PERCEPT
HEALTH · SOLVE

April 2021

Authors: Percept Actuaries and Consultants

Telehealth innovation in Rwanda

Lessons and insights from the babyl experience

BRIEF THREE

Introduction

In keeping with global trends, Sub-Saharan Africa has seen an increase in the use of telehealth solutions. These tools facilitate improved efficiency and reduce the burden placed on African healthcare systems that are often under-resourced. Access to care and issues of equity can also be addressed with the help of these innovations by providing care to those in remote and rural areas.

This brief highlights the experience of *babyl* – a telehealth and digital therapeutics innovation in Rwanda. The tool is an end-to-end digital solution that enables remote triage, consultation and medication prescriptions.

Babylon is a UK-based digital healthcare provider that was founded in 2014. It developed a mobile application that triages healthcare delivery using an artificial intelligence (AI) chatbot.

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.

The company aims to improve access to convenient, affordable healthcare through a telehealth solution in partnership with local governments.[1]

In September 2016, Babylon launched its digital health service – *babyl* – in Rwanda, in partnership with the Rwandan Ministry of Health. The country was chosen as the pilot site to demonstrate the effectiveness of the service in low- and middle-income countries (LMICs), and several investment incentives favoured Rwanda as a pilot site. These included a favourable tax regime,[2] opportunities for scaling up, and the availability of the Universal Health Coverage (UHC) scheme, which covers 93% of the Rwandan population.[3]

In this brief, we review the impact and growth of *babyl* in Rwanda, and aim to present the insights gained by this innovator in reaching their current scale.

