

Mobile health innovation in self-management

Lessons and insights from Sub-Saharan Africa



Introduction

With its burgeoning digital innovation landscape,¹ Africa is poised to see the proliferation of digital health technology advances in the future. Although there's been reasonable mobile phone penetration in sub-Saharan Africa to date, the technology has not progressed.² The development of relatively simple mobile phone messaging interventions has therefore proliferated to help achieve better primary healthcare outcomes in hard-to-reach populations.

In this brief, we explore two such innovations in sub-Saharan Africa, led by Triggerise and WelTel respectively. As self-directed patient-care tools, they aim to empower healthcare users to better manage their own health and to navigate healthcare access earlier and more successfully – ultimately contributing to healthier communities and a decrease in the healthcare burden downstream. In addition to providing remote access to healthcare and facilitating health education, these tools also provide the opportunity to incorporate behaviour-change modalities in the encouragement of appropriate self-care and healthcare-seeking behaviours. In the WelTel example, these include regular reminders to adhere to treatment, prompting a “self-check-in” to evaluate one’s health status and needs, and ready access to healthcare advice. In Triggerise, behavioural science principles are applied through

ABOUT THIS SERIES

This series of five briefs describes the current use of tech-enabled PHC tools in Sub-Saharan Africa. We highlight the key lessons and insights from some of the leaders in innovation, and put forward the enablers and constraints that exist in this resource-constrained setting.

a digital platform to nudge service uptake of healthcare services within an ecosystem of quality assured healthcare facilities including clinics and pharmacies.

In addition to the improvement of self-care, mobile-based healthcare innovations also allow for the decentralisation of healthcare, making it accessible to rural communities and decongesting central health facilities. Such initiatives have been particularly valuable during the Covid-19 pandemic, which brought about a sudden and overwhelming burden on health systems worldwide – and exponential strain on already overburdened systems in Africa. Limiting the spread of the virus at health facilities has also encouraged the remote care of stable but chronically ill patients, further expanding opportunities for mobile health interventions.

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Triggerise

Triggerise is a not-for-profit organisation that was founded in Amsterdam in 2014, where its headquarters are now located.³ It's since rolled out in many countries around the world. In 2017, Triggerise launched its flagship programme in Kenya,⁴ In Their Hands (ITH) project, funded by the Children's Investment Fund Foundation with support from the Kenyan Ministry of Health.^{3,5} The programme uses mobile technology to trigger positive behavioural change. Through the Triggerise ecosystem, service users, healthcare providers (HCPs) and facilities, and micro-entrepreneurs are connected with the aim to promote teenage sexual and reproductive health (SRH) and access to care. In Kenya, the Triggerise digital platform – "Tiko platform" – is run on mobile phones and voucher cards, and is used to nudge adolescent girls to access appropriate care.

Users can self enroll or be enrolled onto the platform by community mobilisers ("Tiko Pros") using the free SMS service.^{5,6} The users are enrolled using their phones or Tiko Cards for those who do not own phones to ensure access to the Tiko health offers regardless of phone ownership. Users don't need smart phone or internet access to utilise the service.⁶ Nudges in the form of reminders, follow-ups, discounts on health services and instant rewards are sent to encourage users to access appropriate healthcare services.³ By accessing a service, they accumulate Tiko rewards, which can be spent at a variety of service providers linked to the platform's ecosystem.⁶ The rewards are redeemed virtually, and they're immediate, and can be used to receive further care, purchase contraception or access services at retailers such as beauty salons.⁶ Triggerise operates on the principle that by connecting young girls to services they need and providing positive reinforcement through application of behavioural nudges, lasting behavioural change can be achieved.^{3,6}

1.1 Relevance: is the intervention doing the right things?

Triggerise aims to improve sexual and reproductive health in teenagers by promoting access to contraception and HIV testing. When it established its footprint in Kenya, Triggerise strategically targeted areas with high rates of teenage pregnancy and high prevalence rates of HIV and sexually transmitted infections (STIs).⁵ Consequently, most of its activity has been in urban informal settlements and peri-urban areas. Since its inception in 2015, more than 250,000 adolescents in Kenya have enrolled in the programme.³

Due to the need for mobile phone infrastructure and connectivity, Triggerise hasn't managed to establish itself in many remote and rural parts of Kenya where services may also be needed.⁵

Triggerise has reached vulnerable teenage populations to improve sexual and reproductive health using behavioural economics principles. Many rural areas have however not been exposed to this innovation due to a lack of necessary infrastructure.

1.2 Coherence: how well does the intervention fit?

Informed by the preference among the target population for accessing care at private clinics and pharmacies, Triggerise has to date partnered exclusively with private facilities.⁵ However, the Kenyan Ministry of Health provides the healthcare commodities to these private facilities, as well as the reporting tools.⁵ This allows for data to be collected at a national level, and for the data to

