REPORT

# Expanding Access to Education, Energy and Health Services Through Digitally Enabled Delivery in Lesotho

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FINMARK TRUST
Making financial markets work for the poor

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**About FinMark Trust**

FinMark Trust is an independent non-profit trust whose purpose is 'Making financial markets work for the poor, by promoting financial inclusion and regional financial integration'. We pursue our core objective of making financial markets work for the poor through two principle programmes. The first is through the creation and analysis of financial services consumer data to provide in depth insights on both served and unserved consumers across the developing world. The second is through systematic financial sector inclusion and deepening programmes to overcome regulatory, supplier and other market level barriers hampering the effective provision of services. Together, these programmes unlock financial inclusion and sector development through a symbiotic relationship between rigorous data collection and research activities. Our work can be found in South Africa, throughout the SADC region and the global arena.

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# Access to Basic Services – 1 of 5 reports

Innovative programmes are required to help the poor rise out of long-term poverty and link vulnerable communities to services that build their human capital, like health and education. Affordable and more easily accessible access to basic services is likely to increase productivity, enabling individuals and households to strengthen and diversify their livelihoods.

This study focuses on five countries in the SADC region – Botswana, Lesotho, Madagascar, Malawi and Eswatini.

This scoping study has been conducted to identify the barriers and opportunities to enable affordable digital delivery and access to basic services.

- **Purpose:** New and existing knowledge is developed and utilised to improve access to education, health and clean energy service delivery systems.
- **Overall objective:** To generate insights from selected countries about the countries' landscape across these basic services and to identify blockages, partners and potential digital interventions that will broaden access.
- **COVID-19:** Align with COVID-19 recovery strategies and policies at a country level and identify intervention areas to support COVID-19 recovery.

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# Executive summary

Access to basic services such as health, clean energy and education is an important aspect in Lesotho's quest to achieve the 2030 Sustainable Development Goals (SDGs). Lesotho's least developed country status means that socio-economic challenges, including widespread poverty, large rural populations, gender disparities and poor infrastructure create a particular imperative to expand access to basic services to the most vulnerable population segments. However, Lesotho's mountainous topography and limited road network increase the cost of basic service delivery. The country also faces service delivery hindrances that are common in many other African countries, including governance, tax collection and limited fiscal resources. COVID-19 is placing added pressure.

*Against this context, how can basic service delivery be enhanced and what solutions can be leveraged to achieve this?* This study looks specifically at how access to basic services in the education, energy and health sectors can be improved through *digitally enabled delivery models* in Lesotho, with specific emphasis on the role for donors, development agencies and market systems facilitators in achieving this aim.

Digitally-enabled delivery models refer to a broad set of implementation models underpinned by technological innovations. Essentially, these models leverage digital technologies (digital tools and digital channels) in order to enhance the delivery of a product and/or a service to consumers. This might be in the form of connecting users to digital content or virtual access to service providers like doctors or teachers. The rate of digital transformation globally means that a wide range of digitally-enabled models are already being used to enhance access to basic services:

- In **energy,** solar home systems and solar or hydro min-grids are emerging as the main digital delivery models to extend electrification beyond the reach of the national grid

- In **health**, telehealth, m-Health and digital marketplaces models are capable of connecting users to healthcare practitioners, digital diagnostic tools and health product supply chains

- In **education**, both e-Learning and tutoring and digital content libraries provide a digital platforms for learners to access teachers and educational resources

Based on desktop research, regulatory review and consultations with more than 20 market and regulatory stakeholders, the study finds there is a clear need for digital delivery in Lesotho given the socio-economic profile, challenges to public sector reach and delivery, and topography. There are also some existing examples of digital delivery innovations across the three sectors, albeit with limited ability to scale so far[1].

However, the local context in Lesotho means that not all models will be a viable option for Lesotho or even appropriate in helping to overcome the basic service-delivery challenges facing individuals. A feasibility assessment of potential digital delivery models across the three basic services sectors suggests that, in energy, mini-grids may offer a more sustainable medium-term solution to meet the power needs of off-grid households. In health, the m-health model may be the most straightforward model to pilot and is likely to be the most accessible to users given current market conditions. In education, the digital content library model may be feasible to introduce in urban areas initially, leveraging key partnerships in South Africa.

The experience to date shows the need to start small, the importance of patience to create the right enabling environment, as well as, as the health example shows, the need for partnerships across the public, private and donor sphere to reach scale. It also underscores the need for a physical link to most

[1] This includes the imminent roll out of mini-grids by OnePower, thermal cookstoves with solar charging functionality by African Clean Energy, small-scale initiatives facilitating learner access to technology such at the Lesotho Learning Hub and pilots for m-health initiatives to deal with the implications of HIV/AIDS such as the Vodafone Moyo, which was run in partnership with government.

digital models: an agent network, physical infrastructure, connectivity and hardware (access to devices or equipment) are all likely to remain important factors to the success of digital delivery in the foreseeable future. Furthermore, digital payments are an important enabler across the three basic services sectors[2].

The analysis identifies a number of a cross-cutting roles for development agencies and market system facilitators, such as FinMark Trust, in expanding access to basic services via digital delivery across the three sectors:

- **Building an enabling environment.** The stage of digital maturity of a country matters. As the Lesotho context illustrates, there are a number of structural issues that may need to be resolved, such as the cost of devices and data and access to the internet. Thus, there is a need to consider policy interventions (like removing tariffs on digital devices and services) that may help to increase the feasibility of digital delivery models. There is also a need for technical assistance to regulators in creating an enabling regulatory framework that will ensure a level playing field with clear and facilitative regulatory parameters.

- **Convening ecosystem actors to facilitate dialogue.** There are often silos across the public sector as mandate holder for basic services delivery and private sector innovators and delivery partners who can solve challenges of extending reach on the ground. This highlights the role for a market system facilitator in establishing forums for open and ongoing dialogue between market incumbents, potential innovators and regulatory authorities across different relevant spheres3, to ensure a joint understanding of the market needs and imperatives. This need takes on a new dimension in light of the COVID-19 pandemic, where physical convenings are challenged.

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[2] For example, under Vodacom's Pay School Fees with M-Pesa Campaign, launched in 2018, over 95 schools have been registered to receive their school fee payments through M-Pesa. Through Vodacom's M-Pesa network there is still scope to increase the reach of digital payments for use cases such as bill payments in the for electricity and health services.

[3] Notably, the sector regulator as well as telecommunications or ICT authorities.

- **Brokering partnerships.** For innovation to happen, broad-based dialogue needs to translate into concrete partnerships[4]. The most far-reaching role for a market systems facilitator may therefore be to identify and act on high impact-potential partnerships, particularly in establishing the digital payments link that would enhance efficiency across various digital delivery models.

While this research identifies these, and other, key considerations for thinking about and mapping out initial steps in this space, enhancing access to basic services in Lesotho is likely to remain a long-term game, requiring a presence in-country to support initiatives and drive partnerships on the ground.

[4] Partnerships are key to resolving access challenges – for example, zero rating fee partnerships between MNO and basic services providers may help to reduce usage frictions.

# 1 Introduction

The Kingdom of Lesotho is a small, landlocked country in southern Africa, completely bordered by South Africa. Geographically, it is the only country in the world where more than 80% of the country lies above 1,800 m (MRC, 2018). It is divided into 10 districts and subdivided into 129 community councils. Lesotho has a small population of 2,125,268, with 71% of the population living in rural areas and 29% in urban centres. The country is classified as a lower-middle income country, with approximately 28% of the total population living below the international poverty line of USD1.25 a day (World Bank, 2017). The unemployment rate remains high and is estimated at 24%. Approximately 70% of Basotho households in 2016 earned below M1,000 (USD70) a month (Housing Finance Africa, 2018).

Significant scope remains to expand access to basic services to the most vulnerable population segments, in line with national policy prioritisation to achieve the 2030 Sustainable Development Goals (SDGs). With its elevated topography and concentration of low-income individuals in rural and outlying areas, the country faces barriers to the delivery of basic services to the bottom of the pyramid, especially to those who face affordability challenges and are residing in outlying and hard-to-reach rural locations. Despite these challenges, however, Lesotho fares relatively well compared to the average sub-Saharan Africa (SSA) country as measured by access to energy, investments in education and health services cover (see Table 1).

**Table 1: Selected development indicators**

| Indicator/Region | Lesotho | SSA | High income |
|---|---|---|---|
| Access to electricity (% of population) | 47% | 48% | 100% |
| Total public expenditure on education per capita | USD80 | USD73 | USD2,003 |
| Universal health coverage service index[5] | 48% | 44% | 82% |

*Sources: (World Bank, 2018)*

In the age of digital transformation, this study considers what the scope is for digital tools and technologies to be leveraged to extend access to basic services. For digital technology to be widely adopted, device access and connectivity are needed. Mobile phone ownership is high in Lesotho, at 78.7%, though smartphone penetration is low at 45%. Internet penetration, however, is only 30%, with 83% of rural dwellers not using the internet at all. In urban areas, half of the Basotho population does not access the internet (ITU, 2018).

Digital payments can be an important facilitator of the use of digital technology for extending access to basic services. The uptake of mobile money in Lesotho appears significant: FinMark Trust (2019) reports 54,1% of adults to have 90-day active mobile money accounts[6]. Person-to-person (P2P) transfers are the mobile money transaction type with the highest number of transactions, followed by utility payments, airtime purchases and then person-to-business (P2B) transactions. Between 2018 and September 2019 the mobile money market saw an increase of 101% in volumes (228,640 to 459,300 transactions) of merchant payments (part of P2B). This can be partly attributed to the SIMM

[5] Coverage index for essential health services (based on tracer interventions that include reproductive, maternal, new born and child health, infectious diseases, noncommunicable diseases and service capacity and access). It is presented on a scale of 0 to 100

[6] This compares to a figure of 27.6% of adults (defined as fifteen years and older) with a mobile money account according to the 2017 World Bank Global Findex databased, available via the FinMark Trust data portal: https://finmark.org.za/data-portal

programme[7] and the natural evolution of mobile money usage in Lesotho (FinMark Trust, 2019).

The rest of this report considers how access to basic services can be improved through digitally enabled delivery models in Lesotho, with specific emphasis on the role for donors, development agencies and market systems facilitators in achieving this aim.

The report is structured as follows:

- Section 2 describes the research methodology.
- Section 3 presents a framework for assessing the feasibility of digital delivery models for basic service delivery.
- Sections 4 to 6 outline the country context, model overview, feasibility assessment and practical recommendations on the role of development actors and agencies in overcoming access and delivery challenges in each of the focus sectors. Section 4 considers education, Section 5 energy and Section 6 health.
- Section 7 draws cross-cutting conclusions and recommendations.

7 The Lesotho 'Scaling Inclusion through Mobile Money (Lesotho SIMM) programme is a product of the partnership of FinMark Trust, Lesotho Ministry of Finance and UNDP Lesotho. This programme is aimed at advancing access to formal and semi financial services for the poor through provision of a coordinated support | for development of an inclusive ecosystem for mobile financial services.