SECTION

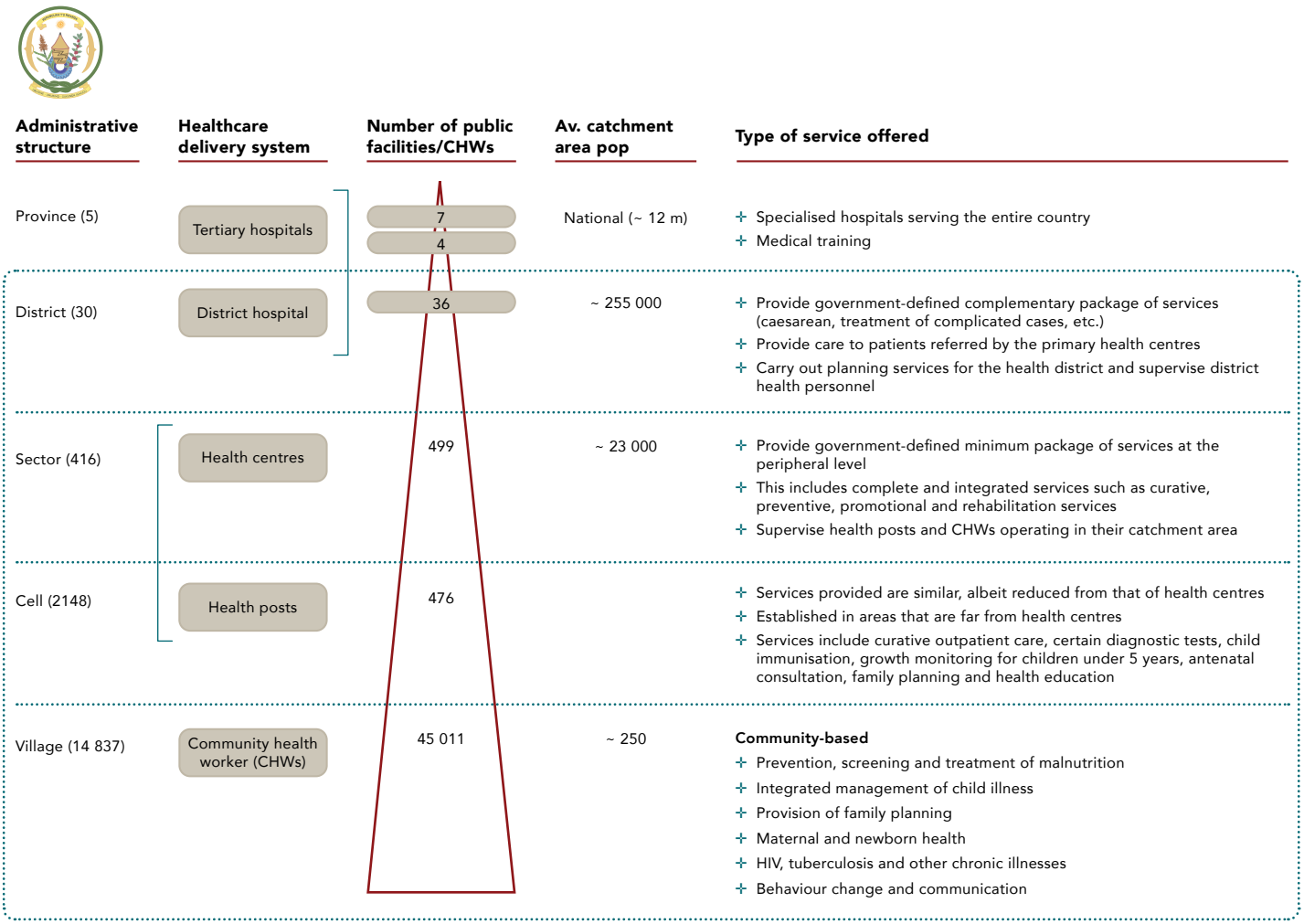
1 babyl: Insights from Rwanda

The healthcare context within which babyl is positioned:

Before the Rwandan genocide in 1994,[4] healthcare was largely free. However, the genocide resulted in the destruction of infrastructure and the health workforce fleeing.[4] Following this, the government attempted to restore the health system by rebuilding the infrastructure and workforce through the development of 12 nursing schools.[4] Efforts to ensure the prevention, treatment and control of malaria, tuberculosis and HIV/AIDS was prioritised.[4] A community-based health insurance policy was developed in 2003,[4] and in 2007, the law was enacted, making Rwanda one of the few countries to have UHC with a focus on primary healthcare.[4] This has improved access to healthcare in particularly poorer areas, where utilisation has since increased.[4]

The majority of health facilities in Rwanda are public sector (64%) facilities, with 28% run by faith-based organisations.[4] The rest of the system is made up of the private sector. Both sectors are governed by the Ministry of Health[4] and the system is structured into four tiers, as shown in Figure 1.

Figure 1: Rwanda's health system[4]



Source: *World Health Organisation. Primary Health Care Systems (PRIMASYS) Case study from Rwanda., 2017*

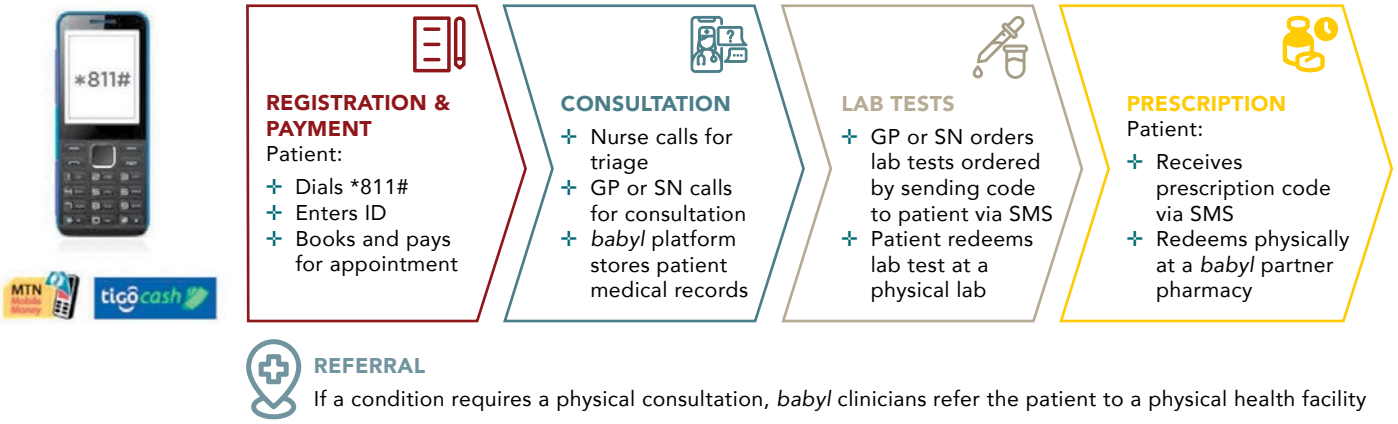
Rwanda prioritised health in its public expenditure. Approximately 16.5% of the national budget was allocated to health spending in the 2015/2016 fiscal year, which exceeds the 15% spend required under the Abuja Declaration.[4] Approximately 11.2% of the GDP was spent on the health sector, with 9.9% allocated to PHC.[4] Out-of-pocket expenditure accounted for 8.8% of total health expenditure.[4]