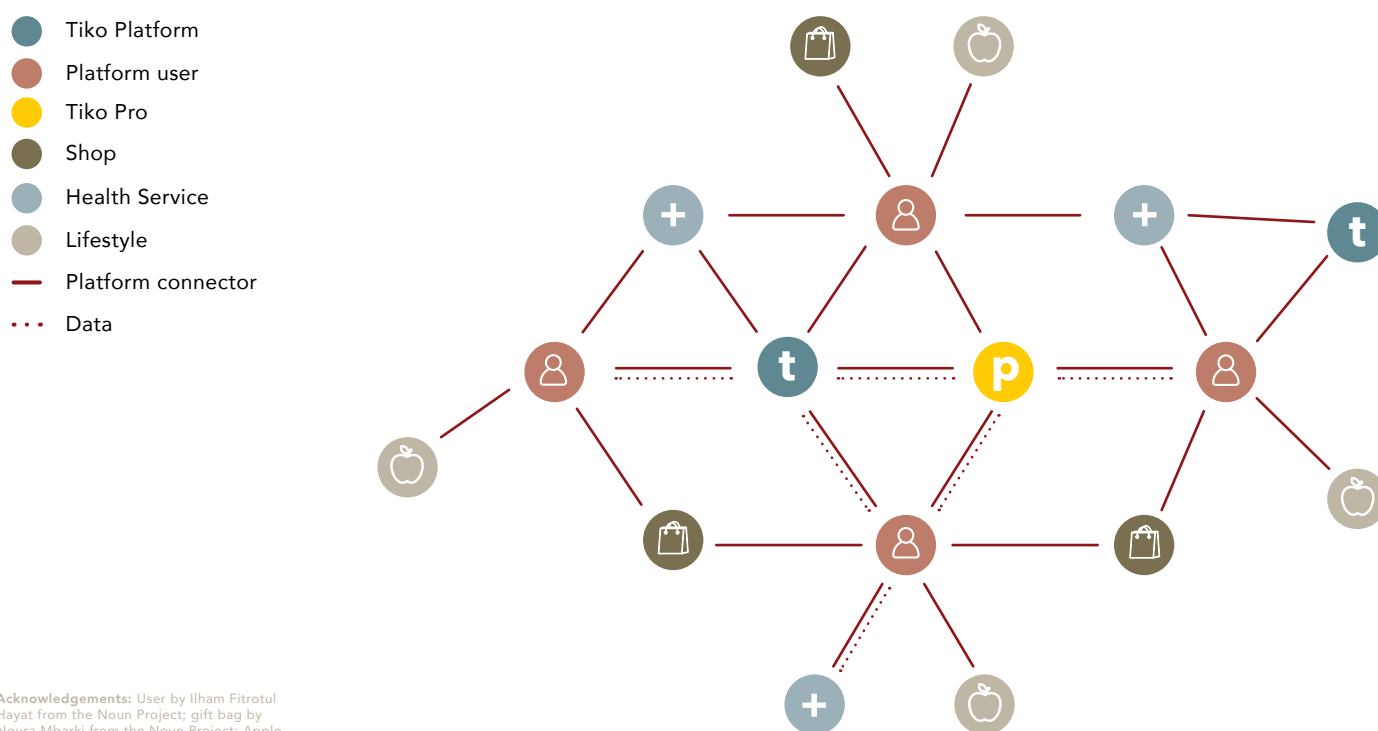
be integrated with existing health information systems through validated reporting. Additionally, the Ministry of Health supports quality assurance supervision visits and provides a degree of training and mentoring to participating facilities.⁵ Planning is underway to pilot the platform in public sector clinics and non-franchise private clinics to extend the reach within current areas of program implementation.⁵

Approximately 70% of users undergo assisted enrolment via Tiko Pros, attached to local community based organizations (CBOs), who are trained community-based Triggerise facilitators and work as community health workers under the Ministry of Health.⁵ Tiko Pros receive training on safeguarding policies through a code of conduct, effective messaging on accurate age appropriate SRH services such as contraceptives and on use of the Tiko Platform technology.⁵ The training takes approximately two days, with monthly meetings thereafter.⁵ The success of the programme has been partially attributed to its CBO led demand-creation strategy supporting assisted enrolment along with peer referrals, promotions and 'above-the-line' communications.⁴

In addition to growing its number of users, Triggerise has also built a strong network of providers, creating 145 Tiko ecosystems in Kenya (Figure 1).³ Approximately 551 service providers – including retailers and 196 clinics in 15 counties are linked to the platform.³ Of these, the 196 existing healthcare facilities can provide users with contraception, HIV self-testing kits and STI testing.⁴ A minimum of five retail outlets are connected within walking distance to a participating clinic or pharmacy to promote easy access to rewards and services.⁵

"The success of the programme has been partially attributed to its demand-creation strategy"

Figure 1: The Tiko ecosystem linking supply and demand³



Acknowledgements: User by Ilham Fitrotul Hayat from the Noun Project; gift bag by Noura Mbarki from the Noun Project; Apple by Alena Artemova from the Noun Project

In a bid to increase the basket of health offers on the platform, beyond contraceptives, Triggerise uses user-centred design to identify additional SRH needs of the adolescents and youth. With support from donors, Triggerise plans to introduce other health offers on the platform including cervical cancer screenings, antenatal care and vocational training, to the Tiko platform.^{3,5} Engagements with community-based organisations further helps to destigmatise teenage sexual and reproductive health and their associated services.⁵

“partnerships with public healthcare facilities are also needed to extend the reach of the programme to deeply rural areas”

Triggerise leverages off existing private healthcare services and vendors to reach adolescents in informal urban settlements and peri-urban areas. However, **partnerships with public healthcare facilities are also needed to extend the reach of the programme** – and to ensure that the service coheres with the public healthcare system.

1.3 Effectiveness: is the intervention achieving its objectives?

Triggerise has a dual objective: to improve adolescent sexual and reproductive health, and to boost local economies.³ Since 2015, approximately 1,322,692 girls have accessed care using Triggerise worldwide, with 91% of registered users currently accessing care.³ Of the four countries using the Tiko system, Kenya had the fastest uptake of users in 2018 (Table 1).⁶

Table 1: Tiko users in four countries⁶

PERIOD	KENYA	INDIA	DRC	CAMEROON
2016	2	970	17	0
2017	4,681	29,226	780	0
2018	161,914	32,399	11,733	1,667
Q1 2019	84,072	14,674	1,870	848

Triggerise uses the data accumulated on the Tiko platform to evaluate which nudges and incentives are most effective to guide its strategy and ensure the most appropriate tools are used to improve uptake.³ The platform allows users to rate and provide feedback on the services accessed. In 2020, 87% of HCPs in the network received a five-star rating.³ Although rating measures the entire customer experience non-specifically, qualitative follow-ups are also performed to better understand the user experience and service

quality.⁵ In addition, complaints and service escalations are monitored on the supply-side of the Triggerise ecosystem.⁵ Quarterly meetings are held with providers for feedback on their experience and challenges.⁵ Reimbursement and income generation were identified as areas that require more attention in future to retain HCPs and retailers in the ecosystem.^{4,5}

Triggerise is meeting its objectives and has improved the uptake of sexual and reproductive health services among adolescent girls and young

mothers through its extensive and integrative platform across 15 of 47 counties in Kenya. A renewed focus on expanding platform offers and income generation and retail providers has been identified as key to maintain and expand the supply-side of the ecosystem.

