DIGITAL HEALTH, TECHNOLOGY, AND DIGITAL DIPLOMACY: AFRICAN SOLUTIONS FOR AFRICAN CHALLENGES

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ABSTRACT: This paper presents reflections *in situ* on sustainable digital health in an African society. It notes that the research and development of digital health necessitates embedding in context. The context determines the political components of the technology, and its relationships, meaning and meaning-making, knowing and ways of knowing. Against this background, this paper argues that, for sustainable development there is a need for social and cultural sensitivity and to question colonial beliefs to eliminate, what Ramon Grosfuguel calls, epistemic racism. While it proposes that digital health is one of the African solutions to African challenges, the paper submits that researchers in technology can learn lessons from research done in health sciences to illuminate the obscurities around the uptake of mobile telephones and technology in rural Africa beyond its projected usability.

KEYWORDS: digital health, digital diplomacy, Africa, challenges, solutions

INTRODUCTION

Digital health is proposed as a solution to African challenges in the health sector (Chawurura, Manhibi, van Dijk, & van Stam, 2019). By digital health, we mean health care support using electronic devices. Digital health also goes under the banner of eHealth, with mHealth being digital health via mobile devices. This paper deals with the sense that digital health in Africa is mostly implemented from an external frame of reference (Mawere & van Stam, 2019b; van Stam, 2016), based on assumptions that may not apply in an African context, or are, at least, in need of incisive interrogation. Any discussion of African needs and realities needs to take into account at least five basic parameters:

- That different societies form the various nations of Africa – not one nation, but different nations.
- African health challenges need context-based solutions, including context-sensitive and appropriate technologies.
- Digital health is one of the possible local-global solutions to the myriad of problems in the health sector in Africa.
- There is an interest in sustainable development based upon cooperation between nations, as well as the possibility that such collaboration, if well attended, can help to resolve African challenges.
- Although international cooperation in the past six decades is largely seen as positive, it has not led to the promised, sustainable outcomes and, aware of the ongoing extraction of Africa's resources including data, many African nations are not sure if the current lopsided support arrangements should continue.

As a case in point, we review the presence of mobile telephony. This technology is heralded as one of the successes of the introduction of technology in Africa. Undoubtedly, the introduction and use of mobile networks and phones has had an enormous influence. Francis Nyamnjoh (2009) describes mobile phones as the modern drums of Africa, replacing the indigenous drums used for communication in times past. The GSM Association (GSMA), which represents the interests of nearly 750 mobile network operators and associated industries, reports that there were 456 million unique mobile subscribers in Africa, accounting for 44% of the population, at the end of 2018 (GSM Association, 2019). With regard to the use of digital platforms, the GSMA reports that 239 million of the 456 million mobile subscribers in Africa use the Internet. Tim Unwin (2017), among other scholars, qualifies the connectivity-growth narrative by noting a distinct slowing down of the growth in the use of communications networks in so-called developing countries. Internet roll-out is also stalling. The Broadband Commission for Sustainable Development notes that 'business-as-usual' is not addressing the needs and expectations of those who are not connected and that, in low-income countries, traditional approaches to network deployment are failing (Broadband Commission, 2019). Inspired by the Bill and Melinda Gates Foundation's Pathways for Prosperity Commission (Pathways for Prosperity Commission, 2018), the Broadband Commission proposes the notion of 'meaningful universal connectivity', which reorients network expansion policies from seeing connectivity in the light of resource sharing, to more holistic approaches that position connectivity as a utility.