# 2 Methodology

This research assignment was commissioned and funded by FinMark Trust and completed by Cenfri between October 2020 and January 2021. It followed a mixed research methods methodology, focusing on crowding in the insights of industry and other ecosystem stakeholders. The methodology consisted of the following core activities:

- A literature review and desktop scan of global and local best-practice digitally enabled delivery models for expanding service delivery in the sectors of education, energy and health.
- A desk review of the macroeconomic, policy and sectoral landscape of Lesotho to provide a diagnosis of the country's context as it relates to basic services access and delivery.
- Expert interviews with ecosystem actors, including those from the public sector, the private sector, civil society organisations, development actors and donors.
- The development of a conceptual framework for assessing the feasibility of different types of digitally enabled delivery models for each sector,8 as a basis for conducting qualitative and quantitative feasibility assessments that identify those models with the highest potential for impact and reach.
- Testing the feasibility assessment results with ecosystem actors during an interactive virtual workshop.

Key terms or definitions referred to throughout this report to note are:

- **Digital transformation** is defined as the transformation of economic activities through digitisation and/or digitalisation. The former entails converting analogue processes into digital processes; the latter entails

[8] These assessments were conducted for the sectors of energy, education and health, but the conceptual framework and assessment approach could well be refined and applied to other sectors of service delivery and additional countries.

inserting digital processes into the workings of businesses or everyday life (The Enterprises Project, 2020).

- **Digitally enabled models** refer to a broad set of implementation models underpinned by technological innovations; essentially, these models leverage digital technologies (e.g. digital tools, digital channels) in order to enhance the delivery of a product and/or a service to consumers (Fourweekmba, 2020).

- **Digital tools** are programs and website and/or online resources that make it easier to complete a task, e.g. machine-learning applications (Department of Health and Social Care (UK), 2020).

- **A digital channel** refers to a digital platform through which communications and/or payments can occur, e.g. mobile money channels.

# 3 A framework for assessing the feasibility of digitally enabled delivery models

The rate of digital transformation globally means that a wide range of digital enabled models are already being used to enhance access to basic services. Digitally enabled delivery models have the potential to also enhance access to basic services in the energy, education and health sectors in Lesotho. However, the local context means that not all models will be a viable option for Lesotho or even appropriate in helping to overcome the basic service-delivery challenges facing individuals. It is therefore vital to assess the feasibility of each model independently, considering both demand- and supply-side drivers.

Sections 4 to 6 will outline and assess the feasibility of digital delivery models in each of the study sectors. This section describes the analytical framework that will be applied for assessing the feasibility of models in the particular sectoral context. The framework consists of four key feasibility criteria: affordability, access, regulatory feasibility and market dynamics.

- **Affordability.** Elements such as the cost of accessing and using the digitally enabled delivery model, the level of disposable income of the consumer or household and their expenditure habits all play a role in determining how affordable these models are for a particular target segment or group of users.
- **Access.** A number of factors contribute to the proportion of the population that will ultimately be able to access the model. These include:
    - **Digital connectivity.** Digital connectivity is a decisive factor when seeking to exploit fully the opportunities of digitalisation through digitally enabled delivery models. It is therefore important to understand the extent to which ICT infrastructure and mobile devices are readily available for communication and transactional purposes in Lesotho – this would also consider whether public institutions such as schools and medical facilities have internet access, for example.
    - **Analogue support infrastructure**. Digitally enabled delivery models rely on a combination of digital and physical layers in

order to be effective. One of the physical layers needed is a distributed agent network that enables ongoing person-to-person engagement for customer onboarding, delivery, and product maintenance, among other things.

    - **Basic physical infrastructure.** Finally, it is important to consider to what extent basic physical infrastructure such as road networks, national power grids and basic service institutions such as schools and clinics are present and accessible.

- **Regulatory feasibility.** This refers to government structures, regulations, policies and incentives that can either support or impede the delivery of basic services either through existing channels or through digitally enabled delivery models.

- **Market dynamics.** This refers to the viability of the digital model from the provider's perspective. This is affected by a number factors, but for the purposes of this research the focus is on the level of competition in the market and the scalability, given any potentially large barriers that may need to be overcome.

In Section 4 – 6, the starting point for the feasibility assessment for each sector is understanding the context within which digitally enabled solutions can be applied and the core challenges faced in expanding access to these services. Then best-practice models that could best help overcome the specific delivery and access challenges faced in the sector are assessed, based on a non-exhaustive scan of models in Africa and globally. The feasibility of each of these key models is then deducted by applying the analytical framework as set out above in the Lesotho context, in order to form the basis for recommendations per sector for Lesotho.

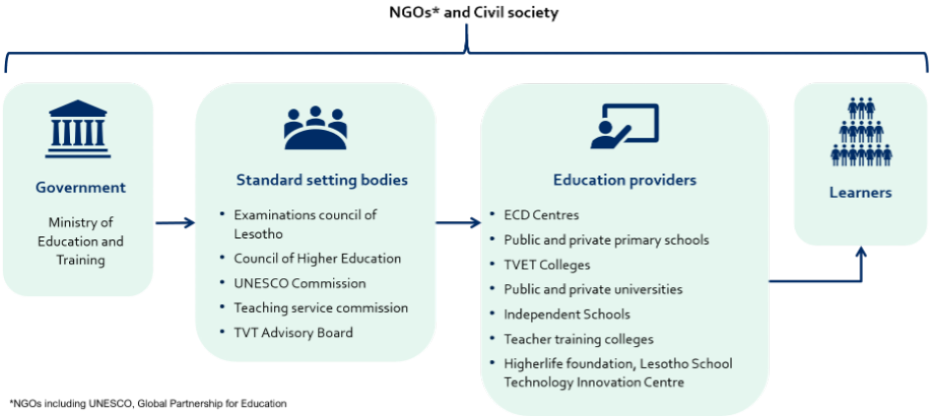
# 4 Education

Development of the education sector in Lesotho remains slow and faces a number of challenges, including a lack of qualified teachers, a dearth of widespread access to learning materials, and the affordability of secondary education. The Covid-19 pandemic has further exacerbated the access and delivery challenges in this sector, highlighting the need for innovative educational technology (EdTech) models as a way to reach out to and support children in the continuation of education and improved access to educational content and resources.

## 4.1 Institutional arrangements and supply-side dynamics

***The government's vision of ensuring a literate and productive society is grounded in its 10-year National Education Sector Plan (NESP).*** The 2016–2026 National Education Sector Plan aims to improve access, quality and equity in order to enhance the relevance and applicability of skills, institute an appropriate curriculum and best practices in teaching at all levels and transform institutions in the sector to be world class. The current organisational structure of the education sector is shown in Figure 1 below. The Ministry of Education and Training holds the main government position in consultation with various domestic and international standard-setting bodies to ensure that the mandate of the NESP is upheld.

**Figure 1: Education market overview: Supply-side actors and interlinkages**




*Source: Global Partnerships (2016)*

***Public-sector spending on education declining, despite being named a top priority.*** According to UNICEF (2019), limited fiscal capacity has resulted in a 6.9% cut in education spending (in real terms) in 2019–2020. Looking over a longer historical period, the Government's education budget has been on a declining trend in relative terms, from 7.9% of GDP in 2014–2015 to 6.6% of GDP in 2019–2020. Education spending as a percentage of total government expenditure is lowest in Lesotho (14%) as compared to regional partners such as Swaziland (15%), South Africa (19%), Botswana (22%) and Namibia at 24% (UNICEF, 2018).

***The majority of schools in Lesotho are owned by faith-based organisations.*** In 2017, there were 1,478 registered primary ***schools and agencies in Lesotho, most of them church-owned*** (Global Partnerships, 2016)***. The Catholic Church has the majority (34%), followed by the Lesotho Evangelical Church (32%) and the Anglican Church of Lesotho (12%). Some 11% of registered primary schools and agencies are government-owned***[9]***, whereas 4% are community-owned and only 1% are private*** (Bureau of Statistics Lesotho, 2018)***.***

[9] 56% of the education budget is spent on primary education.

## 4.2 Access and affordability of education services

***Lesotho fares well in getting children into primary school, but not in transitioning learners successfully through secondary levels.*** According to Global Partnerships (2016), universal free education, alongside the government's investment in building schools in rural areas,[10] has seen the national primary enrolment rate reach more than 80%. These policies have been further complemented by interventions such as school-feeding programmes, child grants, the provision of learning materials and the integration of children with special educational needs into primary schools. The latest available data from the World Bank (2017) suggests that Lesotho's primary school access exceeds comparative global statistics: the gross intake ratio[11] in the first grade of primary education, for instance, is 120% for Lesotho, compared to 114% for SSA and 105% globally. Despite these improvements at primary school level, secondary education enrolment rates lag significantly behind primary level, at less than 50%.

***Basic infrastructure lacking, thereby deterring continuous school participation.*** More than half of the schools nationally operate in informal and ill-equipped spaces such as huts, church halls, tents, or outside. Moreover, only 50% of schools have access to electricity (World Bank, 2020). The lack of appropriate and enclosed classroom spaces arguably contributes to absenteeism and the high dropout rates of learners, especially during winter months when the high altitude means that temperatures in Lesotho reach uncomfortably cold levels.

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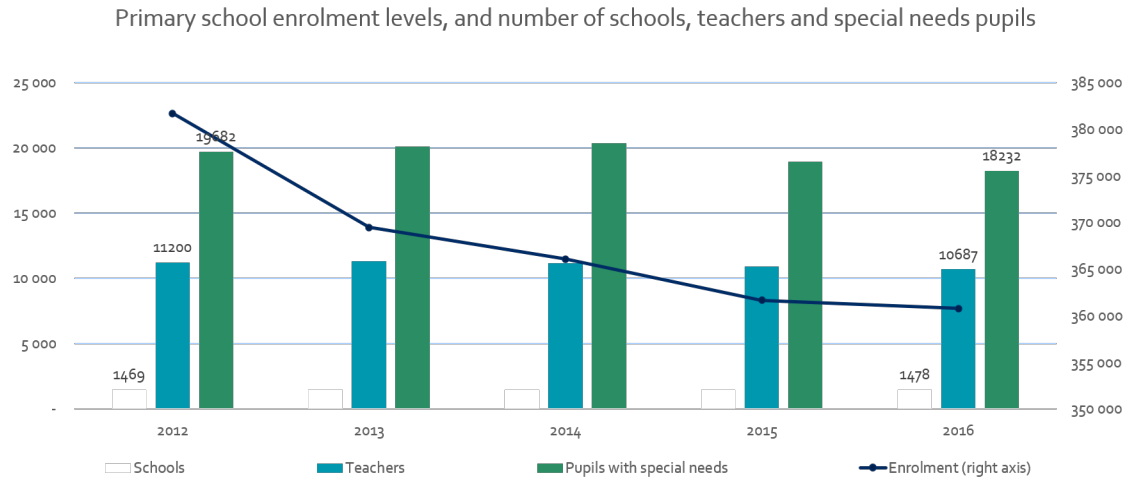
[10] The total number of primary schools increased continuously from 1,469 in 2012 to 1,478 in 2016 (see Figure 2), underpinned by the government's school-building investment efforts in remote areas.