What is babyl?

babyl is a public sector primary healthcare initiative that was initiated in partnership with the Ministry of Health. The National Health Insurance scheme in Rwanda covers approximately 90% of the population,[3] and the *babyl* service is covered under this scheme. The service is subsidised and users are required to only pay 10% of fees.[3]

babyl offers digital triaging, treatment, referral and medication prescription services. It's categorised as a telehealth and digital therapeutics innovation and the service works using an Unstructured Supplementary Service Data (USSD) platform, as mobile phone penetration is greater than 75%, while smartphone penetration is low.[5] A patient dials a USSD code from a mobile phone to request an appointment, and payments are made using mobile money. A proposed appointment time is sent to the patient and confirmed via SMS, and a triage nurse – based at a *babyl* call centre – then calls the patient and assesses their eligibility for digital treatment and follow-up or referral. If a follow-up is required, this is done digitally by an in-house provider (senior nurse or general practitioner), or the patient is referred to an external facility. The patient can fill prescriptions and receive laboratory tests at designated facilities through the use of a code that's sent by SMS. If they're referred to an external facility, the clinician can access the patient's medical notes and reason for referral digitally. *babyl* practitioners work within the health system in addition to working part-time at the *babyl* call centre.

Figure 2: Steps to access care using *babyl*[6]



Acknowledgements: Hospital by Izwar Muis from the Noun Project; lab testing by ProSymbols from the Noun Project; consultation by LAFS from the Noun Project; Registration by Larea from the Noun Project; lab testing by ProSymbols from the Noun Project

While all patients receive initial advice, the scope of practice for digital treatment is limited to a specific list of conditions exclusively managed in the primary healthcare setting, licensed by the Rwandan Ministry of Health.[3] The conditions included are common, mild ailments amenable to remote management (Box 1). The restrictions placed on the scope of practice during the initial stages of the pilot were intended to prevent harm to users and since 2016, when very few low-risk conditions could be managed, and only in adults, these restrictions have gradually been lifted.[3] The services *babyl* provides are currently restricted to people over the age of 12.[1] The scope is likely to be broadened further as *babyl* reaches scale.[3]

Box 1: Primary care conditions treated through digital medicine under the *babyl* license from the Ministry of Health[6]

- Abdominal pain
- Allergies
- Anal itching
- Antenatal advice
- Asthma
- Bereavement
- Breastfeeding issues
- Chronic pain
- Colds, flu & respiratory tract infections
- Conjunctivitis
- Constipation
- Contraceptive advice
- Diarrheal diseases (mild symptoms)
- Erectile dysfunction
- Food poisoning
- Genital discharge
- Genital bleeding outside of pregnancy
- Gout
- Headaches and migraines
- Heavy periods
- Indigestion
- Insect bites
- Intestinal parasites
- Joints pain
- Menopause issues
- Mild depression
- Mild injuries
- Mild pain
- Morning sickness
- Nutritional advice
- Painful periods
- Painful urination
- Palliative care
- Postnatal advice
- Prescription refills for chronic conditions
- Sexually transmitted Infections
- Simple flu
- Simple malaria and prophylaxis
- Skin conditions
- Sleep disorder
- Stomach ache and acid reflux disease
- Stress
- Tonsillitis

1.1 Relevance: is the intervention doing the right things?

Before the introduction of *babyl*, approximately 80% of the burden of disease was addressed and treated at a district level or lower levels of care.[4] The district of Kigali contains approximately 50% of all healthcare practitioners, despite only representing 5.7% of the population, while rural districts of Rwanda account for approximately 82% of the population, who lack access to care.[3,7] *babyl* was borne of the need to increase access to care, decrease the congestion of facilities and drive equity in Rwanda by providing digital care throughout the country. [6]

> "babyl was borne of the need to increase access to care, decrease the congestion of facilities and drive equity in Rwanda by providing digital care throughout the country."

