemented to combat different health conditions. These technologies have demonstrated the potential to enhance clinical and public health practices [20]. Studies conducted in Madagascar, Niger, Côte d'Ivoire, Senegal, and Tanzania used digital technologies to enhance the utilization of educational resources and health information. Mali and Cameroon have successfully established hubs of specialized knowledge in the field of digital health, thereby making valuable contributions to the realms of research, innovation, education, and application of digital health technologies [21]. In Africa, the domain of digital health faces several obstacles, including inadequate synchronization, feeble health systems, and insufficient infrastructure. Nevertheless, it has the potential to enhance the availability of healthcare services and attain comprehensive health coverage [22].

Challenges of advancing digital health in Somalia

Advancing digital health in Somalia presents several obstacles. The nation's healthcare system is ranked as one of the poorest globally, with restricted availability of crucial healthcare services [23]. Civil conflict and prolonged humanitarian crises have caused disturbances in the healthcare system, leading to resource shortages and instability among healthcare professionals [24]. Somalia has relied heavily on international aid, but there is now a notable decrease in donor support, resulting in a substantial funding gap for healthcare requirements [25]. The combination of these challenges, along with insufficient economic resources and instability, creates obstacles to effectively providing healthcare in Somalia [10]. Furthermore, the lack of integration between information systems and limited connections between different solutions impedes the progress of digital health in the nation [26]. Overall, addressing these challenges and strengthening the

health care system are crucial for the successful implementation of digital health initiatives in Somalia.

Future prospects for advancing digital health in Somalia

Digital health has the potential to significantly impact healthcare outcomes and access in Somalia. The field of digital health is expanding rapidly and uses digital technologies to improve patient outcomes and healthcare delivery [27]. It can empower patients by informing, communicating, and motivating them [28]. The growing telecommunications network in Somalia can provide access to the Internet, which in turn provides access to information that can improve healthcare [9]. However, the development of digital health in Somalia requires a deep understanding of both technical and medical aspects [10]. Efforts are being made to assess various aspects of digital healthcare such as safety, quality, end-user experience, and equity. Strengthening medical competence requires collaboration between medical staff, patients, and the government [27]. By strengthening the healthcare system and investing in appropriate resources, digital health can improve long-term capacity and access to healthcare in Somalia.

Comparative analysis with similar socioeconomic contexts

The advancement of digital health technologies in Africa represents a case shift in the management and delivery of healthcare services. In Kenya, the M-TIBA platform has successfully leveraged mobile technology to enable people to save, send, and spend funds, specifically for healthcare services. This innovative approach has improved access to healthcare for underserved and streamlined payments and data management for healthcare providers [29]. In Rwanda, the use of drones to deliver blood and medical supplies to remote areas has dramatically reduced delivery time and improved the availability of critical healthcare resources. This pioneering use of technology has showcased the potential of digital health solutions to overcome logistical challenges and enhance the delivery of healthcare services [30].

Ethiopia's deployment of mHealth initiatives has significantly impacted healthcare delivery, reaching over half a million participants, and showcasing the potential of digital technologies to enhance healthcare accessibility and outcomes [31]. In Nigeria, the strategic emphasis on bolstering the healthcare workforce has been pivotal for advancing Universal Health Coverage (UHC), illustrating the critical role of human resources in the successful adoption of digital health technologies [32]. These illustrations offer insightful perspectives on the benefits and practical approaches to implementing digital health

technologies, which could be instrumental in shaping Somalia's digital healthcare landscape.

The way forward for digital health initiatives in Somalia

Digital health initiatives have been implemented worldwide to improve access to healthcare and enhance the quality of care. Examples include patient portals, virtual care platforms, and smartphone-based applications [33]. These initiatives have shown potential for better outcomes when patients and their family members are engaged in all aspects of planning, implementation, use, and evaluation [34]. However, there is little guidance on effective engagement in digital health initiatives. In the context of Somalia, where aid delivery "On Budget" is a challenge, it is important to consider the use of national systems in digital health projects. The use of country systems has both perceived and actual risks and benefits, and finding the right mix of tools is crucial for state-building goals [35, 36]. By implementing digital health initiatives in Somalia, there is the potential for improved access to healthcare and enhanced care quality, aligning with the international community's objectives [37].

Therefore, establishing a supportive policy and regulatory framework for digital health in Somalia is crucial to strengthen the country's health system. This framework should prioritize strengthening local governance and management capacity, enhancing efforts for strong health-financing mechanisms, engaging with the private sector, and investing in appropriate human resources for health [38]. Government agencies, international organizations, and stakeholders play an important role in this process. Government agencies need to take the lead in coordinating and implementing the regulatory framework, whereas international organizations can provide technical support and resources for capacity building [39]. Stakeholders, including health and development professionals, should be closely involved in the development of the framework to ensure that they address the specific needs and challenges of the Somali health system [40]. Collaboration and coordination among these entities are essential for achieving long-term capacity improvement in Somalia's health sector [41].

Community engagement and education can also play a crucial role in the success of digital health initiatives in Somalia. To involve local communities in the adoption of digital health solutions, it is important to design programs that train learners in effective community engagement strategies [42]. This can involve learning programs with theoretical and practical components that have clear aims and assessment methods [43]. The preparatory phase should be performed before experiential learning, which includes debriefing and reflective learning [44]. Creating

and sustaining relationships with the community is essential, and members with expertise in community engagement should be engaged [45]. It is also important to consider the wider socioeconomic context, power dynamics, and representation of communities and their voices to ensure the success of community engagement initiatives [19]. By addressing these factors and implementing stakeholder strategies, local communities can effectively be involved in the adoption of digital health solutions.

Conclusion

Digital health is a promising field that can improve healthcare outcomes and access in Somalia, a country facing many challenges in its health system. By implementing digital health solutions, such as telemedicine, mobile health, electronic health records, and artificial intelligence, the country can benefit from enhanced accessibility, efficiency, and quality of healthcare. However, to advance digital health in Somalia, it is essential to establish a supportive policy and regulatory framework through collaboration with international and local partners, and effective community engagement. Moreover, by investing in digital health infrastructure and human resources, Somalia can leverage the power of digital technologies to strengthen its health systems and achieve better health.

Authors' contributions

MMA conceived the idea and initiated the project. NID, SSM, and DELP critically reviewed the paper and provided valuable feedback. AKM, AHE, OASA, MAL, UJ, BR, YA, ZKO, MRH, OK, SL, and BC contributed to writing different sections of the paper and revised the drafts. All authors read and approved the final manuscript.

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Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

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Competing interests

The authors declare no competing interests.

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