[11] The Gross Intake Ratio (GIR) can exceed 100% because of the inclusion of under and/or over-aged students. This can be due to grade repetition and early or late entrance to school. See (UNESCO, 2021) for more information.

***Poor quality of education delivery, low number of schools and shortage of human resources of further concern.*** Schooling participation rates are not the only concerning issue; the quality of education in the country is poor: Lesotho lags behind average regional learning outcomes in critical learning areas such as reading and mathematics (Global partnerships, 2016). Alongside this, and perhaps a contributing factor, the number of teachers in Lesotho has declined (see Figure 2). Moreover, many teachers are unqualified. The World Bank (2019) quotes an earlier government report finding that 51% of primary school teachers in mountain areas were unqualified (without a teaching certificate), compared to only 24% in the lowlands. This increases the rural–urban divide in education quality. Challenges in attracting and retaining qualified teachers in remote areas persist, and the recent COVID-19 pandemic has further exacerbated the situation, having caused delays in the physical onboarding of teachers.

**Figure 2: Number of schools, teachers, and enrolled learners at primary school level in Lesotho**




*Source: Bureau of Statistics Lesotho (2018)*

***Secondary education remains unaffordable for many, despite public-sector intervention.*** The high poverty levels as mentioned in Section 0 makes affordability a serious constraint to secondary school access, despite a national cap on school fees (Lesotho Times, 2011). A study tracking the average annual costs for students across four secondary schools in Lesotho found that typical costs range from M7,435 to M9,120 (USD522 to USD642) for day scholars and M9,185 to M12,720 (USD649 to USD896) for boarding students, including examination fees for Grades 10 and 12 at M905 (USD64) and M1,600 (USD113) respectively (World Bank, 2019). These costs are prohibitive for many children from rural backgrounds, particularly, because the costs are approximately the same as the GDP per capita in Lesotho (World Bank, 2019).

## 4.3 Best practice digitally enabled delivery models in education

**E-learning and tutoring** and **digital content library** models have been identified as two potential solutions to some of the key challenges facing the education sector in Lesotho, such as the lack of teaching /learning resources, low levels of basic computer skills for learners and low learner outcomes. These models provide primary and high-school learners with reliable and affordable access to the essential educational resources needed to ensure key learning

outcomes in Lesotho – outcomes that would be important for the attainment of SDG 4[12].

## e-Learning and tutoring

***Interactive learning model.*** The e-learning and tutoring model enables learners to make use of a mobile device to engage interactively with digital education content such as courses, modules and training for remote learning purposes. Through a mobile device a simple platform connects learners to educational resources meant to supplement the national curriculum. Key features common across this type of model may include an "Ask a Teacher" function, where students can ask questions to a pool of teachers or tutors also connected to the platform and receive responses. There may be a financial incentive for tutors who would be able to reach a greater number of learners while teachers would be able to engage in a more focused way with learners who use this service. Learners will also be able to access lessons and quizzes as part of their revision and homework. At present, this type of model is operational in countries such as Kenya and Zambia.[13] In Kenya, for example, M-Shule (see Box 1) had reportedly reached around 20,000 students in 2020. Meanwhile, a similar player, Eneza Education, reached 1.6 million subscribers across Côte d'Ivoire, Ghana, Kenya and Rwanda, with 1.5 million of them being in Kenya. This model is not yet active in Lesotho. Stakeholder noted several steps to be completed before operations can begin:

1. Engage with regulatory authorities for education and telcos
2. Seek approval from the relevant education board for content used
3. Seek approval from the relevant education board for accreditation of teachers.

[12] Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

[13] Briterbridges (2020).

To ensure the appropriateness of content used, service providers may collaborate with private publishers as well as schools and the Ministry of Education. Depending on the technical expertise of the provider, it may be appropriate to partner with telcos and leverage existing rails to effectively reach learners.

***Three main cost drivers.*** The main cost drivers identified through stakeholder consultation for this model are implementation, content adaptation and skills.

- **Implementation.** The actual cost of sending an SMS is a big driver. While certain providers enable learners to send free messages, providers pay a negotiated rate with MNOs to do so.
- **Content adaptation.** While the technical process and learner support can be automated, each time content is adapted human labour is required, which drives up costs.
- **Shifting to other channels.** As these models grow, they may seek to incorporate additional channels beyond SMS such as browser and mobile app functionality. Making this switch is likely to involve further investment in software, processes and skills.

**Box 1: M-Shule**

M-Shule is the first personalised, mobile learning platform in Africa to empower learners through adaptive learning and SMS. M-Shule's platform uses machine learning to provide personalised training, life skills information, and data tracking over SMS and chatbots. Learners access instructional, academic or vocational content on the most basic phones, with no need for smartphones or the internet. The adaptive platform uses SMS interactions to deliver self-development tools, personalised lessons and micro-courses that adjust topics and pathways to users' individual needs, backgrounds and performance. At present, M-Shule is operational in Kenya and has reportedly reached around 20,000 students in Kenya in 2020.

For educational training, learners receive more difficult content when they do well, or easier content if they need to build foundational knowledge. Their learning profile dynamically updates based on their tracked learning progress and selects the best next sets of content and information to maximise their potential. As learners interact, the platform analyses

their performance and progress, after which the analytics, insights, and reports are shared with the learner's school, teacher, and parents through SMS and web-based channels, allowing the student's performance to improve through SMS learning. In this way, this model can help to inform targeted learning approaches based on the relative strengths and weaknesses of a specific learner.

*Source: (M-Shule, 2020)*

***Moving away from internet connectivity to boost access.*** While many educational technologies rely on an internet connection, an increasing number of e-learning and e-tutoring models in Africa are shifting their focus to enabling learning via SMS or USSD, given the lack of mobile connectivity and the cost of data. In Lesotho, only 24% of mobile devices owned are smartphones, whereas just 32.5% of the population is connected to the internet (Lesotho Communications Authority, 2017). This suggests that only a small portion of the population would be able to access an e-learning and/or an e-tutoring model this way. Relying on SMS and USSD, more familiar and accessible channels for a greater number of households, including the most vulnerable, seems to be a more viable option. Nevertheless, there are a number of initiatives in the public schooling system to drive internet connectivity in schools in Lesotho. Vodacom, for example, had provided free internet connectivity to 90 schools as part of its Schools Connectivity Programme with a commitment to connect 200 schools by the end of the 2018 financial year, enabling more digital learning and access to content for learners[14]. The Universal Service Fund (USF) has also, over the last few years, supported the deployment of 46 base stations to remote areas and the connection of 40 schools to the Internet. As of 2016, 10 schools were provided with mobile labs and Internet access[15].

[14] BiztechAfrica (2018)

[15] ITU (2017)

***Data-driven, blended learning approach***. According to stakeholder consultations e-Learning and e-tutoring models often incorporate a blended learning approach that combines classroom time with online learning to build theory and practical skills, while providing access to guidance and support. This is done by collecting and analysing data relating to learner progress on the platform and sharing this with teachers to enable a more learner-centric approach to education. The analytics component is completed by the digitally-enabled delivery model provider or an affiliate organisation. It is also important to note that where learner-teacher ratios are unfavourable, this may limit time available for individual engagements between learners and teachers.

## Digital content library

***Access to digital educational content.*** According to key informant interviews, teachers in Lesotho often cite the lack of resources (e.g. textbooks and exercise books) as a significant challenge to reaching better educational outcomes. This model makes educational content such as textbooks and study aids available to learners in a digital medium through a mobile device. Platforms such as Snapplify (see Box 2) and Siyavula, which operate in South Africa, are good examples of this type of model. As with e-learning, these models are not yet found in Lesotho. However, stakeholder interviews suggest that a similar initiative was introduced by the Council for Higher Education (CHE) in response to the outbreak of COVID-19 in 2020. The Council piloted a platform with tertiary institutions that enabled tertiary-level students to access educational content and learning resources relevant to their university courses. The platforms were created by the relevant institutions/universities and the CHE then engaged with them to negotiate with Lesotho Communications Authority for zero-rating. In this way, continued learning was made possible for these students remotely.

***Multisided platform or content developer.*** Under this model, a provider acts in a similar way to a multi-sided platform through which suppliers and consumers are connected for the purchase of educational content – in this way, the model can act as an ecosystem facilitator. A benefit of this model is that through partnerships with different publishers, digital textbooks can be made available

at varying quality and price levels to suit the needs and income limitations of different schools and learners.

**Box 2: Snapplify**

Snapplify is an EdTech company that establishes a marketplace for digital education content, related educational services, and devices. Snapplify provides institutions with everything they need to create a secure, collaborative e-learning environment for students, including a 24-hour-access digital-library solution offering thousands of free ebooks and widely applicable curriculum-approved educational content supplied by partner publishers from across the globe. Moreover, Snapplify has developed its own hardware distribution solution for ebooks, the Snappbox.

Consultation with Snapplify revealed they are involved with two main types of player in the education sector. The first type includes traditional education publishers – Snapplify has around 400 content producers for whom they provide digital distribution as well as local players that are often well established but struggling to make the transition to digital distribution. Snapplify works with these players to provide a digital means for distribution and analytics.

The second type includes startups, such as EdTech startups, and others involved in education to produce content. Starting the education journey with textbooks, Snapplify is able to use their proprietary tech solutions to track learners and the textbooks that they're using and enable learners to use one profile to access and sign on for various EdTech partners that are part of the Snapplify ecosystem. In this way, one of the major barriers to onboarding new learners is removed. Beyond this, Snapplify also uses predictive machine learning in their search functionality and the personalised reading recommendations they provide based on a child's Lexile reading level, to recommend resources to learners and teachers.

Since starting their operations in 2011, Snapplify has been able to reach a range of institutions and learners in the education sector. This includes:

7,196 registered institutions

64,070 teacher users

14,766 librarian users

14,582 IT administrator users

369,988 learner users.

For pan-African reach:

64% of Snapplify's traction is in South Africa

8% in Kenya

8% in Nigeria

The remainder is split between 14 other key territories.

*Source: (Snapplify, 2020)*

Table 2 summarises the cost to consumer and current reach of the regional examples of education models:

**Table 2: Examples of education models, including costs and reach**

| Model | Provider | Cost to consumer | Reach |
|---|---|---|---|
| e-Learning and e-tutoring | M-Shule | USD4 per month | 20,000 users |
| | Eneza Education | 84 cents per month (USD) | 4 million users |
| Digital content library | Snapplify | Cost of content products | ~370 000 learner users |

## 4.4 Feasibility assessment

Table 3 summarises the feasibility assessment for each of the two digital education models, as compared to the public education system.