Like in connectivity reports, in mHealth-research, statements about rural areas are sparse, generic, and seem to echo a dominant narrative of Africa 'failing' through underdevelopment, poverty and unrealised potential. In their 2015 report, the GSMA noted that "The unconnected population is predominantly rural" (GSMA Intelligence, 2015, p. 3). In GSMA's 2019 report, the word 'rural' does not appear. Although the 2019 Broadband Commission report mentions the word 'rural' several times, the statements remain unspecific. When travelling in rural Africa, the disparity in mobile penetration (in terms of the percentage of the population using the service and the availability of connectivity) is glaring. Due to ambiguous

definitions of what constitutes 'coverage', the claims of mobile operators appear to be exaggerated. Questioning the available data, observers like Helen Nyambura-Mwara and Simon Akam (2013) estimate mobile (geographical) area coverage in Africa to be far lower than reported – as little as 30% in certain countries. Hence, the data on coverage area shown by mobile operators cannot be relied upon when reviewing the availability of access to wireless information and communication technology (ICT) networks in rural areas (van Stam, 2013a). Even, when connectivity is available, only a small per cent of members in communities own a mobile phone for themselves (field visit, Chiúre district, northern Mozambique, December 2019).

As an example of pulling the triumphant narrative of the potential of the mobile phone 'down to the ground', Catherine Sutcliffe *et al.* (2017, 2014) showed how the availability of mobile connectivity is unclear in the rural community of Macha, Zambia. They report that only 30% of the 490 mothers who participated in their study had ever used a mobile phone. Yet, the study showed that mHealth has the potential to improve early infant diagnosis in HIV exposed children. The authors mentioned a range of practical challenges, including low mobile phone ownership, communal use, and incomplete coverage in rural areas.

For digital health, digital literacy is a challenge. In 2017, Braat *et al.* (2018) conducted a baseline computer knowledge and usage survey among student nurses in two nurse training schools in the rural areas of Masvingo Province, Zimbabwe. At these schools, thin-client-computing allow for shared computer resources, providing access to general and expert information and a wealth of educational resources. Seventy-four student nurses completed a structured questionnaire that captured baseline information on their ICT knowledge and usage. Of the 74 respondents, 62 (86%) were female, 31 (41%) had used a computer previously, and 3 (4%) had received formal computer training. In addition, 24 students (32%) owned a computer and 56 (76%) had ever used a smartphone. Most respondents, 43 (58%), reported having no access to the Internet on their devices and 20 (28%) used email. Only two people used a computer for their studies: one student did an online course and one visited medical related websites. A quarter of the 74 students, 19 (25%) used Facebook. The question that remains is: what do the results of this survey mean for ICT knowledge and usage in Zimbabwe and Africa in general?

OBJECTIVES AND METHOD

The objective of this paper is to provide a report on the availability, affordability, use and sustainability of digital health in an African place. To do this, we reflect on data and our observations in the field, noting that, although in the past six decades international cooperation has been seen as positive, these days it seems that many Africans are questioning if this is still true today. This situation means that the circumstances surrounding this uncertainty warrant critical investigation and unpacking.

The research for this paper involved intersectional observations by both authors over ten years of frequent travel – at least once a week – in rural areas of Southern Africa, as well as the assessment of data and reports on health care, including the probing of issues to do with mobile phones in Zambia and Zimbabwe. The paper is set in a reflexive science to appraise the power-distance dynamics in high-level reports from, presumably, 'parachute research' (Lancet Global Health, 2018) by insights from day-to-day, longitudinal field research.

CONTEXT

In the settings where normative epistemologies prevail, questions on bifurcations and the distinguishing of borders are common. Such is not the case in African environments, where a holistic and dynamic epistemology is prevalent (Bigirimana, 2017). Cisler (2000) argues that there is no division between information 'haves' and 'have-nots', but rather a gradation based on different degrees of access to information technology. Warschauer (2003) considers the notion of a binary divide between the 'haves' and 'have-nots' inaccurate and patronising, because it fails to value the social resources that diverse groups bring to the table. He states that technology and society intertwine, while the aim of the process is one of social inclusion. Dourish and Mainwaring (2012) even argue that the whole set up of ubiquitous computing, from which digital health emerges, is colonially biased and inundated. Gurstein (2012) poses that, in the context of rural Africa, the conventional mobile communications mode, i.e., one-to-one (or many-to-one) is non-functional and even potentially destructive.

