

Digital health for all: How digital health could reduce inequality and increase universal health coverage

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Abstract

Digital transformation in health care has a lot of opportunities to improve access and quality of care. However, in reality not all individuals and communities are benefiting equally from these innovations. People in vulnerable conditions, already in need of more care and support, are often not participating in digital health programs. Fortunately, numerous initiatives worldwide are committed to make digital health accessible to all citizens, stimulating the long-cherished global pursuit of universal health coverage. Unfortunately initiatives are not always familiar with each other and miss connection to jointly make a significant positive impact. To reach universal health coverage via digital health it is necessary to facilitate mutual knowledge exchange, both globally and locally, to link initiatives and apply academic knowledge into practice. This will support policymakers, health care providers and other stakeholders to ensure that digital innovations can increase access to care for everyone, leading towards *Digital health for all*.

Keywords

Digital divide, telemedicine, health equity, health policy, primary health care, health services accessibility

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Introduction and context

Over the past decade, the digital transformation has drastically changed several parts of society including healthcare. As in other sectors, digital health extends further than just digitizing the existing steps in care processes. It offers new possibilities for how patients, care providers and other stakeholders relate to and connect with each other,¹ potentially leading to a further democratization in health care.² Digital health strengthens patient-centred care, for example, with the use of electronic health records, which contain information on risk factors including clinical and laboratory data and enable patients to monitor their health with digital applications under potential supervision and support from clinicians.³ In the ideal world, more innovation and technology in digital health would increase access to care for *all* patients.

However, not all citizens are likely to benefit from digital health equally.⁴ As the distribution of mobile phones and related technology is growing rapidly worldwide, digital

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health is providing numerous opportunities to supply value to individuals and communities. But in reality, it appears that for structural, practical, commercial and economic reasons, digital health is tending to increase inequality in health.^{4–7} Lack of resources (telephone and computer), infrastructure (internet connection), information, knowledge and self-confidence are major drivers of these differences.^{4,5} Moreover, embedded structural complexities such as racism and power imbalances resulting in inequitable access still play large roles in maintaining health inequity.⁷

Furthermore, it seems that digital health applications are currently not well-suited to people with limited reading and health skills, and limited digital skills.⁸ Even in the most digital advanced societies such as in the Netherlands, it appears that 42% of adults are not sufficiently familiar with the use of new media such as the internet and social media.⁹ Moreover, it is estimated that 37% of the world's population have never used the internet in 2021, of which 96% live in developing countries.¹⁰ Finally, limitations in cognitive ability, living conditions or having one or more chronic conditions can hinder the use of digital care.¹¹

It seems that people living in vulnerable conditions, already in need of more care and support than other groups, often people with a migration background, older adults, or 'high users' of health services, are also the ones facing challenges in using digital health services.¹² Despite needing more support, individuals in vulnerable situations benefit less from the current digital lifestyle and self-management tools. This could mean that as digital health takes on a greater role in healthcare, individuals in vulnerable conditions are more likely to be excluded. Providing appropriate adjustments and adapting digital technologies to the capabilities and strengths of the most vulnerable groups, could potentially empower them to use digital health, but this aspect is often overlooked.¹³

Therefore, it has become evident at both local and global scales, particularly during the COVID-19 pandemic, that increased use of digital health, despite its potential to reach across physical and mental boundaries, has exacerbated and broadened the digital divide of existing inequity in health care.¹⁴ This phenomenon appears to be present across continents, countries and regions. Therefore, increasing accessibility to digital health has become a crucial aspect of the global health arena, where the traditional contrast between high-income and low-middle-income countries is transforming into efforts to reduce global health inequities worldwide.¹⁵ These observations prompt important questions: How can digital health contribute to improving the health of all citizens? What steps can we take to enhance access to digital health for everyone?