**Table 3: Feasibility assessment of education models**

| | E-Learning and tutoring | Digital content library | Public education |
|---|---|---|---|
| | • Enables continued learning to take place remotely, i.e. teaching, exercises, etc<br>• Low digital skills levels required for usage<br>• Feedback loop with schools<br>• Low-to-no data required (USSD/SMS mobile channel)<br>• Regulatory approval typically required | • Enables remote access to educational content<br>• Improves affordability of textbooks<br>• Requires data connectivity<br>• May require smartphone | • Free primary education<br>• Lack of resources to maintain the infrastructure<br>• Distance to schools challenging for learners<br>• Cost of secondary school difficult for many households to meet |
| Affordability | ✓✓✓ | ✓✓ | ✓✓ |
| Access | ✓✓✓ | ✓✓ | ✓ |
| Regulatory feasibility | ✓✓ | ✓✓✓ | ✓ |
| Market dynamics | ✓✓✓ | ✓✓ | ✓ |
| | | ✓ Low ✓✓ Medium ✓✓✓ High | |

Below, the feasibility assessment for each model is explained in turn.

## E-learning and e-tutoring

***Affordability: Cost within reach of low-income households in Lesotho.*** In Lesotho, the Government's school fee policy makes primary education free, resulting in high enrolment at primary school level (more than 80%). For secondary school, however, annual fees can range from USD41 to USD157, which represents around one-tenth of the average annual income (USD1,300) of the majority of households in Lesotho. In contrast, the cost of e-learning and e-

tutoring models ranges from USD5 to USD12 per annum in other parts of Africa. Overall, the secondary school fees being paid show that individuals are already investing in education and suggests that the low cost of these digital models would represent only a marginal additional investment.

***Access: Feature phones enhance accessibility.*** In Lesotho, mobile penetration is largely in the form of feature phones (Lesotho Communications Authority, 2017). These phones are often low-spec devices capable of basic functionality such as calls, SMS and USSD. These functions are key as they support basic payment channels such as mobile money and delivery models such as e-learning and e-tutoring models. Assuming a low-cost service is offered (around USD1 per subscription) and accounting for disposable income and education expenditure as a portion of total household expenditure, it is estimated that approximately **557,000** individuals (see Appendix for calculation) could be reached through these models, the main targets being primary and secondary school learners.

***Regulatory feasibility: Regulators open to digital interventions.*** Consultations with the Ministry of Development Planning in Lesotho suggest that the regulatory approval process for educational content is unlikely to be a significant barrier for prospective providers to enter the market. It is clear that the public sector has a strong focus on supporting innovative and alternative solutions, and is rapidly looking to onboard private-sector and donor support given COVID-19 pandemic challenges emerging for sustained education delivery in the country. It is also important to keep in mind that the content generated through this model is intended to be supplementary rather than a substitute for existing curriculum content. In cases where providers develop new or bespoke content for the Lesotho market, it may be important to work with people who have already developed approved content or have gone through the regulatory process. The content from those formats could then be adapted to work on SMS or USSD channels. This strategy may expedite the regulatory approval process.

***Market dynamics: Low competition suggests opportunity for new players.*** At present, there are only a limited number of providers of digital delivery models

in the education sector in Lesotho, which is predominantly serviced by public institutions. One case is the Lesotho Learning Hub (see Box 3); however, this Hub does not support remote-learning functionality. Again, it is important to emphasize that consultations with stakeholders in the education sector do suggest, however, that the education authorities are open to innovative players' entering the market to provide solutions that work to fill the gaps in the current setup, particularly in the light of the COVID-19 risks and restrictions. This may create an attractive environment for prospective providers seeking to reach the large, unserved pool of learners.

**Box 3:The Learning Hub**

The Lesotho Learning Hub, formed in 2013, is a completely donor-funded project of the Morija Museum in Lesotho. This interactive internet café targets learners and the youth so as to empower them with digital skills that will foster enhanced learning and broader business channels by ensuring access to film equipment, information and a stable internet connection. In addition, agents are available to teach learners how to be technologically savvy, analyse information and make technology work for them.

Since 2015, there have been more than 400 members. Users are required to pay an annual membership fee of USD6,50 to access the Hub's facilities. Approximately half of the members have been able to pay the fee before coming to the facility, whereas other members are sponsored by participating in voluntarily clean-ups.

COVID-19 lockdown restrictions have led to the Hub's not being operational as activities were primarily conducted in person. Other major challenges experienced by this initiative include limited funding opportunities and the lack of space, as the project has outgrown its current small location.

Opportunities to scale a similar initiative more broadly in other jurisdictions may be limited in the near term due to the ongoing COVID-19 pandemic and restrictions this may place on indoor gatherings. The availability of funding would be another prerequisite for extending reach.

*Source: The Lesotho Learning Hub (n.d.)*

## Digital content library

***Affordability depends on scale of ecosystem.*** The cost of digital content made available under this model can be varied and is likely to depend on the nature of the suppliers and consumers that can be connected within its ecosystem. For instance, where relationships can be developed with established publishers, the range of textbooks available is likely to be greater and their cost lower. Should a prospective provider already have connections with a broad range of suppliers and an established network, that may lead to more affordable products in the context of the Lesotho market.

***Access: Model reliance on smartphone devices and mobile data, limits scaling to low-income and/or rural population segments.*** This model is often reliant on access to a higher level of mobile technology than is the case with the e-learning and e-tutoring model. First, users are likely to require a basic smartphone device at the very minimum to be able to engage properly with digital content through this model. This already presents a challenge in the Lesotho market, where smartphone ownership is low and access to smartphones is limited. Secondly, consultations with the providers of this model indicate the need for a stable internet connection to access and download their digital content. Outside of the urban areas in Lesotho, where ICT services are neither broadly available nor stable, this presents a challenge to the extent to which individuals would be able to make use of this model. In this instance, collaboration between the providers of digital content models and local schools may lead to innovative solutions, such as the aggregation of content and caching on-site, to enable learner access to digital content under this model. Snapplify's "Snapbox" solution, for instance, has the potential to be moved to more urban areas for a time to enable content to be downloaded and then taken back to the rural schools, for example, where content can be shared with other devices without requiring internet access. Although not the most efficient solution, this is an example of the innovative ways in which users are overcoming connection challenges.

***Regulatory feasibility: Low regulatory hurdles for digital content model.*** The value in this model is that it offers a tech-based platform to effectively

aggregate content providers and consumers, with very little being created by the model itself. From a regulatory perspective this suggests that low levels of approval will be needed as the model simply curates educational material rather than advising on content. A further consideration relates to consumer data protection and whether the current regulatory framework provides sufficient protection to individuals using the digital content model. Lesotho's constitution does aim to protect consumer data through the Data Protection Act, 2011 which attempts to bring Lesotho into compliance with EU standards and to reflect SADC data protection standards. However, Lesotho's Data Protection Commission has not yet been appointed to enforce the Act and the body will likely have considerably less enforcement power than similar bodies in other jurisdictions given its stipulated powers in the Act. This raises a question around the extent to which digitally-enabled delivery models such as the digital content library model would have sufficient oversight.

***Market dynamics: Potential to scale not yet clear in Lesotho.*** While the level of competition in this space is currently low and there remains a need for alternative distribution channels for educational content for learners, the scalability of this model is not yet clear. At present, the landscape of mobile infrastructure is underdeveloped and would require a significant overhaul for it to get to a point where the model can be scaled sufficiently.

## 4.5 Recommendations for Lesotho's education sector

Given the current market context in Lesotho, it appears that the digital content library model would be feasible to consider investing in but may only be impactful in more urbanized areas. The most feasible route would be to support an existing player such as Snapplify to enter Lesotho, bringing with them their technical infrastructure, publishing partners and expertise, and connect them with potential local partners. Market systems facilitators such as FMT could play a role in identifying pilot communities and helping with physical onboarding, which makes an important contribution to the effectiveness of these types of model.

**Table 4: Education-sector recommendations overview**

***Partnership coordination important for ecosystem development.*** Partnership

| Proposed solution | Digital content library |
|---|---|
| **Partnership opportunity** | • Private sector<br>• EdTech providers<br>• Mobile network operators (MNOs) |
| | • Public-sector coordination institutions<br>• Ministry of Education, Lesotho |
| **Intervention areas** | • Piloting solutions in urban areas<br>• Zero-rating content for download<br>• Digital skills training for educators and/or learners |

formation will be a key element in supporting the growth of the digital content ecosystem in the case of Lesotho. There will need to be strong coordination between several key players to ensure access to this model, affordability and scalability. The key players that need to be reached out to include:

- The technical solution providers ( see Table 4) such as Snapplify;
- The Department of Education in Lesotho as it will have oversight over schools that can be integrated into this model, in this way providing an aggregator and an additional distribution channel for content to learners; and,
- Finally, MNOs, as it will be important to consider how various data arrangements, such as the zero-rating of data for digital-content platforms, may be implemented to realise widespread access and usage of these models.

***Mobile device access schemes needed to overcome barriers to ownership.*** The digital-content library model does require a mobile internet connection that can facilitate the download of sizeable content files and a mobile device that supports higher-quality resolution images for learners to engage with. The recommendation is that support and rollout should be focused initially in urban

areas of Lesotho where these conditions are more likely to be available, before expanding into more rural locations.

***Lessons from similar initiatives.*** It may be useful to engage directly with the Council for Higher Education about the nuances of their (digital) education platform pilot in the tertiary education system during the 2020 COVID-19 pandemic. They have initiated a study to gauge learnings, but at the time of writing the findings were not available yet. There may be cross-cutting implementation learnings that can be applied to the primary and secondary education contexts in Lesotho.

***Digital skills transfer for learners and teachers.*** Across all digitally enabled delivery models in the education sector, digital competences – apart from the most basic (such as using a mobile phone for voice calls or simple messages) – cannot be developed without foundational literacy and numeracy skills. In Lesotho, the relatively low level of digital skills is considered a barrier to the uptake of digital tools (DAI, 2020) and may therefore provide an opportunity for development agencies to intervene more directly in support of digital skills programmes or initiatives to develop these competencies for the use of digitally enabled delivery models.

# 5 Energy

Access to electricity in Lesotho remains limited for large segments of the population, particularly rural households, with the mountainous topography limiting the development of the national grid network in these areas. A key challenge is therefore to determine which innovative off-grid solutions are most appropriate for meeting the basic electricity needs of households in an affordable and sustainable manner.

## 5.1 Institutional arrangements and energy supply dynamics

***Hydro and imports main sources of electricity supply.*** The country has an installed generation capacity of 75.7 MW, which comprises 98.8% hydropower and 0.7% diesel. The Muela Hydropower station generates most of the country's electricity supply (accounting for approximately 86% of peak demand). However, in 2019 Lesotho shifted to being a net importer of electricity from Eskom in South Africa and Electricidade de Moçambique (EDM) in Mozambique. The Lesotho Highlands Development Authority (LHDA) is another entity tasked with managing Lesotho's hydropower capacity through the Lesotho Highlands Water Project (LHWP), a multi-phased project to provide water to the Gauteng region of South Africa and to generate hydro-electricity for Lesotho. Seasonal effects contribute to the net import demand of the country, especially in colder winter months.