1.4 Efficiency: how well are resources being used?

Through the creation of an ecosystem and the use of behavioural nudges, Triggerise has enabled girls to easily and quickly access care.³ Basic reproductive healthcare services at private clinics and pharmacies are funded by donors, and healthcare commodities are supplied by the Kenyan Ministry of Health, thereby leveraging off existing private and public care infrastructure to easily reach the target population.⁵

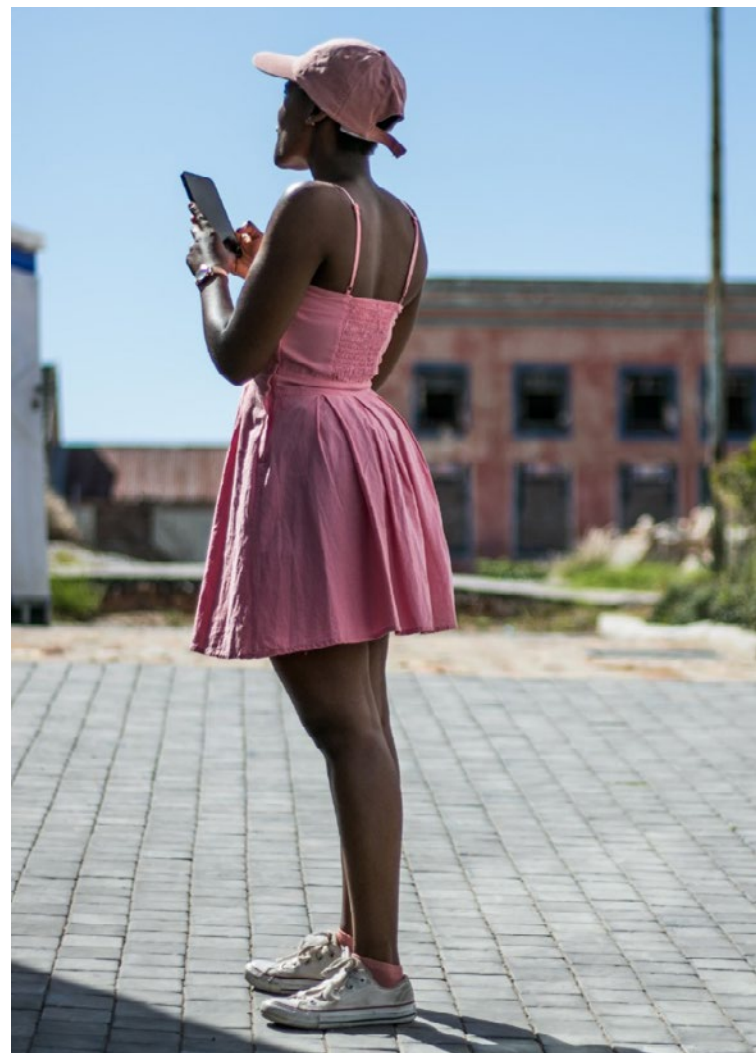
Connecting users to an ecosystem consisting of existing local private clinics and pharmacies, including retailers, allows for seamless disbursement of funds to support service provision, therefore directly boosting local economies. This approach has prevented the establishment of parallel supply chain networks for basic contraceptive and other reproductive health services, and allowed the channelling of business to the existing local economy instead.⁶ Additionally, the Tiko system has injected a virtual currency into the Kenyan market, further boosting local economic activity.⁶

The Tiko system appears to be cost-efficient. The average cost for contraception in 2018 was \$27 per Tiko user per annum, which is lower than the \$35 average in Africa.⁶ This cost is 100% subsidised, and users only require a basic feature phone or a Tiko card to access the service.⁵ Private funders cover all costs and the government provides the facility commodities free of charge.⁵

Real-time data related to interactions, user ratings and the customer experience are collected and presented to funders on a central dashboard.³

This is also used to increase impact by making adjustments to the ecosystems in a fast and transparent way by increasing or decreasing the number of service providers in a given area. It allows for an increased focus on the elements that produce the greatest outcomes, as well as the efficient allocation of resources.³ This process of data collection also enables timely fraud detection by picking up sudden spikes or drops in service use.⁶ Data privacy is protected by only collecting relevant information such as gender and year of birth and ensuring compliance to GDPR and local data protection regulations.

Triggerise uses existing private healthcare service providers and local retailers in its ecosystem to offer subsidised quality services. This enables the platform to connect users to less costly care, while supporting the local economy.



1.5 Impact: what difference does the intervention make?

The development of the Tiko health-and-retail ecosystem has made a significant impact on Kenyan adolescents and approximately 268,226 girls accessed sexual and reproductive health products and services over the past 2.5 years through 145 ecosystems.³ It's made Triggerise one of the most impactful health programmes in East Africa.³ The ability to access the platform using either the SMS service or a Tiko card makes it accessible to all³ and as mentioned above, **the introduction of a health-and-retail ecosystem also boosted the local economy.**³

In 2018, approximately 143,425 couple-years of protection were achieved through the platform⁶ – a sharp increase from the estimated 99,223 couple-years of protection before the development of Triggerise in 2015.⁷ This is an indicator of annual pregnancies prevented as a result of contraceptives. As the use of contraceptives in Kenya has historically been low, this intervention has the potential to reduce unwanted pregnancies – as well as the cost and health complications arising from them.

Between 2018 and 2019, Triggerise grew by 18% globally and connected 230,524 young girls with sexual and reproductive health services.⁴ Approximately 73% of this uptake was in Kenya, where 277,970 girls were enrolled, and 212,650 sexual and reproductive health services were accessed.⁴

“the introduction of a health-and-retail ecosystem also boosted the local economy”

Globally, 6,288 active micro-entrepreneurs have been included in the Tiko ecosystems.⁴

Triggerise has had a significant impact globally and in Kenya, with both health and economic benefits for affected communities. It's been described as one of the most impactful health programmes in East Africa.

“Through the use of ecosystems that leverage existing infrastructure and connect multiple providers and users, continued growth and impact at scale can be achieved.”

1.6 Sustainability and scalability: will the benefits last?

In 2019, the Kenyan Triggerise platform had a 60.5% uptake in sexual and reproductive health services.⁴ There was a 9% growth in active users and a 53% increase in service uptake between 2018 and 2019.⁴ In 2020, positive health-seeking behaviours among users in response to nudges – as indicated by the enrolment-to-service uptake conversion rate – had increased to 89%.³

Through the use of ecosystems that leverage existing infrastructure and connect multiple providers and users, continued growth and impact at scale can be achieved.³ The platform is also adaptable as it uses real-time data to inform its strategy.

User preferences can be determined, and they can efficiently and cost-effectively be linked to a variety of markets that are appropriate to them.⁴ This enables the scalability of the Triggerise model, and the Kenyan experience is a great example.

Triggerise has partnered with Accenture Development Partnerships to increase its capacity to transition from a start-up to an organisation functioning at scale.⁴ Growth to reach scale is enabled by the ability of any user to access the Tiko system using mobile phone technology or a card, the high degree of user satisfaction and the implementation of tools that are acceptable and appropriate to the target audience.⁵

“Triggerise has grown and reached scale through international partnerships and the implementation of data-driven tactics and tools.”