Of Rwanda's population of 12 million, approximately 2.5 million (30%) are registered on the *babyl* platform.[1,3] Currently, 3,000 consultations are performed daily by both doctors and nurses who are based in central call centres. The characteristics of *babyl* users are representative of the distribution of gender, age, location and socioeconomic status in Rwanda, with approximately 70% of them residing outside of the Kigali district, where accessing healthcare is more challenging.[6]

babyl has also led to job creation and although there was initially significant resistance from healthcare providers, there's now substantial buy-in. Two years after its implementation, *babyl* has paved the way for 300 jobs and this number is expected to rise with the upscaling of the platform and future development of AI in Rwanda.[1]

As is evident from the growing uptake and acceptance by patients and healthcare providers alike, babyl is addressing the clear need to improve access to care in Rwanda in an equitable way.

1.2 Coherence: how well does the intervention fit?

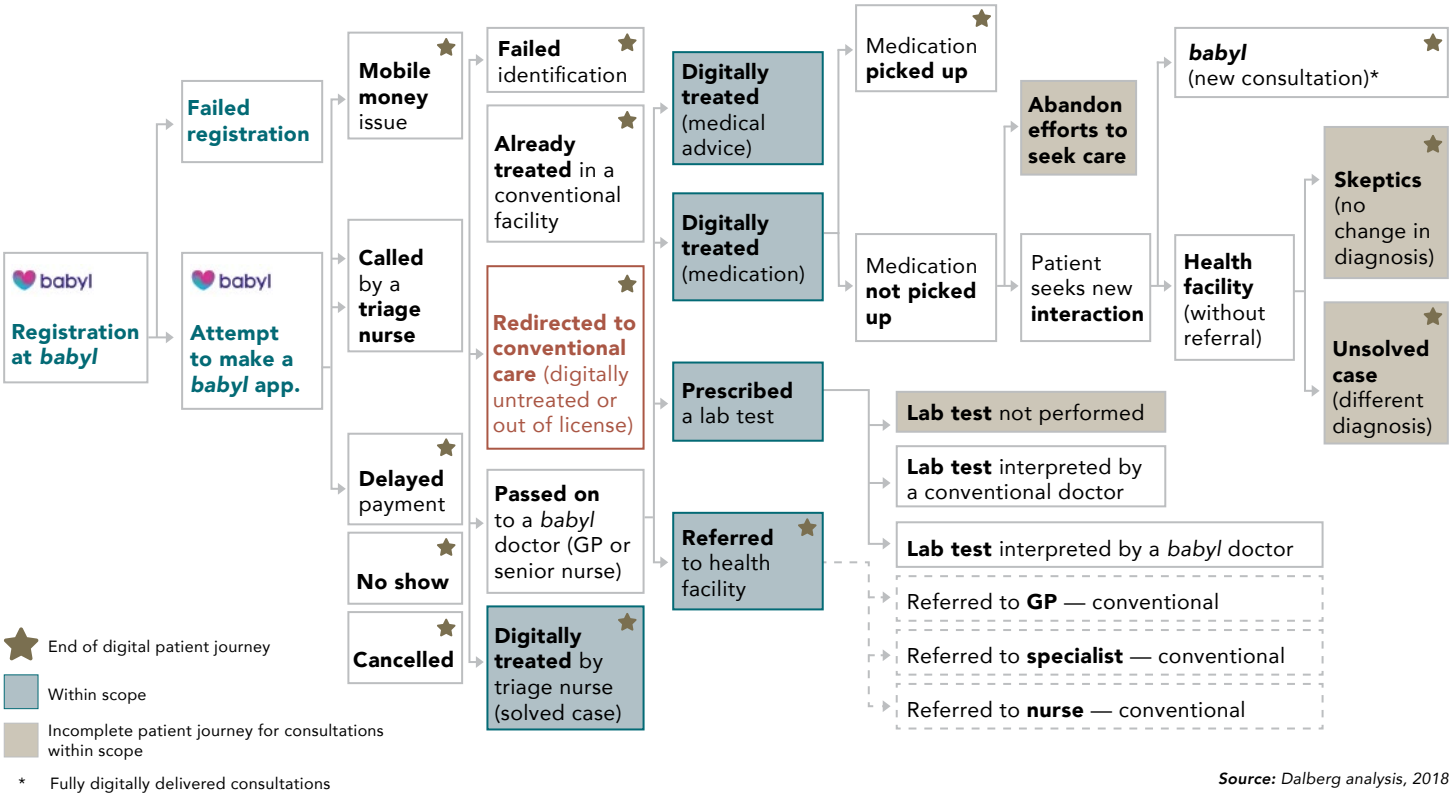
Because *babyl* was introduced in Rwanda in partnership with the Ministry of Health, the service has been well integrated within the health system. The platform is also covered under the National Health Insurance, which insures 93% of the population.[3] In future, *babyl* is likely to be covered by private health insurance schemes.[3] The National Health Insurance currently covers 90% of user fees associated with *babyl* with the remainder to be paid by patients.[3] External funding has been provided to help scale up the project.[3]