***Solar a relatively untapped opportunity.*** Solar accounts for only 0.01% of the generation capacity in Lesotho. Despite Lesotho's being among the countries with the highest solar energy potential,[16] only a limited number of solar home

[16] There is a high potential for renewable energy in wind and solar as the country is one of the top four southern Africa countries with good, exploitable winds and has some of the highest annual solar radiation globally (Zhou & Simbini, n.d; World Bank, 2020).

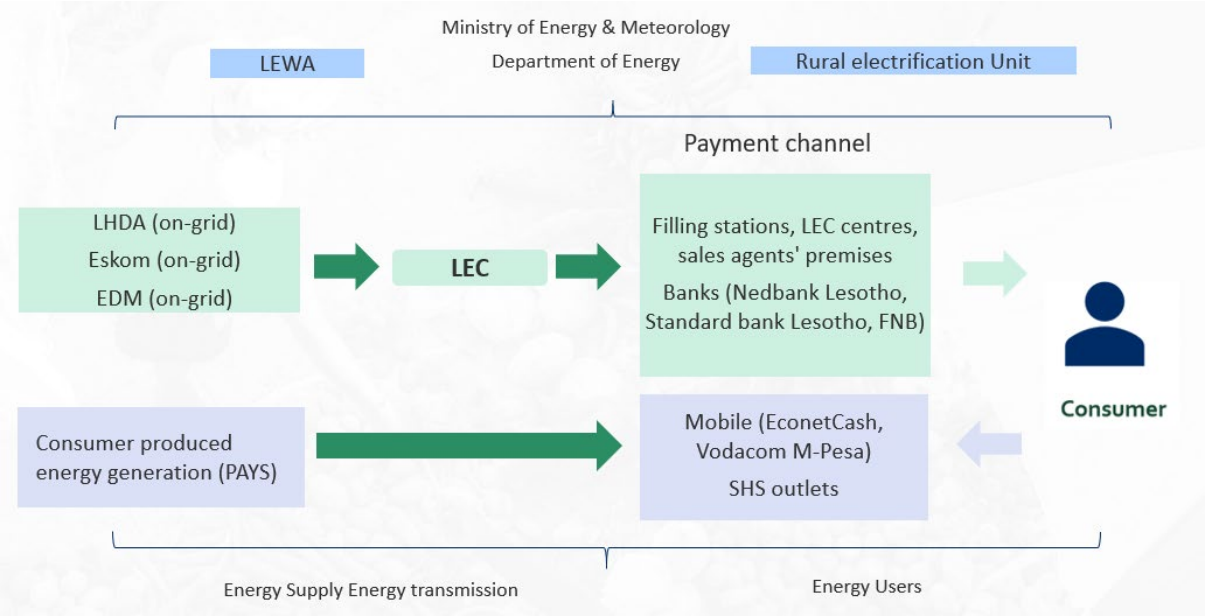
system providers are active in the country, and on the mini-grid side only one provider – One Power – has been granted the necessary regulatory approvals to pilot alternative solar-grid connections.

***Policy coordination via the Department of Energy***. Figure 3 below presents the supply-side actors and their interlinkages within the energy market. The Ministry of Energy and Meteorology, through the Department of Energy (DoE), is responsible for the overall administration and coordination of the energy sector in Lesotho. Additional organisations that report to the DoE include the Lesotho Electricity and Water Authority (LEWA), which deals with electricity and water regulation. Rural electrification is driven by the Rural Electrification Unit (REU). In the diagram below, the light green section is focused on on-grid supply while the light blue section focus on off-grid supply. Off-grid supply often makes use of a Pay As You Save (PAYS[17]) approach for repayment of SHS products.

***National energy supply and transmission is the mandate of parastatal Lesotho Electricity Company (LEC).*** The LEC owns and operates Lesotho's hydro-power stations and imports power from Eskom and EDM. The LEC is also responsible for electricity connections, billing and payments. Electricity payments can be made at LEC centres, filling stations, selected supermarkets and all banks. End-users can use a Pay as You Go model for both on-grid and off-grid electricity.

[17] Pay As You Save (PAYS) is a financial mechanism that allows a utility to pay for the upfront cost of a distributed energy solution and to recover its cost on the monthly bill with a charge that is less than the estimated savings. The customer sees positive cash flow at the start of operation, and once the utility is able to recover its costs, the equipment belongs to the customer (Cleanenergyworks, 2020) .

**Figure 3: Supply-side actors and interlinkages in Lesotho's energy sector**




*Source: Lesotho Electricity Company (2018); MRC Group (2018)*

## 5.2 Access, usage and affordability of energy services

***Low levels of electricity access, given on-grid distribution challenges at high altitudes.*** In 2018, the national electricity access rate was very low, at 47%, and even lower, at 38%, in the rural areas, where most of the population resides (World Bank, 2018). To illustrate how dire this is from an enterprise development perspective, approximately only 40% of small businesses in Lesotho have access to electricity as an input to business operations (World Bank, 2020). The densely populated areas are situated in the lowlands, where on-grid infrastructure is mainly located. Lesotho's challenging topography limits on-grid extension in rural, remote and sparsely populated communities situated in mountainous areas. Based on the in-country stakeholder interviews conducted, a consistent view emerged that it remains economically unviable to install on-grid transmission networks in these types of remote regions.

***Low levels of energy usage in rural areas tied to least-developed country status.*** Most people living in rural areas do not own electrical appliances and mainly rely on biomass sources of energy to provide for their cooking and

heating needs[18]. The average rural Basotho household consumes less than 30 kW per day, relative to approximately 40 kW for the average SSA country (Blimpo & Cosgrove-Davies, 2019). This is due to electricity supply and affordability constraints in the high-lying and remote areas, associated with Lesotho's least developed country status.

***Electricity unaffordable for many.*** Domestic customers are the largest consumers of energy and among the highest payers of electricity charges (LEWA, 2018). Consultations with LEWA suggest the Government has implemented pro-poor pricing electricity pricing at 73 lisente for 30 kWh per month to ensure basic access to electricity. Yet the average consumption is declining as some consumers still cannot afford the basic electricity pricing. The higher kWh usage is charged at the standard rate of M1.48/kWh (LEWA, 2020).

## 5.3 Overview of best practice digitally enabled delivery models for expanded access to energy

Given the topographical and other challenges to the extension of the national grid, solar home systems (SHSs) and mini-grids have been identified as possible digitally enabled delivery models to contribute to Lesotho's energy challenges. These models could provide individuals and households with access to clean, reliable and cost-effective energy through the use of innovative infrastructure and technology.

[18] This has placed tremendous pressure on indigenous trees and shrubs. The country has lost forest cover at a rate of 50% a year from 1990 to 2010, leading to fuel wood being imported (World Bank, 2017). Furthermore, the stakeholder interviews suggest that the burden of unpaid work associated with collecting firewood to fill these basic household needs has a disproportionally negative impact on the livelihood experiences of women in rural communities.

## Solar home systems

***Plug-and-play solution to rural household electrification.*** SHSs are innovative and clean electricity sources that avoid domestic air pollution, noise pollution and greenhouse gas emissions. The photovoltaic technology used in SHSs is a relatively efficient way of delivering continuous limited amounts of electricity to remote off-grid households for lighting and appliances. In rural areas that are not connected to the grid, SHSs can be used to meet a portion of a household's energy demand, fulfilling basic needs for electricity. This system can be divided into multiple tiers based on the types of appliance used in the household (see Table 5 below).

**Table 5: Multi-tier matrix for measuring access to household electricity services**

| Tier 1 | Tier 2 | Tier 3 | Tier 4 | Tier 5 |
|---|---|---|---|---|
| Task lighting AND phone charging | General lighting and phone charging<br>AND television<br>AND<br>fan (if needed) | Tier 2<br>AND any medium-power appliances | Tier 3<br>AND any high-power appliances | Tier 4<br>AND any very high-power appliances |

*Source: World Bank (2015)*

Based on current electricity consumption trends in rural households in Lesotho, SHSs that provide enough electricity for Tier 1 and Tier 2 appliances are likely to be the most beneficial. An example of an SHS operator in Lesotho is Africa Clean Energy (ACE). It primarily focuses on energy efficient biomass-powered cookstoves but also incorporates a tier 1 solar component in the system.

**Box 4: Africa Clean Energy**

African Clean Energy (ACE) is a family-owned social enterprise founded in 2011 in Lesotho that provides renewable electricity and thermal energy to remote rural and peri-urban areas in Lesotho.

Since starting operations, approximately 60 000 biomass stoves have been sold around the world and with the majority of sales in Southern Africa. The company has since expanded to other developing countries such as Uganda, Cambodia and now Kenya, but with primary manufacturing still being conducted in Lesotho.

The basic ACE connect package consists of the cooker stove plus 10-watt solar panel, built in battery and USB port to connect an LED lamp attachment. The price ranges from USD111 cash or USD115 paid in instalments over ten months, at no interest, with an initial deposit of USD17. This is much lower than the deposit required for the prepaid meter installed by the LEC.

The ACE Stove enables phone charging which enables users to save money as don't have to pay to charge their phones elsewhere and no longer pay for candles (built in battery and LED lamp). Consumers can also use stove for heat and cooking which relieves women from spending hours collecting fuel for fire and cooking. A recent survey highlighted that after 7 months people are able to save more money than they pay for the stove – key to this is an interest-free loan.

This model involves the distribution of interest-free loans for the first 10 months to make the model more affordable for consumers. To address defaulting loans, ACE has control of both the smartphone and the biomass stove that allows ACE to remotely shutdown the system until payments are made.

The ACE model relies heavily on a local sales and agent network to conduct onboarding and take up, address payment challenges, financial literacy challenges and offering maintenance services. They have no criteria for their target market, but would sell to anybody, without conducting any credit checks. At the time of writing, they had reached about 25,000 clients.

*Sources: Africa Clean Energy (n.d) and Lesotho Times (2020)*

***Innovative financing schemes key to uptake of energy models.*** Accessing finance remains a key challenge for low-income households in SSA and becomes a focal issue when considering appropriate energy models for widespread use. Low-income individuals are often seen as higher risk by banks and can therefore be charged substantially higher interest rates - up to 60-90% annualized. SHS providers have therefore acknowledged the need to offer lower-cost financing solutions to their customers as a way to make their products more affordable and accessible. ACE in Lesotho has made substantial progress with an interest-free model. This model involves the distribution of interest-free loans for the first 10 months to make the model more affordable for consumers. To address defaulting loans, ACE has control of both the smartphone and the biomass stove that allows ACE to remotely shutdown the system until payments are made. Consultation with ACE suggests non-repayment rates are low, with less than 10% of customers not following through on payments. In Malawi, Yellow Solar, is able to offer an effective rate of around 32% to consumers by positioning its price point low enough to generate added value for consumers. In this way providers can achieve greater scale and lower default rates on repayments making lower interest rates a sustainable model.