An agnostic platform and the agility to adapt to insights from real-time data have also been key drivers of its success.⁵ The reliance on private healthcare facilities has seen the exclusion of deeply rural communities where these facilities are sparse. Planned partnerships with public health facilities will further advance the scaling of this programme.

Working with vulnerable groups like adolescents presents specific challenges and sensitivities such as finding ideal communication styles and accommodating regulatory constraints around consent to treatment. Triggerise identified these as key factors that will impact its success.⁵ In addition,

successful behavioural change efforts require sophisticated approaches such as incentivisation and other behavioural economics strategies. Merely sharing information is not enough.⁵ Agility in the design of the programme has enabled Triggerise to readily make adaptations as these lessons transpired. One such challenge has been the expansion of self-enrollment, while still maintaining acceptable involvement of the Tiko mobilisers.

Acceptability of the Tiko system has been integral to its success and scalability. Kenyan adolescents have been found to prioritise popular mobile phone applications such as SnapChat ahead of Triggerise when data storage space on their mobile phones become depleted. To circumvent this, Triggerise has partnered with existing messaging services such as Facebook, WhatsApp and Telegram.⁶

Triggerise has grown and reached scale through international partnerships and the implementation of data-driven tactics and tools. The use of data to customise responses to local settings and challenges specific to its target group has allowed Triggerise to reach scale in several areas.





1.7 Key takeaways

Ability to adapt

In the Triggerise environment, the ability to adapt to user needs and respond to real-time data has been important drivers for success.⁵ An agile, agnostic platform that's focused on user needs enables this.⁵

Simplicity enables scaling

The use of a simple mobile phone platform and the Tiko voucher card as an alternative for users without mobile phones has enabled Triggerise to reach the scale it has to date.

An ecosystem with health and economic benefits

The establishment of the Triggerise/Tiko ecosystem, which connects users to existing private healthcare and commercial infrastructure within their communities, has promoted easy access to healthcare as well as income generation for participating retailers.

Understanding the target population

A comprehensive understanding of the target group and its unique regulatory and behavioural challenges is important for success, especially in vulnerable, complex population groups such as adolescents. Meaningful and sustainable behavioural change requires sophisticated interventions informed by behaviour change science, and not merely the distribution of information.

Greater public sector partnerships required to reach rural populations

Although the success of Triggerise has rested largely on leveraging off existing retail and private healthcare infrastructure, partnerships with public sector resources are required to reach underserved areas with less commercial activity.

WelTel is a non-profit organisation that was founded in 2011. It has headquarters in both Kenya and Canada and also operates in Rwanda and Uganda.⁸ WelTel focuses on the management of HIV, Tuberculosis and immunisations, and has also recently extended its reach to support Covid-19 initiatives.

WelTel is a two-way messaging service and connects patients and HCPs through weekly SMSs that simply read, “How are you?”. Patients can respond with any queries or issues that arise between follow-up appointments⁹ and this allows HCPs to address problems, triage patients⁹ and facilitate regular self-assessments – promoting treatment engagement among patients.⁸ The platform therefore aims to reach the most remote areas where vulnerable individuals reside.¹⁰ With the assistance of Grand Challenges Canada and Amref Health Africa, WelTel is in the process of scaling up its services.¹⁰

2.1 Relevance: is the intervention doing the right things?

The high degree of mobile phone penetration in Kenya during the antiretroviral therapy (ART) rollout facilitated the development of a text message-based adherence intervention.⁸ As a patient-to-practitioner text service had not been introduced before, a clinical trial was performed to test its efficacy in improving treatment adherence.¹¹ The message that was used – “How are you?” – was informed by focus groups with patients and HCPs.⁸ Due to stigma at the time, many individuals chose not to disclose their HIV status to family

members and friends. It was therefore important to use messaging that maintained confidentiality. The open-ended nature of the prompt also allowed for personalised engagement tailored to a patient’s specific issues.⁸

The simplicity of this intervention allowed it to be introduced in more remote areas such as the rural northern parts of Kenya, and to engage with patients who often lacked access to healthcare.⁸ A study on pregnant women and mothers in northern Kenya found that most women (82.1%) had access to a mobile phone.¹² Of these women, approximately 90% indicated that they’d like to receive text messages from their HCP.¹² In rural Uganda, a similar rate of acceptability was found among literate mobile phone users.¹³ However, a significant proportion (35.6%) of people living in rural Uganda are illiterate or don’t have access to a mobile phone, and alternative adherence support interventions remain necessary.¹³

During the Covid-19 pandemic, WelTel has been used in several countries as it was already suitably designed for home-based care with sufficient privacy protection. In Kenya and Rwanda, WelTel is used to support cases and contacts in isolation using the check-in messaging service at more frequent intervals.⁸ It’s also used for virtual consultations with high-risk patients.⁸ Adoption in Rwanda has been rapid, facilitated by a centralised and streamlined national health decision-making process.

Technological literacy and mobile phone access remain prerequisites for the use of WelTel which may be a challenge for those living in deeply rural areas.