Several points of integration into the health system are currently in place. Firstly, practitioners work on a part-time basis – for both *babyl* and within the public or private health sector. This provides them with substantial insight into the health system and familiarity with clinical protocols, which means that the care they provide through *babyl* is more appropriate for users. Additionally, through negotiation, the Rwandan government amended policies that prohibited nurses from being able to prescribe medication, and they're now allowed to do so. Secondly, referral systems between *babyl* and conventional health facilities are well established. This was a necessity, as the scope of practice under *babyl* has been limited to a select list of primary care conditions. Thirdly, *babyl* has partnered with several pharmacies and laboratories. This allows individuals using the platform to use e-prescriptions and laboratory tests. Finally, the online patient data system used by *babyl* has been integrated with the system used by public health facilities – so patients' journeys and interactions with *babyl* are now captured on the public health data system.

The successful uptake of *babyl* in Rwanda may partly be due to a lack of alternative innovations that fill a similar need. To date, *babyl* is the only telehealth solution in sub-Saharan Africa (excluding South Africa) with an end-to-end service operating through the entire patient journey.[3] It takes approximately 30 minutes for a patient to be contacted by a practitioner remotely. Thereafter, it takes a minimum of 2-3 hours to access care at a public sector facility or laboratory in person.[3]

> "To date, babyl is the only telehealth solution in sub-Saharan Africa (excluding South Africa) with an end-to-end service operating through the entire patient journey."

Figure 3: The *babyl* patient journey[6]



Source: *Dalberg analysis, 2018*

While *babyl* is a pioneer in the African landscape, similar innovations exist in other LMICs, such as Halodoc in Indonesia, which has gained substantial traction (Box 2).[8,9]

Box 2: Halodoc Indonesia

Halodoc is a mobile platform operating in Indonesia. Similar to *babyl*, it provides an end-to-end health service delivery model. Users are able to obtain access to a medical doctor, medication delivery and at-home lab services. Halodoc has also improved access to equitable healthcare in Indonesia. Approximately 7 million patients use the platform per month, 80% of whom are located outside of major cities such as Jakarta and Surabaya.

Although *babyl* has largely been successful in Rwanda, room for further integration in the primary healthcare (PHC) space still exists. In 2017, *babyl* approached community health workers (CHWs) who work as volunteers in Rwanda with the opportunity to collaborate. However, a working model could not be established as incentives were not aligned. CHWs chose to prioritise other activities over those required by *babyl*. CHWs function on a volunteer basis and take great pride in this; they were unable to create the time and space for *babyl* operations and often prioritised their regular operations over *babyl* requirements.[3] Additionally, the cost of providing training for 60,000 CHWs in Rwanda proved to be prohibitive.[3]