***SHS rely on incremental payment structure.*** Because of the relatively high upfront cost of SHSs (the average upfront cost of a Tier 1 system is USD23, whereas a Tier 2 system is USD45[19]) and low levels of disposable income at the household level in Lesotho, energy service providers (ESPs) often permit customers to pay for the SHS through small incremental payments over a longer period, and in this way they incur a lower upfront cost that may be more affordable. This is known as a Pay-As-You-Go (PAYG) payment structure. This structure not only provides greater flexibility to customers but also offers ESPs

[19] Refer to the Appendix of this report for more detailed costing information and assumptions.

a way of reaching price points more accessible to households and of providing greater control over the payment for and usage of the SHS.

***Maintenance of SHSs an ongoing concern.*** When compared to other models, such as a national grid or a solar mini-grid, the SHS represents a relatively lower-quality device that is designed to meet the basic electricity needs of households quickly, but is not necessarily built to be operational for extended periods. This can create ongoing maintenance risks and associated costs, should it be overused. Providers such as ACE are however able to collect data on the usage of the stoves by customers using GSM technology, which may help to identify and address harmful customer behaviour going forward. Stakeholder consultations revealed that common maintenance issues arising with these systems include: customers using the system to drive appliances the system is not designed to support; users being unfamiliar with these systems and their vulnerabilities, which leads to a breakdown of these systems. For instance, the batteries sold in SHSs deteriorate quickly when drawn below 50% of their charge. Where this is done continually, the battery is destroyed, rendering the system unusable. From the provider's perspective, the cost of sending out maintenance staff to each house and address where these faults occur can become unproductive, particularly where these products are fully paid off or fall outside of their service plan or warranty. Providers such as ACE do make use of their agent network to educate consumers on the safe use of their ACE stoves, which offers a potential approach to ensuring products are well-maintained.

***Physical distribution a key consideration for the SHS model.*** One of the keys to the scalability of the SHS model is the ability to establish or leverage an effective distribution network. A distribution network in this context comprises a combination of supporting infrastructure such as roads, warehouses for storing goods, vehicles for delivery of SHSs to households and an agent network to service various locations. In Lesotho, the mountainous terrain and the underdeveloped road network, particularly in rural regions, is likely to result in an additional layer of cost to make it feasible to operate on these routes. This will weaken the business case for providers seeking to operate in this market.

**Box 5: Pay-As-You-Go**

The PAYG business model is an innovation that emerged to resolve the energy-access challenge and to provide electricity generated from renewable energy sources at affordable prices, with payments facilitated by the technologies available in these areas. Widespread use of mobile payment technologies, rich solar resources and declining solar Photovoltaic (PV)[20] and battery costs, coupled with increased awareness of these technologies, have been key drivers in the implementation of this business model.

Globally, ESPs have so far been offering PAYG packages with power-supply services that range from very basic power supply, including only lighting and phone charging (Tier 1) to more comprehensive packages, including the possibility of powering multiple home appliances (Tiers 2 and 3).

ESPs can provide either a "lease-to-own" model or a "usage-based payment" model.

The lease-to-own model, also referred to as the "consumer finance retail" model, involves customers paying for the entire generation capacity (i.e. SHS) in small instalments over a period of one to three years. A small solar PV system capable of powering light bulbs and small appliances, such as radios, and of charging mobile phones, is priced at approximately USD150. These systems are usually paid for in instalments over six to 24 months. Solar PV systems with batteries that can power major appliances that need uninterrupted supply (e.g. refrigerators) can cost up to USD1,000. This can be repaid by customers in instalments over six months to 36 months. More than 90% of SHSs operate using the lease-to-own model (Sotiriou et al., 2018). If a customer consistently fails to pay the daily, weekly or monthly rates, the ESP will go to the customer's house and remove the system.

The usage-based payment model, or the "micro utility" model, involves customers prepaying for the electricity supply (in kilowatt-hours). The customer loads money onto a prepaid meter and can use the amount of electricity that corresponds to the amount of

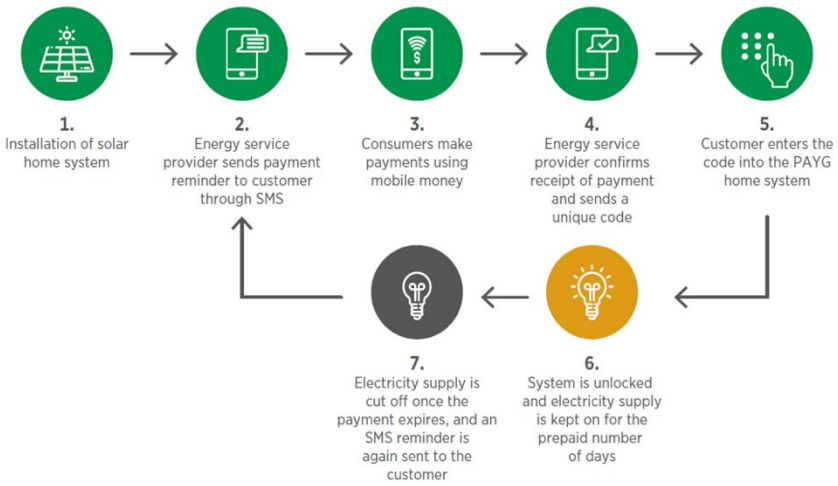
[20] Photovoltaic (PV) devices generate electricity directly from sunlight via an electronic process that occurs naturally in certain types of material, called semiconductors (SEIA, 2020).

money paid. Once the period lapses, the solar PV system is turned off automatically by the ESP through a remotely managed control system until the next payment is made. Unlike the lease-to-own model, the customer never owns the system but consumes only the electricity generated. Despite being used mostly in the context of solar PV systems, the PAYG usage-based payment model can be used for any type of system, including grid-supplied electricity. The payments are usually made via mobile credit, by sending a text message. The systems can feature a remote monitoring system that can be activated via mobile network connection.

There are PAYG solar home systems without remote monitoring systems, but they still have a SIM card built in to allow ESPs to shut them down remotely if payments stop. Some ESPs equip their systems with a GPS tracker to be able to locate the system anytime. Systems that do not have connectivity to GSM (Global System for Mobile Communications) are controlled by a simple timer that functions according to the payment code introduced by the consumer after the payment has been made. The visual below represents the PAYG concept.

*Source: (IRENA, 2020)*

## Mini-grid




***An off-grid community electrification solution.*** A mini-grid or microgrid is a miniaturised version of the larger grid, a configuration of energy resources,

distribution wires and buildings, all within a distinct geographic footprint. There is no size limit, but microgrids tend to be scaled to discrete operations, such as a small village, neighbourhood, community, business park, education campus, mine, or an industrial facility.

- Mini-grids developed in response to the growth in distributed generation, which brings generation closer to the point of consumption, and the microgrid concept allows local control over localised generation.
- Mini-grids also allow renewable energy resources to be used efficiently in communities isolated from the national grid. The size and development of microgrids allows smart grid features to be incorporated which optimises power generation, storage and use (Energize, 2020).

***Mini-grids experiencing growth in Africa.*** According to a 2018 Navigant report, the Middle East and Africa are forecast to be the world's fastest-growing market for mini-grids – at a compound annual growth rate of 27%, representing almost 1,145 MW by 2027. African governments are beginning to recognise the negative financial and environmental impacts of reliance on fossil fuels or biomass for energy, so forward-looking countries are shifting their policies in order to prioritise distributed renewable energy (Homer Energy, 2019). Mini-grids offer longer-term energy solutions and arguably more sustainable development impact. Most systems have a productive life span of 15 to 25 years, which is longer than many other clean-energy technologies such as cookstoves.

***Mini-grids not in competition with SHS.*** Owing to similarities in the technology used and the consumer segments targeted, SHSs and mini-grids are often perceived to be direct competitors in low-income markets. However, instead of competing, the two technologies are in fact complementary. SHS electricity has immediate appeal to householders because of its relative simplicity, but it serves only limited household electricity needs. Moreover, it cannot be scaled up to adequately power commercial businesses, health clinics, schools and other resources required for rural economic development. For that transition to occur, it is necessary to take the next step up the energy ladder to mini-grids,

which can handle more robust electricity generation. Solar lighting is a worthy first step, but it is likely that its users are going to discover – and want – the other amenities that electricity can bring.

***Mini-grids cater for growth in demand***. Another advantage of mini-grids vis-à-vis SHS is that they allow for growing electricity demand. The introduction of electricity may support local economic development, which will generate additional electricity use cases. Stakeholder interviews indicated that mini-grid providers model not only current demand, but also potential future demand. This modelling is largely based on data from recently electrified communities to build a probability function and generate realistic forecasts of a community's electricity demand. Mini-grid systems can then be built to allow room for expansion as demand grows.

***Mini-grid maintenance is crucial.*** The importance of effective maintenance in achieving sustainable mini-grids cannot be overemphasised. Appropriate systems design and routine maintenance are a necessary technical aspect that is a priority in mini-grid planning, development, and management. The lack of local expertise often means that renewable energy contracts are awarded to foreign experts. The issue with this arrangement is that some of these experts are not familiar with the local conditions and they may not be available for the continuous operation and maintenance of the systems. For example, the maintenance exercise includes cleaning the dust on solar PV modules, checking the battery contacts and replacing battery cells or failed inverter/controllers and circuit breakers. Theft of and security for these systems is another maintenance consideration, although consultations with One Power, a mini-grid provider in Lesotho, suggest that this is not expected to be a major issue in Lesotho.

***Regulatory environment still a grey area, although progress has been made.*** The nature of the energy sector in SSA means that models such as mini-grids are usually heavily regulated. The reason for this is that mini-grids tend to operate in similar spaces to the national grid and form a local monopoly. This is an inherent part of the business model of a micro-utility such as a mini-grid and for this reason the close regulation of tariffs and services in such instances is necessary. One of the main challenges, however, is that regulators and

policymakers are still developing appropriate policy for renewable energy and mini-grid deployment, making it difficult to navigate this space (International Review of Electrical Engineering, 2015).

**Table 6: Examples of energy models, including costs and reach**

| Model | Provider | Cost to consumer | Reach |
|---|---|---|---|
| SHS | M-Kopa | USD0,6 per/kWh[21] | 230,000 homes in Kenya |
| Mini-grid | One Power | USD0,33 per/kWh | 20,000 homes in Lesotho |

*Source: Triodos Investment Management (2015)*

## 5.4 Feasibility assessment

Table 7 summarises the feasibility assessment for each of the two digital energy models in the Lesotho context, as compared to the national grid, followed by a discussion on each assessment. This is done according to the same four feasibility assessment criteria introduced in the framework described in Section 3 of this report.