2.2 Coherence: how well does the intervention fit?

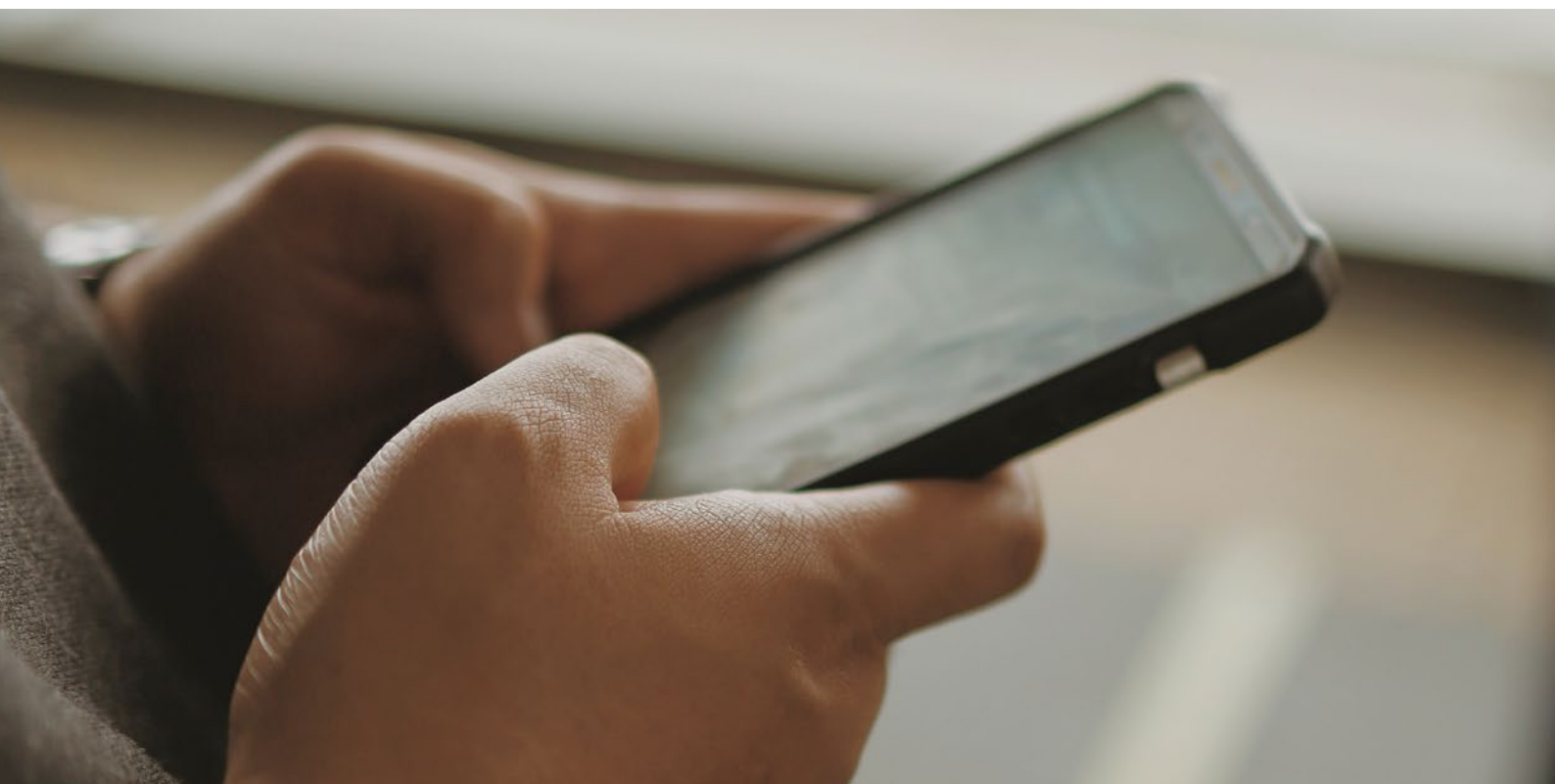
At its inception, WelTel was the only known text messaging service between the patient and HCP.⁸ Since then, the programme has expanded. It's now active in Kenya, Rwanda, Uganda and Canada. Within African countries, WelTel has focused on reaching remote areas.⁸

WelTel was initially met with scepticism from HCPs, who feared that it would increase their workload. The development of an automated text messaging system has helped to circumvent their concerns.^{8,10} Patient responses have also been captured and categorised for use in an AI system that can generate individualised feedback.⁸ The platform is cloud-based and integrated with other digital communication applications such as Zoom,⁸ allowing for virtual consultations, which may see future expansion as internet access in Africa grows.

Although WelTel is well integrated into the National Data Centre in Rwanda, integration with health systems in other countries has been challenging.⁸ In the absence of full integration, data is made available for sharing in commonly used formats.⁸ The Rwandan government has actively supported WelTel, but similar partnerships with the governments in Kenya and Uganda have been slow to establish.⁸

The automation of the WelTel messaging service has facilitated acceptability by HCPs. The system is however not fully integrated with all national health data repositories, and government support has been lacking in some countries.

“The automation of the WelTel messaging service has facilitated acceptability by HCPs.”



2.3 Effectiveness: is the intervention achieving its objectives?

The WelTel solution's stated goals are to connect all patients to HCPs, to reach more patients while ensuring no person is left behind, to function as a social enterprise (sharing revenue with [its] non-profit sister company), and to scale precision health, ensuring timely access to appropriate care.¹⁴

The interactive SMS intervention employed by WelTel has been tested in several disease contexts, including tuberculosis¹¹ and asthma,¹⁵ but the most significant success to date has been in HIV adherence improvement. The commitment of the developers of the intervention to build a robust body of evidence to support and guide its use is evident in several scientific publications on WelTel.

A multisite randomised clinical trial of HIV-infected adults initiating ART in three clinics in Kenya¹⁶ showed that the **SMS support used by WelTel significantly improved ART adherence and viral load suppression**. Patients in the intervention group received weekly SMSs from a clinic nurse to enquire about their general health status and

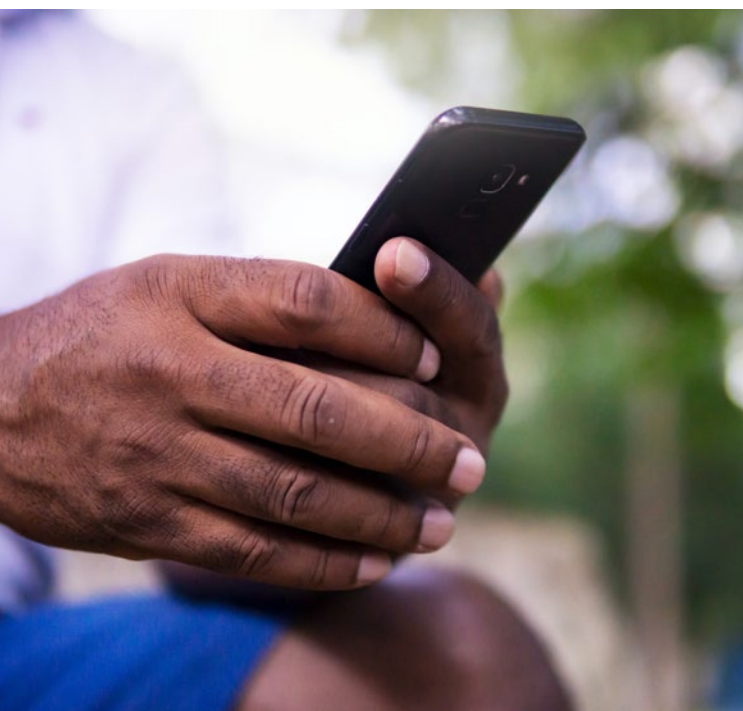
"SMS support used by WelTel significantly improved ART adherence and viral load suppression."

offer telephone-based support. Patients were instructed to respond within 48 hours. If they indicated a problem or didn't respond, the clinician would call them. It was found that for every one person achieving treatment adherence greater than 95%, nine people had to receive the WelTel intervention. To achieve viral load suppression, this number (number needed to treat, NNT), was eleven. It suggests that WelTel is an effective, feasible intervention for HIV treatment adherence improvement.