Current digital health actions and activities to improve health of all citizens

Fortunately, there are numerous global initiatives and national programs that are committed to making digital health and digital well-being accessible to all citizens and

communities and strengthening health care systems. For instance, the WHO Global Digital Health strategy 2020–2025, the Digital Health Atlas of the WHO, EU Global Health Strategy report and numerous initiatives from the World Economic Forum.^{16–18} In addition there are networks installed like I-DAIR and Digital Connected Care Coalition.^{19,20} Although all these initiatives are clear about the importance of health equity, they often lack concrete examples of inclusive digital health projects on the ground. Besides learning from the digitally advanced societies in Europe and North America²¹ there are also a lot of interesting initiatives and expertise in digital health in low-resource settings such as Southeast Asia and Sub-Saharan Africa.^{22,23}

In low-resource settings, global challenges such as limited healthcare workers and access to healthcare are even greater, which create a sense of urgency to look for digital solutions. At the same time there are fewer barriers from existing infrastructures and still around 50% of all care is delivered by private (both for- and not-for-profit) providers.²⁴ Within these settings there is more urgency for bold and creative changes, often referred to as leapfrogging. This can be observed in the Kenyan County of Kisumu where the digital health infrastructure is extensively developed, most probably more advanced than in high income regions. Here digital health supports the overall health infrastructure through quality insurance and financing support so that the universal health coverage can be offered to the whole population.²⁵ Other examples are: 'Tess', which offers mental health support through a chatbot to refugees in Jordan and pregnant women in Kenya,²⁶ and 'M-TIBA', a financing platform striving for universal healthcare coverage in Africa.²⁷

However, professionals and policy makers are not always aware of both local and global initiatives in digital health, and initiatives are not always familiar with each other, so in practice they lack the connection to create synergies and jointly make a significant positive impact.²⁸

Although the overall impact might yet be limited, the individual examples show that digital health can stimulate the long-cherished global pursuit of universal health coverage.^{29,30} In line with the WHO Declaration of Alma Ata Health for All,³¹ which has led to enormous health gains in overall populations through a focus on universal health coverage,^{32,33} there is a need for a similar approach. Policymakers, health care providers, the wider public society, and other stakeholders, such as local and regional authorities and public health experts, should focus on an inclusive agenda and collaborate on improving digital innovations that can increase access to care for everyone, leading towards *Digital Health for All*.

Which steps should be undertaken to make digital health accessible for all?

To make digital health accessible to all citizens, including citizens living in the most vulnerable circumstances, we consider it necessary to facilitate mutual knowledge exchange, both globally and locally, and to link initiatives

and apply academic knowledge into practice. Therefore, we believe several steps should be undertaken, see Table 1.

Firstly, it is important to bundle (academic) knowledge and expertise from a wide range of disciplines regarding digital healthcare. Secondly, this knowledge can be implemented in concrete projects in collaboration with communities, existing initiatives, and healthcare providers. Attention needs to be paid to impact as well as to science. Thirdly, as health and socio-economic factors are not independent of each other, inequality of opportunities inevitably leads to inequality in health. To map the inequality, it is important to use and combine available patient data from different domains in a data infrastructure. Ideally the data infrastructure benefits both academics and initiators from the community and initiatives that can use and derive value from the database.

Combining (academic) knowledge and expertise by building a collaborative centre on Digital Health

As mentioned previously, numerous global and local initiatives exist to promote inclusivity in society and increase accessibility to digital health care. However, we believe that a transdisciplinary approach involving academia from a wide range of disciplines, the private sector, non-governmental organizations, and most importantly; citizens, is necessary to achieve our goal of 'Digital health for All'. In the first phase, emphasis will be put on agenda setting, education and societal debate.

Within the University of Amsterdam, we are currently building an interfaculty collaboration centre on the topic of 'Digital Health for All'. The faculties of Medicine, Psychology, Anthropology, Economics, Law and Sociology are involved in tackling this complex problem, taking a multi-transdisciplinary perspective. The collaboration centre of Digital Health for All aims to address health inequalities through demand-driven approaches, considering what is needed to reduce health inequalities, with a global outlook and engagement with different disciplines.

Inclusivity is a key concept in the agenda setting for the collaboration around Digital Health for All, which means engaging with different stakeholders from the early stages of research and innovation.³⁴ This includes taking citizens living in vulnerable circumstances as the main starting point, and including them from the beginning making sure that digital tools fit their capabilities and needs, and involving various levels of actors, ranging from bottom-up community initiatives, including volunteers, to complex interventions of international NGOs such as Médecins Sans Frontières and Boat Refugee Foundation (BRF), both from public and private sectors.

Moreover, the collaborative centre considers education on the concept of Digital Health for All pivotal. Health professionals, such as doctors, nurses and medical students, should be educated on the concept of Digital Health for All, with a strong focus on equal access to healthcare

Table 1. Summary of actions to stimulate digital health that will benefit all populations and individuals.