[21] Based on SHS costs in Malawi. National grid costs approximately USD 0,2 per/kWh (Eales et al., 2020)

**Table 7: Feasibility of energy models**

| | Solar Home System (SHS) | Mini-grid | National grid |
|---|---|---|---|
| | • Lighting + mobile charger<br>• High flexibility<br>• Regulatory requirements minimal<br>• Maintenance and repair complex in rural areas<br>• Distribution of generation capacity | • Lower cost of energy<br>• Lower investment for villages<br>• Regulatory complexity<br>• Local management required<br>• Business case not always clear | • Most affordable for consumers<br>• Centralises energy generation and distribution<br>• Subsided by government<br>• Unreliable supply<br>• Low network coverage |
| Affordability | ✓ | ✓✓ | ✓✓✓ |
| Access | ✓✓✓ | ✓ | ✓ |
| Regulatory feasibility | ✓✓ | ✓✓ | ✓ |
| Market dynamics | ✓✓ | ✓ | ✓ |
| | | ✓ Low ✓✓ Medium | ✓✓✓ High |

## Solar home systems (SHSs)

***Affordability constraints for many Lesotho households.*** Despite the developmental gains such as lighting, the removal of air pollution and the lower cost from kerosene replacement, the upfront costs of an SHS remain high for many of Africa's poorest. The kWh produced with an SHS remains more costly (USD0.6/kWh) than that achieved through a mini-grid (USD0.2/kWh) or a national connection (USD0.1 to USD0.2/kWh) (Eales et al., 2020). Furthermore, the research indicates that the once-off cost of a Tier 1 SHS can range from USD77 to USD292, whereas that of a Tier 2 SHS can range from USD127 to USD1,168.

Given that around half the population of Lesotho earns on average less than USD790 per month, the feasibility of these models comes into question from a consumer perspective (Salary Explorer,2021). However, the introduction of

PAYG by providers is an attempt to make these products more affordable to low-income users by lowering the upfront cost and making possible smaller incremental payments over a longer period (10 to 30 months).

***Access: SHSs may be a short-term fix but not a long-term solution.*** The strength of the SHS delivery model lies in the relatively simple, plug-and-play-type solutions that can be quickly installed to start providing a household with electricity. For rural households that may not be within reach of larger power-generation models such as a mini-grid or the national grid due to the terrain or the location of the household, this could be an option to meet their basic electrification needs. Furthermore, the model relies on climate-friendly technology – a strong benefit, given the traditionally high reliance on fossil fuels among low-income and rural households in the country. A stumbling block of this model remains the need for an established road and agent network. Consultations with Yellow Solar, an SHS provider in Malawi, speak to the importance of growing and training an agent network, and the contribution that has had to their ability to scale rapidly in a short space of time. Moreover, the mobile application that agents use allows them to track data on their customers' behavioural trends in transactions and repayments, making sales agents more effective. Beyond the agent network, the relatively low quality of many SHSs may lead to ongoing maintenance issues for consumers, making them vulnerable to periods without power. In future, households would be limited in the potential to scale up their demand for electricity due to the relatively low generation capacity of most low-cost SHSs. This would, in turn, not support the expansion of economic activity.

***Regulatory feasibility: No regulatory barriers for SHS providers.*** Stakeholder consultations suggest that the SHS model is not subject to dedicated regulation and that the Government is encouraging of private innovators to enter the market, particularly those operating in the green energy space. There are several reasons for this, including an acknowledgment of the current grid's shortcomings and that rural households that remain out of reach of more conventional solutions, and the view that the SHS and national grid models will not be competing against each other.

***Market dynamics: Market open for new players but hurdles remain.*** For SHS providers considering entering Lesotho, the market conditions are largely favourable and present a good opportunity to achieve scale. First, there remains a large, unserved consumer segment in Lesotho, predominantly in the rural areas, that could benefit from the SHS model to provide lighting and mobile phone charging. It is estimated that approximately 242,000 adults could be reached with a Tier 1 SHS (see Appendix for calculation assumptions). Moreover, there is currently a lack of significant competition in this space, with few established SHS players operating locally.

## Mini-grid

***Cost-effective alternative for sustainable electrification.*** Solar mini-grids offer a good option when the goal includes sustained impact and local business development. Most mini-grids are designed and constructed to provide access to energy for the whole village and also to support the productive use of energy. They can generate enough capacity to stimulate and support small and medium-sized businesses and they can continue operating for 20 years or more. Owing partly to improving technology, the operating costs are also becoming more competitive. Once a mini-grid is installed and operational, it can save households USD6 to USD24 per month compared to the cost of diesel generators, kerosene lamps or SHSs (Energy and Environment Partnership Trust Fund , 2018) .

***Topography and community layout may limit mini-grid access***. Expanding mini-grids to remote and low-consumption customers will remain a challenge for rural mini-grid projects in Lesotho. The mountainous topography combined with isolated households undermines the viability of mini-grid systems in these areas; this restricts this model to urban or peri-urban locations or otherwise specifically to communities set out to accommodate it.

***Regulatory space being created for mini-grid providers***. Until recently, a lack of clear policies on mini-grid development and its integration into national electrification plans prevented the entry and operation of mini-grid providers in Lesotho. However, almost five years after initial discussions began, a micro-grid

provider in Lesotho, One Power (see Box 6), has recently reached an agreement with the regulator to enable them to operate in the market. This concession agreement should permit mini-grid providers to be able to build and operate micro-grids in Lesotho in future. Consultations indicated that government is also exploring PPP models for mini-grid expansion under the Electrification Master Plan over the next seven years.

**Box 6: One Power**

One Power is a for-profit mini-grid provider in Lesotho that aims to provide affordable and reliable electricity services to off-grid villages, giving families, schools, health clinics and local businesses the resources needed to grow and thrive.

After five years of negotiations with the energy regulator in Lesotho, One Power received regulatory permission for mini-grid development in the country, which will open doors for themselves and other potential players.

Building on these recent concessions, One Power plans to roll out 30+ mini-grid systems to various rural communities or locations over the coming years and one large grid-connected solar farm.

They will charge an affordable fee per watt, as negotiated with the regulator, with the intention that all the costs are built into the per-unit tariff, which is set by the Government and will probably increase with inflation only in the next few years.

Key to the One Power business model, making it feasible from an early-stage investment perspective, has been donor funding, which has helped One Power establish itself in the country. OnePower has also done extensive modelling of demand to understand potential use cases and future growth in demand.

Where mini-grids are feasible, they will probably be cheaper for the end-user than an SHS alternative and will offer "grid-like power". However, One Power does acknowledge that in some areas mini-grids will not be possible and that the only alternative is an SHS.

*Sources: (One Power, 2020)*

## 5.5 Recommendations for Lesotho's energy sector

While both SHSs and solar mini-grids have the potential to contribute to improving access to household electricity in Lesotho, each model serves different parts of the market and fulfils different long-and short-term electrification objectives. SHSs offer a good option when the goal is to reach as many off-grid households as possible at a low initial cost. SHSs can be quickly distributed and installed in rural homes, and they usually require no licensing or tariff frameworks. Solar PV mini-grids, on the other hand, offer a good option when the goal includes sustained impact and local business development. Most mini-grids are designed and constructed to provide access to energy for a whole village and also to support the productive use of energy. They can generate enough capacity to stimulate and support small and medium-sized businesses and they can continue operating for 20 years or more. Owing partly to improving technology, the operating costs are also becoming more competitive. Therefore, a mini-grid model may be most appropriate in the Lesotho context if the intention is to achieve sustainable impact in the energy sector.

**Table 8: Energy-sector recommendations overview**

| Proposed solution | Mini-grid |
|---|---|
| Partnership opportunity | Mini-grid providers<br><br>MNOs |
| Intervention areas | Integrating mobile payments<br><br>Consumer research on behavioural usage frictions of consumers at selected site locations<br><br>Potential pilot of consumer education interventions to improve usage decisions |

## Mini-grid

***Supporting the integration of digital payments channels will be key.*** Consultations suggest that there remain challenges in integrating mobile digital payment channels into the mini-grid model in Lesotho. As part of the smart metering component of the mini-grid system, the provider needs to work with an MNO to provide the rails for mobile payments and customer engagement. This requires a more complex integration process than simply registering as a vendor. At present the MNO is reluctant to grant the mini-grid permission on its system due to the high costs involved and a lead time of approximately six months. There may be an opportunity to broker partnerships between mini-grid providers and other SHS providers in Lesotho that have had success in registering their customers on their PAYGO system to enable effective payment processing and monitoring.

***Consumer education and usage behaviour.*** As part of the initial scoping phase, mini-grid developers conduct in-depth demand assessments for villages to determine not only the cost of the system but its social and economic viability. Key to consider here are the trends in consumer behaviour and how these can be better understood to ensure maximum value is derived. There may therefore be two areas of intervention related to consumer behaviour that can support the successful implementation of microgrids in Lesotho:

- First, consumer education plays an important role in the way that consumers engage with digitally enabled delivery models. Often there is a lack of understanding about how to use these models correctly. This can lead to damage of the system or it could limit the value created for the consumer. Creating the appropriate support system, such as a local agent network, can help to improve consumer education related to mini-grid usage.

- Secondly, there may be scope to develop focused consumer surveys to assess what the usage patterns of consumers are when it comes to electricity and how the introduction of a mini-grid may affect this, to model likely future demand patterns that can inform long-term fit for purpose mini-grid design. This can also be used to analyse consumer willingness and ability to pay for mini-grid use, providing an indication

of the types of tariffs developers can charge and what consumption may look like under this tariff.

***System maintenance requires blended approach.*** Finally, owing to the complexity of the mini-grid system and the locations in which it tends to operate, maintenance is likely to be an ongoing concern across the lifespan of the project. Key considerations here are, first, the time taken to resolve any maintenance issues, as it is important to minimise the downtime for consumers who depend on electricity generated, and, secondly, the channels through which maintenance challenges can be resolved. Developers are often able to address software challenges remotely due to the nature of their system; however, it will also be important to establish a local maintenance force that can be effectively mobilised to respond to physical maintenance issues as they arise. This would require consumers to have access to a communication channel that is reliable and easy to use, such as a toll-free number or a USSD response. Development actors may consider providing support in establishing a local agent force or engaging with relevant telco partners to establish toll-free lines for mini-grid users.