In a follow-up analysis,¹⁷ patient-perceived benefits of the service included being reminded to take their medication and keep medical appointments, access to medical advice, the ability to report side-effects or health problems quickly and feeling that "someone cares".

Interestingly, another study, WelTel Retain,¹⁸ found that the intervention didn't improve treatment retention during the first year of ART (i.e. attending a follow-up clinic visit 10-14 months after the initial visit), but may have played a modest role in improving self-perceived health-related quality of life. However, in this study, both the intervention group and control groups had higher rates of retention in care (80%) than the study-site clinic (65%), suggesting that more significant benefits may be observed in a real-world setting.^{8,18}

The WelTel intervention was developed by building a robust scientific evidence base. Its most significant success to date has been improving ART adherence.



2.4 Efficiency: how well are resources being used?

The WelTel SMS intervention is relatively inexpensive. In 2007/2008, SMSs cost about \$20 per 100 patients per month, while follow-up voice calls cost around \$3.75 per nurse per month.¹⁶ The use of existing mobile phone infrastructure further contributes to its cost-efficiency.¹⁶ When considering travel costs alone, this intervention is likely to be less expensive than in-person adherence interventions.¹⁶ Based on the NNT of eleven,¹⁶ if the SMS intervention had been used for the 297,800 people who received ART in Kenya's PEPFAR programme in 2009, it could've resulted in fully suppressed viral loads in an additional 26,354 people.¹⁶

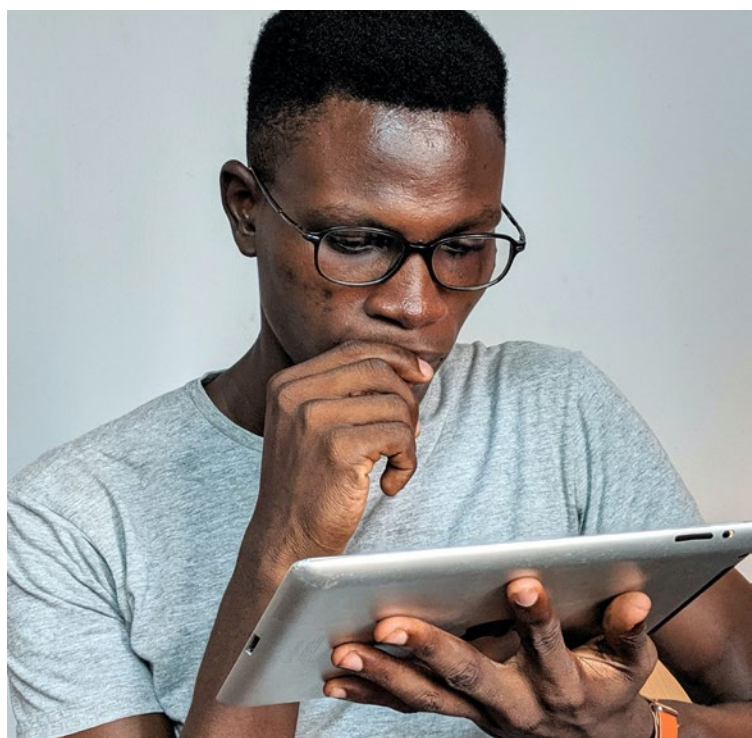
SMS interventions such as WelTel for ART adherence was found to be cost-effective by World Health Organization standards, despite a variation in treatment and care costs.^{19,20} Cost-effectiveness was between the ranges of \$50 per patient per year for interventions with strong effectiveness, and \$15 per patient per year for interventions at the lower end of the effectiveness range.²⁰

As second-line ART can be up to 17-fold more expensive than first-line treatment and difficult to access in resource-limited settings, promotion of treatment adherence and prevention of treatment failure may also result in longer-term cost-efficiencies.²¹ A 2014 MIT review found that if all 410,000 Kenyans who are on ART are covered by the programme, 36,000 more individuals would be virally suppressed, resulting in a \$17.4 million saving in healthcare costs due to the cases of AIDS averted and the decreased need for more expensive treatments.²²

"The WelTel platform was specifically designed to be simple."

The WelTel platform was specifically designed to be simple.⁸ The use of an automated SMS system and AI technology to interpret responses has also improved the efficiency of the WelTel system.⁸ A one-hour training session for the use of the system by HCPs has been sufficient thus far, and patients require no training as they receive a simple, intuitive SMS.⁸

WelTel is a low-cost, cost-effective intervention that may result in longer-term savings by addressing patient concerns sooner and improving treatment adherence, leading to fewer patients with more advanced diseases requiring more intensive and costly therapy.



2.5 Impact: what difference does the intervention make?

In addition to the significant improvement in ART adherence rates, the impact of the WelTel intervention extends to positive changes in the healthcare system. WelTel improves access to care and facilitates self-care.²³ A circumvention of long wait times for immediate healthcare needs has also been observed.²³