***babyl* was able to integrate with the health system through the support of the Ministry of Health and has made a leap towards a telehealth solution. Other end-to-end telehealth services have not been established in African countries. *babyl* has managed to successfully fill this gap while aligning its incentives with that of the government. However, room for further integration in the PHC space remains.**

1.3 Effectiveness: is the intervention achieving its objectives?

Although the implementation of *babyl* proved to be effective in providing convenient access to affordable healthcare throughout Rwanda, the transition to this digital platform was challenging at first.[3] Public facilities primarily used paper-based systems when treating patients. Extensive training was required to initiate the digital platform. Further training in softer skills, such as the ability to emotionally connect with patients, was also needed to ensure that the virtual care was acceptable. Following customer care, IT and service delivery training,[5] mock consultations are run and doctors receive supervision when consulting with real patients to improve their service offering.

Initially there was a lack of buy-in from practitioners since they viewed *babyl* as competition for the current health system. However, thanks to the decongestion of the system that came about through *babyl*, as well as additional income when working with *babyl*, practitioners are now generally fully supportive of the platform.[3]

User acceptance has been more challenging. The main barrier to achieving scale has been the need to increase engagement with digital healthcare, and marketing strategies have had to be adjusted to address this issue. Instead of using only media campaigns, in-person discussions with potential users were conducted to encourage individuals to use *babyl*.[3] This was done through market activations, the use of brand ambassadors and CHWs. In collaboration with the Ministry of Health, patients are also educated and allowed to use *babyl* while waiting for care in public health facilities.[3] Although 93% of the population is covered by the National Health Insurance, which funds the use of *babyl* services, approximately 2,390,000 users have registered with the platform since its inception, and approximately 63% (1,500,000) have had consultations.[3]

Further research investigating the impact of *babyl* on patient outcomes is currently underway.

Several user-related and provider-related barriers were addressed during the initial phases of introduction. Structures that make *babyl* more appropriate for users have also improved uptake.

1.4 Efficiency: how well are resources being used?

As *babyl* provides care from designated call centres, users from around the country are able to access immediate care, regardless of whether access to healthcare facilities is available.

To receive emergency care in Rwanda, patients wait approximately 30-60 minutes.[10] *babyl* provides immediate access to healthcare from the user's home. This has reduced the time patients spend waiting in queues to receive care, and also decongested health facilities.[10] The convenience is therefore beneficial to both the patient and the health system.

Due to the opportunity cost as a result of time spent accessing conventional care, patients often avoid seeking healthcare until their condition worsens. With the convenience of digital consultations, patients can access care remotely. This has meant that earlier diagnoses and treatments are possible as people seek care during the earlier stages of diseases. It reduces the need for extensive treatment, which comes at a higher cost.[10]

> "*babyl* provides users with immediate care, regardless of location."

An evaluation conducted by Dalberg in 2018 also showed that the cost of a consultation using *babyl* (RWF 9,600) is higher than the average cost of a conventional in-person consultation with a healthcare worker at a physical facility (RWF 2,900-3,700). This additional cost is covered by *babyl* and external funders and does not fall on patients. However, to expand the platform, a reduction in costs is needed, which may be achieved through economies of scale over time.[6]

***babyl* provides users with immediate care, regardless of location. It reduces the waiting times experienced by users accessing health facilities and decongests the health system. Ultimately, the cost-effectiveness of *babyl* can only be understood relative to health outcomes achieved and these may only be visible over time.**

1.5 Impact: what difference does the intervention make?

babyl is enabling the provision of healthcare throughout Rwanda, including remote and impoverished areas where access to care is scarce. As its users are representative of the general population, *babyl* has managed to make healthcare more equitable and convenient.[6] The ratio of practitioners to patients in Rwanda is below the recommended threshold.[6,10] The use of *babyl* improves accessibility[6] and this is done by reducing the time required for each consultation and the reallocation of human resources in a more equitable way.[6]

The benefits of *babyl* extend to both the user and health system. For the user, care is more accessible and convenient. For the health system, the burden of care is reduced and facilities are decongested.