In most African countries, the largest part of the population resides in rural areas. Meaningful interventions for sub-Saharan Africa necessitate localising in line with rural realities. In Africa, in health, for instance, government policies promote decentralised care, alleviating the pressure at 'higher levels' of health facilities – situated mostly in cities – through task-shifting and limiting (unnecessary) travel and other inefficiencies in health-care provisioning. Within the health sector, the need to mainstream rural areas in research for establishing a productive and differentiated evidence base is well recognised. It is in the rural areas where cases are being studied, *in situ*, and where the provisioning of health care is tested to its limits. Research reporting from rural settings is appreciated and, especially in the interdisciplinary studies for global health, research conducted by researchers embedded in rural areas is much valued.

Health research is cognisant of different service delivery models, for example, where people come to institutionalised care facilities, as in the case of clients visiting rural health centres. Such service differentiation can allow health care provision to be nurse-led instead of led by medical doctors. To alleviate mounting pressures and high costs, health care models aim for health care to be provided in the clients' environment, within their communities. In this model, even lay health workers take on specific roles in health care provisioning. Studies have shown that task shifting improves patient retention and reduces the workload at higher health care levels, creating space for higher levels to focus on more complicated cases.

In African places, *meaning* is particular to the context and cannot be readily generalised (Mawere & van Stam, 2017). Research in the rural community of Macha, Zambia, indicates that meaning is constructed via the sequence of (1) community engagement, (2) workforce development, and (3) thought leadership (Kroczek, Mweetwa, & van Stam, 2013; van Oortmerssen & van Stam, 2010) in contextual and embodied practice (Bets, van Stam, & Voorhoeve, 2013). An abstract, un-located, and un-situated environment does not exist. Therefore, it is in the contextual practice, rather than abstract or constructed reality, that the *meaning* and *worth* of digital health and how it is to be engaged with will be determined.

When merging Burawoy's extended case method (Burawoy, 2009) with the Macha Works model (van Oortmerssen & van Stam, 2010) – both developed from Zambian experiences – we deduce that although theory can be (re)constructed, its dissemination in the community should take place in embodied formats (Mawere & van Stam, 2017). Sustainable digital

health necessitates embodiment in (local) people for improved intake and appreciation (Kabanda, 2016). According to the integral development model (Bets *et al.*, 2013), the idea is "to hold the space for change to come". It is rather challenging to evidence embodied knowledge in writing and sequential flows, as the embodiment of work can only be assessed in actual interactions and inclusive discussions (van Stam, 2013b).

FINDINGS

Digital health appears to be the flipside of the African philosophy of *ubuntu*. *Ubuntu* is broadly understood as 'communal love' (Mawere & van Stam, 2016b). It emphasises five cardinal virtues: love, sharing, respect, solidarity and care. These virtues, embedded in African culture, are one side of the coin while digital health is the other. While the merits of digital health seem convincing, doubts over its use in Africa remain an important issue for several reasons.

First, suspicion grows because of the sad history that the continent has passed through. In the past, Africa has been coldly and overwhelmingly betrayed ranging from colonialism, which came in the guise of civilisation, to neo-liberal policies, which came in the guise of socio-economic development (Mawere & van Stam, 2016a). In fact, given the complex and multifaceted history and presence of orientalism (fuelling supremacy) (van Stam, 2016), imperialism (fuelling hegemony), and colonialism (fuelling domination) (van Stam, 2017) in Africa, there are significant differences between the perception and reality of the value of what comes from 'outside' (Mawere & Awuah-Nyamekye, 2015). The assessment of digital health, therefore, necessitates scrutiny about the influence of these 'terrible three': orientalism, imperialism and colonialism (van Stam, 2017). For critical (African) thinkers, blind acceptance of digital health, bestowed upon Africa from the outside without African contribution, will subject the continent to new forms of hegemony, such as cultural and epistemological imperialism, and the extraction of its resources, especially data.