1. Combining (academic) knowledge and expertise
 - stimulate collaboration with existing digital health networks, which also connect with projects in low-income settings.
 - engage different stakeholders, including policy makers, academics and communities (living in vulnerable circumstances), from the early stages of research and innovation.
 - involve various levels of actors, ranging from community initiatives till international Non-Governmental Organizations (NGOs) and governmental initiatives, both public and private.
 - learn from already existing digital health initiatives and exchange knowledge.
 - stimulate social debate on the importance and relevance of digital health for all.
 - educate health professionals and the communities about the importance of universal health coverage through digital health.
 - share knowledge with the public via symposia, webinars, media, community organizations and promoting awareness directly in the field.
2. Implementation of knowledge in practice
 - conduct research and implement innovation together with the community at all stages through Community-Based Participatory Research (CBPR).
 - initially focus on deprived neighbourhoods how digital care can increase the health care provision and access.
 - investigate which digital care is already used in different communities and cultures, what digital interest and activity there is, and why digital innovations do or do not connect with vulnerable individuals and communities taking into account their own contexts.
 - collaborate with existing initiatives that support and stimulate the use of digital health from the various communities.
 - connect existing digital channels from the local community organizations (church/mosque/sports club/ etc.) to the digital network of health care facilities.
3. Building up joint data infrastructure
 - develop a data infrastructure containing data from various domains, such as healthcare, education, work, and income to literally map out inequality.
 - investigate how connecting data from different social domains can generate a holistic and cross-domain approach that promotes well-being.
 - use the combined data from different domains to continuously evaluate ongoing initiatives and projects.
 - develop a data infrastructure like for example mobile electronic health records together with and for vulnerable groups such as refugees and homeless people.

worldwide, the role of digital healthcare within primary health care (eHealth) and the concept of digital health literacy. Moreover, awareness should be raised on the

embedded structural complexities such as racism and power imbalance that still plays a large role within healthcare.⁷ The collaborative centre organizes courses in collaboration with various local and international partners, offering students and healthcare professionals an overview of the various (digital) applications and programs, share international initiatives in low-income countries and to start debate on the role of the healthcare professional in providing equal access to digital health.³⁵

Knowledge will also be exchanged with various survey sites worldwide focused on health and innovation like for example in Barcelona, Nairobi and Amsterdam. These places are often seen as a meeting place for social initiatives focused on community based research and digital innovation in healthcare.^{36–38}

Moreover, the collaborative network will initiate societal debate. Societal contributions can be organized through raising awareness for this topic in society to influence policy and health care at both national and international level through the sharing of best practices and new insights via symposia, webinars but also promoting awareness directly in the field.

Implementation of knowledge in practice

In addition to exchanging (academic) knowledge and expertise, facilitating education and societal debate, the proof of the pudding is implementation of Digital Health for All. Below the importance of Community-Based Participatory Research (CBPR), the Health Equity Implementation Framework, and involving disadvantaged communities at all stages is described. Thereafter, a specific example is provided: *HealthEmove*.

To foster ownership, involvement and addressing health disparities, it is important to conduct research and implement innovation together with the community as full and equal partners in all phases of the process.³⁹ Therefore, a specific focus will be on CBPR. CBPR can be considered a partnership approach to research that involves members from the community, researchers and representatives from organizations in all aspects of the research process. All partners are encouraged to contribute with their expertise and ownership and decision making of the process is shared among the partners. Our aim of using CBPR is to increase understanding and knowledge on digital health and to integrate this knowledge in policies, interventions and social change in the interest of community members.⁴⁰

Moreover, it is helpful for health care providers and policy makers to use existing frameworks like the Health Equity Implementation Framework⁴¹ to ensure health equity. In this framework, a clear overview is given of all the different elements which are involved like sociological and economical aspects but also in the context of patient, provider, patient-provider interaction and characteristics of the intervention or innovation.

As mentioned earlier, there is an increasing inequity in health, partly due to globalization and the related urbanization. For example, cities like Santiago (Chile) and Chicago (US)

have differences in life expectancy within their own neighbourhoods of 17.7 and 30 years, respectively.^{42,43} Therefore, several cities have committed to minimizing health inequalities and ensuring that every citizen reaches their health potential, in part through the support of digital health.