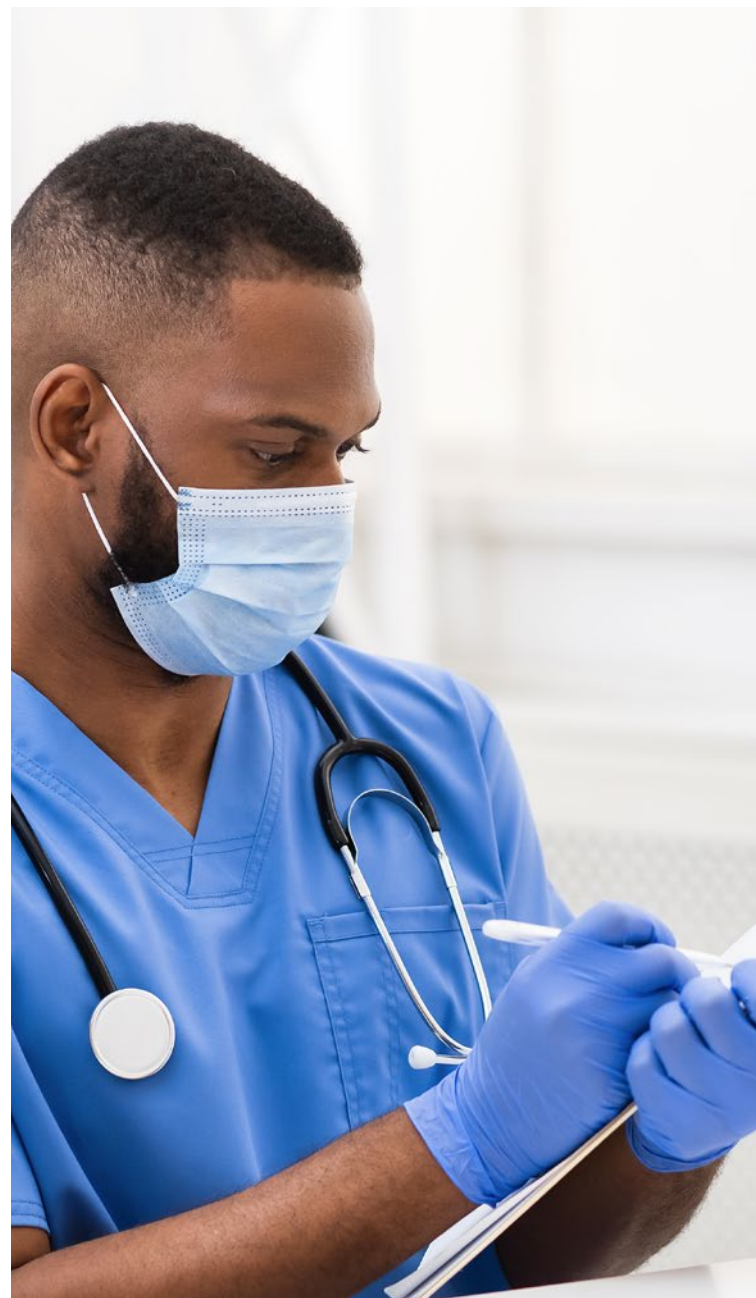
In an evaluation of intervention acceptability and feasibility from the HCP perspective,²⁴ WelTel was found to promote the building of patient-provider relationships. There was also recognition among HCPs that intervention benefits went beyond simply improving the HIV viral load, despite the trade-off of initial workload changes. Positive changes to the “culture of care” at various levels of the healthcare system have been noted as a result of the intervention.²³ These include improvements in staff motivation, performance, teamwork, job satisfaction, work routines and staff and managerial relationships.²³

Timely emergency medical responses have also been facilitated through WelTel in the resource-limited context of northern Kenya.²³ Furthermore, WelTel has played a role in informing needs recognition and resultant improvements at a healthcare service design level, including financial investments in other forms of care.

These include the rejuvenation of HIV psychological support groups and increased appreciation of the scale of tuberculosis co-infection among HIV-infected patients, culminating in the purchasing of a GeneXpert machine for prompt TB diagnosis at a district hospital in Kenya.²³ Increased awareness of social determinants of health, such as extreme poverty and food insecurity, also transpired.²³

Lastly, the improved communication between patients and HCPs facilitated through WelTel, with the opportunity for patients to report malpractice and administrative errors, has resulted in the review of clinical guidelines and protocols and an improvement in HCP and administrative accountability.²³

WelTel has made a positive impact on the greater health system. It's improved self-management and access to care, patient-practitioner relationships and HCP accountability.



2.6 Sustainability and scalability: will the benefits last?

Although WelTel has expanded to several countries following its development in Kenya, growth and uptake have been relatively slow. Only a few thousand individuals in each country currently use the service.⁸ Evidence of its efficacy, cost-effectiveness and feasibility among users has been established. Whereas the development of a scientific evidence base stands out as one of its achievements to date, the need for a robust business strategy has also been identified as a necessity to further grow WelTel.⁸ The focus is now on the development of a sustainable and scalable business model.⁸

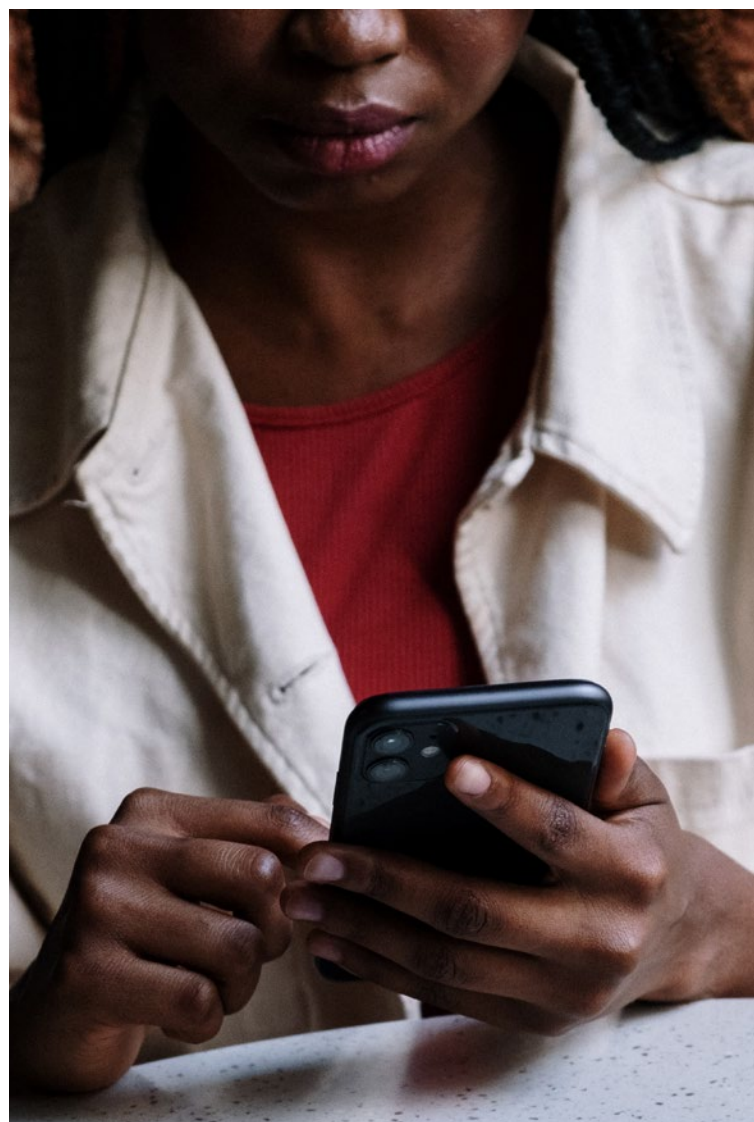
Much of the programme has been reliant on external donor funding, which limits its scalability.⁸ However, Amref and Grand Challenges Canada have awarded WelTel funding that will be used to scale up the innovation.¹⁰ The design of the system has remained simple in order for it to remain low cost and scalable, especially in more remote settings where resources are limited.^{8,10} The efficiency and flexibility of the system have also facilitated its scalability, as demonstrated through the use of WelTel during the Covid-19 pandemic.⁸ The development of other public-private partnerships are underway to achieve a greater scale.¹⁰