Second, in many parts of Africa, digital health applications are introduced without the incorporation of local expertise or based upon broad sweeping assumptions about people and places using preconceived notions of an ideal world (Ahmat et al., 2014; Scott & Mars, 2013). In addition, applications might not work because of latency, congestion and diversity issues, due to the omission of contextual realities in design phases (Johnson & van Stam, 2017). As long as many health applications and system designs remain imports from the USA, Europe or Asia, and are not created within and in alignment with African realities, local knowledge, and culture, they lack meaningful narratives in the local contexts (Mawere & van Stam, 2017), and risks of adverse incorporation (Hickey & du Toit, 2013). What follows, therefore, is suspicion and critical questions like: why does Africa remain unrepresented in the designing of digital applications meant to solve African problems?

Third, while one of the promises of digital health is to ensure equity in health care, in Africa, digital health may create digital divides and deepen, as well as widen, the gap between those without (have-nots) and those with (haves) digital resources. This gap-widening occurs because many Africans do not have access to mobile tools, platforms, and networks, or the financial resources to ensure connectivity and the deployment of digital health. They will be disadvantaged when it comes to such tools. This exclusion is a real challenge in Africa where black holes – that is, those areas (especially the rural areas) with no electricity or Internet connectivity – are common (Mawere *et al.*, 2019). The exclusion that such a

digital health creates makes it culturally, politically, epistemically and economically problematic, and, indeed, an unsustainable, foreign solution to African challenges.

Fourth, digital health poses new challenges for ethical physician-patient interactions. These challenges include the issues of online professional practice, privacy, and informed consent, and emerge from the location and hierarchical agnosticism and embedded coloniality of the base technologies (Smart, Donner, & Graham, 2016; Dourish & Mainwaring, 2012).

Lastly, the ecological consequences of digital health are not yet clear: The growing demand for the scarce resource of electricity, the need for frequent replacement of ICT equipment, the growing demand for data for updates, the guarding against digital threats, and the contribution to the already significant carbon footprint of the electronic industry (Cwienk, 2019), as well as the demand for connectivity are matters of concern.

DISCUSSION

For sustainable development, there is a moral imperative to continuously address the asymmetric power dynamics that exist in the development of technologies. To ensure peace, equity, and justice, *ubuntu* aspires to a symmetric world. The questioning of (super-)colonial practices and their effects in Africa necessitates the critical examination of methodologies, ethics and non-inclusive systems of technology development (van Stam, 2017). The constraints imposed by imported digital equipment and their functionalities, and the categorisations used in digital platforms, are framing health system realities. This can be seen in the case of mobile technology, which a large part of the global population uses on a daily basis (Nyamnjoh, 1996, 2009). Therefore, we must assess how digital health contributes to the burdens in Africa, due to its built-in biases based on race, ethnicity, locality or class, mostly emerging from foreign design environments where beliefs of a singular and material world exists. Interaction is needed to counter confidence in the feasibility to reach a single, objective description of supposed truth, which can subsequently be turned into technology. In sub-Saharan Africa, conversations on digital health require *meaning* and *value* to *be constructed in the interaction* – where results are created, together, in a multiverse society of human beings in their specific contexts and situations (Mawere & van Stam, 2017; Sheneberger & van Stam, 2011).

Africa is the second largest continent in size, with a fast-growing population. Its existence, agency, and abilities must be acknowledged. Africa needs prime space in the development and dissemination of global technology, addressing sustainability challenges and opportunities locally, nationally, and globally. Dedicated African research and development must prioritise African challenges and indigenous knowledge, and be situated in both African and global agendas (Nyamnjoh, 1996). Such African research needs empowerment, recognition, and sustenance. Digital health in Africa will only be truly beneficial for all when it encompasses existing health systems and cultural diversities. Contributions from the African experience can lead to technology development and design in Africa sustained from collaborative efforts to create an equal world. Only with inclusively developed technologies can local communities flourish and stay healthy while incorporating digital health interventions. Technological contributions emerging from the crystallisation of African philosophy, notably *ubuntu*, contribute to the integration of the values of inclusiveness and reciprocity that underlie global networks of cooperation. Africans should be heard in the mainstream of technology development, so that new technologies

do not marginalise the continent and subdue its people, but enable Africans to play their rightful role in the global community – for the benefit of all of humanity.