Through the integration between *babyl* and the health system, patient information is easily accessed. Longitudinal record-keeping may assist the health system to identify outbreaks and endemics. However, there is a risk of false impersonation leading to insurance fraud. This is being addressed through the use of identity numbers that are linked to SIM cards.[5]

Research into the clinical impact of *babyl* is lacking, although an evaluation is currently underway.[3]

***babyl* can be viewed as one of the largest clinics in Africa, consulting with approximately 1.5 million patients to date.**[6]

> "babyl is enabling the provision of healthcare throughout Rwanda, including remote and impoverished areas where access to care is scarce."

1.6 Sustainability and scalability: will the benefits last?

babyl doesn't currently function at an optimal scale. At present, 95% of users don't experience the full convenience of *babyl* as they still incur some transportation costs. This is because they are not aware of the service provided by *babyl* before accessing care at a physical facility – 79% of patients access the *babyl* service through the awareness and recruitment drive once they're already queueing at a facility.[6] As mentioned above, the cost of care provided through *babyl* exceeds that of conventional care. However, costs may be reduced as a result of economies of scale with increased growth. Fraud prevention and access to care also need to be established at a larger scale.

To make use of *babyl*, mobile phone penetration, network coverage and SIM card registration are required. These pose barriers to the sustainability and scalability of the project. Some of these technical barriers have been addressed and call centres with internet access have been established for practitioners to have access to the necessary infrastructure. The platform also moved away from the need for a smartphone application due to the low coverage of smartphones. Instead, a USSD system is used. However, users are still required to make payments with mobile money, which they're not always able to use.

The affordability and scalability of *babyl* is also expected to improve with the introduction of an AI chatbot,[11] which will provide triage and initial advice. This will assist in expanding the service through the reallocation of human clinical resources and provide a further alleviation of the burden on the current healthcare system. In 2018, Rwanda reported literacy rate of 73.2%, with a higher primary school completion rate in rural areas.[12] However, literacy levels are lower among individuals aged 60 years and older.[12] The use of an AI chatbot may therefore be effective with most of the population, especially those in rural areas, while excluding the elderly.

Although *babyl*'s coverage is extensive, scale has not been reached. Various technical barriers such as network coverage, mobile phone penetration and fraud prevention still require scalable solutions. Cost-effectiveness compared to conventional care is another potential barrier to the scaling of the project.

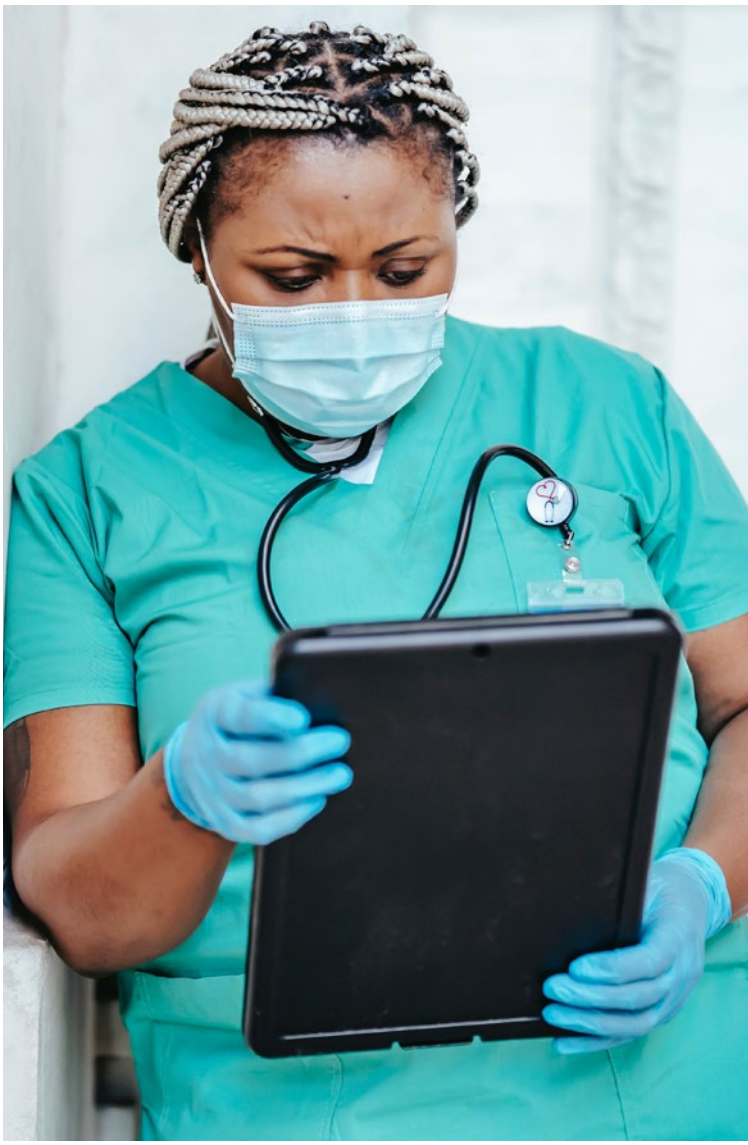
"The affordability and scalability of babyl is also expected to improve with the introduction of an AI chatbot"