To strengthen the whole urban population, we initially focus on deprived neighbourhoods, where healthcare providers (General Practitioners, community care workers, social workers) investigate, in collaboration with the community, how digital care can reduce health inequalities and increase the health care provision. It is pivotal to involve local communities in the development and implementation of digital health interventions and research.⁴⁴ To this end, it is important to first map out which digital care is used by care providers, what digital interest and activity there is in the community and why digital innovations do or do not connect with individuals and communities in vulnerable conditions. Moreover, it is important to collaborate with existing local initiatives that support and stimulate the use of digital health in various communities. In addition, to involve community members, it is important to connect existing digital channels, for example, social media, and groups from the local community such as the church, mosques and sport clubs and link them to the digital network of the primary health care facilities.

Thereafter, existing and new digital initiatives can be made accessible for all citizens through co-creation and co-evaluation between citizens, academics, policy makers and application developers. In this way digital health is aligned and integrated with the capabilities and strengths of disadvantaged individuals and communities.

To evaluate and adjust the effect of the various digital initiatives, it is essential to map in advance what the socio-economic and health differences are in the neighbourhoods in order to measure how a so-called ‘equity equalizer’ effect could occur. This is not just related to health, but also to well-being and any economic impact.

Case: building a digital health record for people on the move

A specific example of how the above-mentioned suggestions can work in practice is the current development and implementation of a personal digital health record for refugees, called *HealthEmove*.

Refugees tend to move to different countries around the world, leading to a lack of continuity in the care process. The limited availability of personal medical data of refugees presents a significant barrier in accessing adequate healthcare for refugees.⁴⁵ This encompasses the lack of access to medical history from their country of origin, as well as data on healthcare received during their journey before reaching their temporary or final destination.^{45,46} As a consequence, there may be duplication of medical procedures, poor continuity of care, and diminished quality of healthcare access, all of which contribute to inefficient healthcare delivery.⁴⁶

Electronic Personal Health Records are reported to likely be efficient and effective tools to improve the health of migrants and refugees.⁴⁷ In literature, several initiatives on Digital Personal Health Records for refugees already exist, such as the IOM's Re-Health and the CARE project. However, issues surrounding these initiatives are found, specifically 'ethical, legal and social issues'.⁴⁸ Moreover, available literature indicates that there is still limited evidence regarding the benefits and drawbacks of Digital Personal Health Records for migrants, including their acceptability to migrants, refugees and healthcare workers.⁴⁷

Therefore, the Amsterdam Health & Technology Institute (Ahti) has started the initiative of HealthEmove, with the use of the CBPR approach. Through their mobile phones refugees in various places and countries, can enter HealthEmove where they can access their own medical history, vaccination status, allergies and a diary in which they can upload photos and take personal medical notes. They are entitled to share their personal health record with healthcare providers of their choice. Moreover, currently other features are being explored such as linking the application to reliable existing health advice channels, functioning as a medical helpdesk for refugees in need of care.

As described above, CBPR is considered a partnership approach, therefore both academics (The Collaborative Center on Digital Health for All of the UvA), non-governmental organizations, local initiatives, health care workers, software developers (Patients Know Best) and the community are involved to cover this complex topic. All are encouraged to contribute with their expertise and ownership and decision making of the process is shared among the partners.

As mentioned above, various communities are involved in the development of HealthEmove from the start. Ongoing working groups with (un)documented migrants from various places and countries are being organized to co-create and develop a web-based and mobile application, in collaboration with software developers and researchers, which can be used as a Personal Digital Health Record for people on the move.

Building up joint data infrastructure

To properly evaluate and facilitate the exchange of knowledge and its implementation, it is important to develop a joint data infrastructure. With data from various domains, such as healthcare, education, work, income, etc., it is possible to literally map out inequality. Then it is possible to investigate how connecting data from different social domains can generate a holistic and cross-domain approach that promotes well-being. The emphasis is on the fact that these data generate added value for the community by adapting projects and care to bring about structural change within those groups that need it, and where inequality is greatest. Under strict privacy conditions, both academics and initiatives can derive value from these linked data.

Conclusion

Digital health has the potential to overcome earlier geographical and practical barriers to health care and therefore be a great avenue to support universal health coverage that policy makers have been striving for in the last few decades. However, in reality the increased use of digital health seems to have further widened the existing inequity of health care. Policymakers, healthcare professionals and patients should be aware of this risk, collaborate and jointly develop, implement and share digital health initiatives, which are increasing the health potential of the whole population including communities in vulnerable conditions. In that way we should ensure the accessibility and affordability of Digital Health for All.

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