The lessons learnt in rural health research seem not to be present in the practice of digital health development. Experiences in health have shown the need to recognise environmental differences, including variations in population groups (with varying proportions of young children, women, the elderly, the sick, and people with disabilities), variations in the means and content of education, geographical distances to centres of resource supply, and distinct features of the environment, e.g. the availability or absence of competing providers and priorities. In the development of digital health, this information seems to be lacking or is not taken into account, thereby, obscuring potential differences in technology seeking behaviours.

Studies in health involve the assessment of cultural, social/education and religious concepts, all influencing (health) service seeking behaviour. Such assessments are peremptory, given that culture, education and religion are primary drivers of fear, with consequences for behaviour and decision making. The influence of culture and religion in conjunction with digital health development appears to receive little attention in the research on technology and its sociality. Demographic and ethnographic studies are essential, as in places with low adoption of foreign technologies, it could well be that different service delivery models are needed than in areas where such adoption is high. One apparent issue is the locus of control – being individual or communal. In African environments, equipment like mobile phones or tablets are often shared, and thus a focus on individualised digital health could be misaligned. In technology reports, we have seen little recognition of such a diversity in orientation, while in the health sciences a variety of understanding of what health means is commonplace in African settings.

Perfecting technological know-how, as exemplified by developments in digital health, is a unique achievement by the West and the Global North in general. However, for this development in the health to gain acceptance in Africa, the following needs to be taken into account:

- Co-development and participatory processes that are context-driven and developed along with sustained local realities and circumstances (cf, Alston, 2019)
- Alignment with African virtues like *ubuntu* to improve human community and quality of life
- Political measures to ensure equitable access for all, leaving no-one behind
- A (w)holistic approach to sustainability, including quests to strengthen the virtues of love, respect, solidarity and care for each other's wellbeing and to make digital health low-cost, accessible and easy to use
- The need for digital health to overcome the cultural challenges posed by new forms of physician-patient interactions, such as online professional practice, privacy, and informed consent, as well as context-specific security systems that guarantee the data-sovereignty of governing authorities and privacy of health clients
- Digital health needs to deploy what we call 'digital diplomacy', which emphasises local cultures and philosophies, like *ubuntu*, as a principle of practice encapsulated in the idea that everyone has the right to good health and that this right should be respected and protected[1]

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[1] Digital diplomacy in the digital age means sensitivity to the local parameters, heritage and philosophy that define societies, the meaning of digital developments and its deployment therein; see Freire's (2000) *Pedagogy of the Oppressed*, which states that in situations of oppression there is a need for dialogue, respect, love for humanity, praxis/action, and reflection to transform the world.

CONCLUSIONS

This paper presents reflections on sustainable, digital health *in situ* in African society. It highlights the fact that the research and development of digital health needs to be embedded in context. The context sets the political components of research, as well as relationships, meaning, and knowing. It is against this backdrop that we argue the need to question colonially held beliefs and to eliminate, what Ramon Grosfuguel calls, epistemic racism. This requires social and cultural sensitivity. For instance, the hypothesis that technology is used differently in towns and rural areas has important policy implications.

Digital health can be part of the solution to the multifaceted challenges confronting the health sector in Africa. However, there is a sense that African issues are too often approached from an outsiders' frame of reference, based on assumptions that may not apply in an African context, or are at least in need of incisive questioning. To be accepted, effective, and sustainable, digital health must be context-driven and its applications designed with local expertise that takes into account system diversity and specific local realities and circumstances.

Digital health can be seen as an opportunity for Africa to develop packages and applications that suit its context, in today's globalising and digitising world. Hence, technologists are challenged and inspired to decolonise and localise to understand the necessity and workability of digital health interventions to be integrated in mainstream African health systems.

We conclude that researchers in computer sciences and other technologies can learn lessons from the research done in health sciences. Unfortunately, currently, the way that digital platforms and peripheral equipment are understood, made available, and used remain obscured due to limited research on technologies and their sustainability in Africa in general. In Africa, digital health needs to be viewed beyond its projected usability and grounded in local research and development.

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