Although there's evidence to support the use of WelTel, scale has not been reached. With the influx of funding and the development of an improved business model, WelTel's simple and efficient system could expand its uptake and reach.

2.7 Key takeaways

Simplicity is best. Although there is a global drive towards high-tech healthcare innovation, simple solutions such as text messages may improve reach, keep costs low and improve efficiency, and it may be the most effective in resource-constrained settings.

Evidence is necessary, but so is a robust business model. Although the WelTel intervention has been proven effective through clinical trials, it's necessary to focus on the business model to reach scale and ensure sustainability. Pragmatic approaches to evidence-building in behavioural health are also needed to accurately evaluate the full potential of digital health innovations.



Other Sub-Saharan digital health innovations of note

SaferMom, MomConnect and Wired Mothers

SaferMom is based in Nigeria and sends health information to mothers and pregnant women via SMS, voice messages and a mobile phone application.²⁵ The information is provided in several local languages and allows the tracking of milestones, reminders of vaccinations, nutritional guidance and advice on the prevention of common infectious diseases and pregnancy complications.²⁵ A shortcode messaging system for immediate access to medical advice is being piloted²⁵ and more than 5,000 women have been reached to date.²⁵

A similar innovation, MomConnect, has been rolled out in South Africa in collaboration with the National Department of Health. The platform has over 2 million subscribers across the country and further expansion is planned to Uganda and Nigeria.²⁶

In addition to user-specific advice pushed by SMS at timed intervals, feedback on services is also collected from users to help inform public health decision-making and improve service quality.²⁷

Based in Tanzania, Wired Mothers links pregnant women and new mothers to healthcare facilities via a one-way SMS system and a bi-directional emergency call system that allows direct communication with their HCPs. Similar to MomConnect and SaferMom, SMSs are sent to subscribers with advice and education tailored to the gestational age and risk of the pregnancy.²⁸ As one of the first mobile health interventions to undergo evaluation in a cluster randomised-controlled trial,²⁸ Wired Mothers has significantly increased antenatal care access as well as care quality.²⁹ It's also increased skilled delivery attendance among urban mothers in Zanzibar.³⁰

LifeQ³¹

LifeQ has partnered with ESET in South Africa to develop a tool that can detect the early warning signs of Covid-19 and track the disease, focusing on the work environment. It allows employers to identify cases within the business early and contain them. A wearable anomaly detector continuously monitors various physiological parameters to identify warning signs. The predictive value of such measurements to detect Covid-19 cases early on is however still being established.^{32,33} Costs may be prohibitive in issuing every employee with a device in low-risk settings. The use of this technology in resource-constrained environments may be more appropriate in targeted, high-risk groups, such as healthcare workers and other essential service workers.³²



Conclusion

Given the current, wider penetration of mobile phones as opposed to more advanced mobile technologies such as smartphones in sub-Saharan Africa, Simple Unstructured Supplementary Service Data (USSD), SMS and phone-based health interventions have the greatest potential for success at scale. The simple act of asking “How are you” can lead to significant behavioural change and translate into hard clinical outcomes such as viral load suppression in HIV, as shown in the WelTel experience. As demonstrated by Triggerise, smart innovations with broader societal approaches may not only benefit health outcomes – local economies could be boosted too.

In the development of mobile health technologies for use in vulnerable populations, several challenges arise. Firstly, acceptability and integration into existing healthcare systems require the commitment of all stakeholders, including developers, service users, existing HCPs and health authorities. By designing solutions that minimise the impact on or improve existing workflows, HCPs may be more supportive, as seen in the WelTel example where messaging is automated. Full integration at a healthcare system level however remains a challenge in both of the examples we’ve presented here. Data integration is an ever-present challenge. The committed participation of national and local health authorities is necessary to achieve full integration, scale and sustainability, and to reach deeply rural communities where healthcare access may be limited.

As the development of many mobile health innovations is inherently technology-driven, challenges also arise in the regulatory environment, and consequently, the willingness of health



“Transparent and appropriate regulation in the field of digital and mobile health may support meaningful innovation in this space”

authorities to support new developments. There’s currently a disjuncture between the traditional methods of clinical evidence generation and mobile health innovation: the latter is often driven by business and profit incentives but may lack scientific rigour, while traditional clinical evidence-building processes such as randomised controlled trials may lack the nuance required to evaluate the full impact of mobile health interventions. In the clinical research environment, outcomes such as quality of life are often labelled “secondary”, yet are becoming increasingly important as our understanding of health becomes more comprehensive. More pragmatic research approaches may be necessary to unlock the full potential of mobile health innovations, while ensuring it remains underpinned by robust science.⁸

Transparent and appropriate regulation in the field of digital and mobile health may support meaningful innovation in this space, particularly by smaller enterprises such as WelTel.⁸ Health authorities may be more comfortable in supporting such businesses under the assurance of compliance with relevant and effective regulation.⁸ Relaxation of regulatory constraints during the Covid-19 pandemic facilitated the timely adoption of the WelTel intervention in some countries, such as Rwanda.⁸ A future challenge would be to preserve the positive gains from this relaxation and avoid defaulting to counterproductive constraints, while maintaining effective regulatory oversight to

ensure safety and the judicious use of healthcare resources, and incorporating new ways of evidence-building suited to mobile health technologies.

Lastly, the simplicity and adaptability of mobile health interventions have been key drivers of success in both the WelTel and Triggerise projects. This allows for timely adjustments and ongoing improvements as the understanding of the target population, its behavioural triggers and the implementation environment grows, and as opportunities arise to expand the disease focus, as seen during the Covid-19 pandemic.



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