https://www.babyl.rw/

1.7 Key takeaways

- **As a digital health solution, *babyl* has significantly improved access to primary healthcare in Rwanda, especially in remote areas where conventional care facilities are not easily accessible.** The decentralisation of care helps to reduce waiting times at conventional care facilities and encourages patients to seek healthcare earlier.
- **Collaboration with the Ministry of Health has allowed for successful integration with existing care delivery systems and facilitated task-sharing among existing healthcare providers.**
- **Uptake and acceptance from healthcare providers and patients required tailored interventions.** It was important for providers to highlight the benefit of decongesting the healthcare system, as well as the opportunity to earn additional income. For patients, in-person discussions with potential users proved more successful than general media campaigns.
- **Electronic record-keeping and transferability of data into the existing healthcare system help facilitate continuity of care.**
- **SMS laboratory test requests and medication prescriptions may further facilitate continuity of care and patient adherence.**
- **The cost-effectiveness of *babyl* consultations compared to usual care has not yet been established.** Future cost-effectiveness evaluations may however benefit from investigations at a societal level, with consideration of potential long-term gains from earlier disease detection and treatment, greater access to care, shorter waiting times and a reduced burden on the existing healthcare system.

"Collaboration with the Ministry of Health has allowed for successful integration with existing care delivery systems and facilitated task-sharing among existing healthcare providers."



References

1. *babyl. Babyl* – Rwanda's Digital Healthcare Provider. Accessed November 3, 2020. *http://www.babyl.rw/*
2. *The Law on Investment Promotion and Facilitation Republic of Rwanda.*
3. Percept. *Percept Interview with Patrick Singa from Babyl.;* 2020.
4. World Health Organization. *PRIMARY HEALTH CARE SYSTEMS (PRIMASYS) Case Study from Rwanda.;* 2017.
5. The New Times. Babyl Rwanda on providing digital healthcare . Published 2017. Accessed November 9, 2020. *https://www.newtimes.co.rw/section/read/222717*
6. Dalberg. *Assessing the Case for Digital Health Using Babyl's Experience in Rwanda.;* 2019.
7. World Population Review. Rwanda Population 2020 (Demographics, Maps, Graphs). Published 2020. Accessed November 13, 2020. *https://worldpopulationreview.com/countries/rwanda-population*
8. halodoc. Halodoc - Complete Health Solutions in Indonesia. Published 2020. Accessed November 10, 2020. *https://www.halodoc.com/*
9. MobiHealthNews. Indonesia's Halodoc raises close to a total of $100M after latest funding round. Published 2019. Accessed November 10, 2020. *https://www.mobihealthnews.com/news/asia-pacific/indonesia-s-halodoc-raises-close-total-100m-after-latest-funding-round*
10. Uwaliraye P, Ndimubanzi P, Muhire A, Lyle V, *Ministry of Health. Integration of Health and Medical Innovations in Rwanda to Promote Health Equity.; 2019.*
11. The New Times. Babyl's chatbot to enhance digital healthcare platform. Published 2018. Accessed November 9, 2020. *https://www.newtimes.co.rw/section/read/227369*
12. Rwanda's literacy rate rises | National Institute of Statistics Rwanda. Accessed January 18, 2021. *http://statistics.gov.rw/node/1086*

PERCEPT

HEALTH · SOLVE