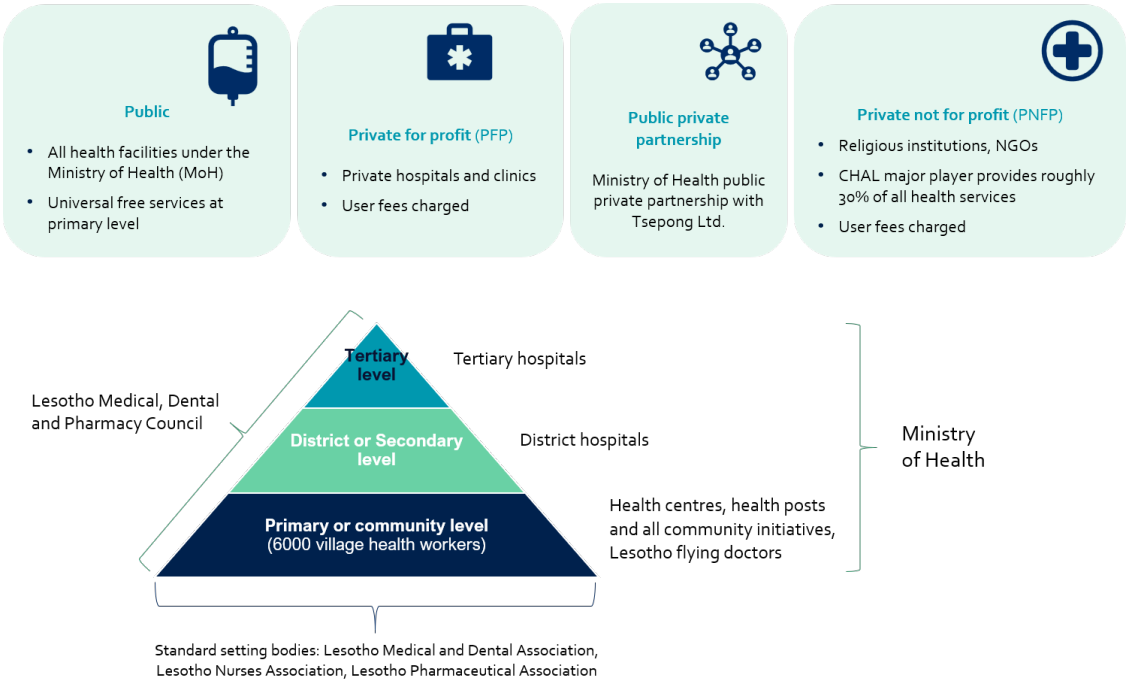
# 6 Health

The health sector in Lesotho continues to be plagued by a number of challenges, many becoming more acute outside of the capital of Maseru. These challenges include the scarcity of health facilities and health professionals, particularly in the rural areas; a high prevalence of HIV/AIDS and a poorly developed supply chain network outside of the urban areas. There is therefore a clear need for innovative models that may help address key gaps in the sector. This includes the need for more widespread access to basic health information and content, the development of reliable distribution networks across the country and more affordable and convenient access to healthcare professionals.

## 6.1 Institutional arrangements and supply-side dynamics of the health sector

***National health system coordinated by Ministry of Health across three tiers.*** The Ministry of Health (MoH) is the government department responsible for the regulation and mobilisation of healthcare resources and the formulation of policies and guidelines. Its five priority areas are maternal, reproductive, neonatal, child health and equity. Figure 4 below shows that the delivery of health services is carried out at three tiered levels – primary, secondary and tertiary. The primary level consists of healthcare centres, which is the first point of professional care, with an average of 26 nursing staff in health facilities. Patients requiring services beyond the tertiary level are transferred to hospitals in South Africa (UNICEF, 2019; Millennium Challenge Corporation, 2019).

**Figure 4: Lesotho's health delivery ecosystem**




*Sources: World Health Organisation (2011), World Health Organisation (2015), Children and aids (2016), UNICEF (2019) and Health regulation (n.d)*

***Limited health facilities***. Lesotho has only ~9 health facilities per 100,000 people and fewer than 1 hospital per 100,000 (see Table 2 below). ***Health centres make up the bulk (51%) of the primary health facilities available.*** The majority of health facilities are electrified: according to the World Bank (2020), only 64 health facilities in the country lack electricity services. The location of health facilities mirrors the population distribution as health facilities are concentrated in the lowland districts of Maseru, Leribe and Berea (Isabel & Nkosi, 2019). Delivery is centred on the fight against the HIV/AIDS pandemic. Lesotho has the second highest HIV/AIDs prevalence rate in the world and this disease burden is responsible for more than 40% of all deaths in the country, posing a significant threat to women and children in particular (UNICEF, 2019).

**Table 9. Health facility infrastructure and reach in Lesotho**

| Health facility | Total | Total per 100,000 (of population) |
|---|---|---|
| Referral hospital | 1 | 0.05 |
| Specialised hospitals | 2 | 0.09 |
| District hospitals | 18 | 0.85 |
| Filter clinics | 3 | 0.14 |
| Health centres | 188 | 8.92 |
| Private surgeries | 48 | 2.28 |
| Nurse clinics | 66 | 3.13 |
| Pharmacies | 46 | 2.18 |
| Total | 372 | 17.65 |

*Sources: Authors' own calculations for total population statistics based on estimates from UNICEF (2017), Lesotho's Bureau of Statistics (2016) and World Bank (2020) population estimates.*

***Strong role for faith-based organisations***. Christian Health Association (CHAL) currently provides approximately 40% of healthcare services in Lesotho and they own eight hospitals and 71 health centres throughout the country. The Lesotho Flying Doctor Service provides medical services in the remote areas of the country. It delivers health services to nine health centres and two village health posts in very hard-to-reach areas by means of air transport (UNICEF, 2019).

## 6.2 Access, usage and affordability issues in the health sector

***Access to healthcare professionals still limited.*** The availability of well-trained health workers is poor, with a ratio of 0.9 and 10.2 per 10,000 people for doctors and nurses respectively compared to the World Health Organisation's Regional Office for Africa (WHO-AFRO) regional averages at 2.6 and 12.0 respectively (UNDP, 2017)[22]. Thus, there is room for improvement in expanding access to healthcare professionals and quality medical services which can better serve vulnerable population segments such as infants in particular[23].

***Low availability of medicine supplies.*** The procurement, storage and distribution of medicines is for the most part the responsibility of the National Drug Supply Organisation (NDSO). Medicine shortages are a major challenge. In 2015, 25% of all health facilities experienced shortages of ARVs and testing kits; furthermore, stringent government tender policies are a major cause of procurement delays, according to African Child Forum (2016).

***Low cost of health services, but also low quality.*** In 2008, universal primary healthcare was made free to all of the population. Moreover, some district and tertiary hospitals waive the fees for poor patients, children less than five years old and the elderly, provided that they have a letter from the Department of Social Welfare (UNICEF, 2019). A typical consultation fee in Lesotho costs only USD1.5 (LSL15), according to Endeva (2014) and, since 2009, price inflation for health has been significantly slower than overall consumer price inflation in the

[22] More recent World Bank data suggests that the country has a rate of three nurses/midwives per 1,000 people, compared to a rate of only one to 1,000 people for SSA, yet this is still significantly lower than the high-income rate of 11 (World Bank, 2020).

[23] World Bank (2020) data indicates that, despite there being relatively more nurses in the country than in SSA, Lesotho's infant mortality rate at 66 per 1,000 live births is higher than that of SSA's rate of 53. This is probably a function of the comparatively high incidence of HIV (8.2%) among children aged 0 to 14 in the country – nearly double the rate for the average SSA country (UNICEF, 2019) – and also the low availability of medicines to combat the disease burden effectively.

economy (Lesotho Bureau of Statistics, 2019). Despite this seemingly low cost, individuals who can afford private healthcare tend to go to South Africa to access specialist care, given the limited availability of specialist surgical workers locally (Endeva, 2014). The tiered public-health referral system has been described by stakeholders as being relatively ineffective in its implementation due to a shortage of human resources and ineffective information systems.

## 6.3 Overview of best practice digitally enabled delivery models for expanded access to health

A scan of global best-practice models identified three potentially relevant types of digitally enabled delivery model in the health sector: **telehealth**, **m-health** and a **digital marketplace**. These models contribute to SDG 3 by providing individuals with access to the tools, human resources and products needed to diagnose and treat health conditions and promote long-term health and well-being.

**Telehealth**

***Digitally extending health services.*** Telehealth is a digitally enabled delivery model that connects healthcare providers and patients, where distance is a critical factor, through online services, chats, video calls, texts and other digital communication tools. It is used to exchange valid information for diagnosing, treating and preventing diseases and injuries. This allows service-providers to cater for the healthcare needs of diverse clients, provided the patients have access to a tablet, a computer or even a basic phone. The shortage of healthcare practitioners and facilities in SSA, particularly in rural regions, makes the telehealth model a potential way of optimising existing healthcare resources, making them more accessible to a wider segment of the population (see Table 9).

***Telehealth a timely response to COVID-19.*** Using technology to deliver healthcare has several advantages, including cost savings, convenience, and the ability to provide care to people with mobility limitations, or those in rural areas who do not have access to a local doctor or clinic. For these reasons, telehealth

has become even more essential during the coronavirus (COVID-19) pandemic. Fears of spreading and catching the virus during in-person medical visits have led to a greater interest in, and use of, technology to provide and receive healthcare in this way in South Africa and other developing nations in SSA. The telehealth model may also be beneficial to frontline healthcare workers as a way of connecting them with medical practitioners from other locations and providing access to health-related content and digital tools that can improve their own understanding and better equip them to tackle the health challenges faced by the country.

***Legal, ethical and regulatory concerns remain.*** Offering patient care over a distance and possibly from another country raises issues such as liability, licensure, jurisdiction, quality and continuity of care, confidentiality, data security, consent, authentication and remuneration. In many countries in SSA, these issues are still largely unaddressed, making it difficult to provide and govern these services effectively in a particular jurisdiction. The potential cross-border nature of this model also raises the matter of licensure, i.e. does the physician providing a telemedicine consultation from another country have to be licensed to practice in the country of the patient and the referring doctor? This and related questions still need to be confronted in regulations if telehealth is to become a more widespread and safer digital model in SSA.

Key to note is Lesotho's constitution does aim to protect consumer data through the Data Protection Act, 2011 which attempts to bring Lesotho into compliance with EU standards and to reflect SADC data protection standards. However, Lesotho's Data Protection Commission has not yet been appointed to enforce the Act and the body will likely have considerably less enforcement power than similar bodies in other jurisdictions given its stipulated powers in the Act. This raises a question around the extent to which digitally-enabled delivery models such as the Telehealth model would have sufficient oversight.

**Table 10: Features of the telehealth model that can improve health outcomes**

*Source: World Bank (2017)*

| Telehealth systems | Local healthcare providers | Implementing partners | Healthier low-income patients |
|---|---|---|---|
| Employ ICT in transmitting text, audio, video or images to local healthcare workers<br>Provide modern ways of diagnosis, treatment and prevention<br>Design as simply as possible with the flexibility to adapt to older technologies | Access telehealth tools to consult with experienced doctors or specialists<br>Rely on augmented professional support that helps users reman in rural settings | Set up a turnkey solution that is plugged in to existing systems<br>Share costs between private and public actors for set-up, equipment, training and maintenance, etc. | Receive quality care at home or a local kiosk in rural areas<br>Reduce time, travel and related costs for accessing specialist care<br>Deal with fears and resistance to use of technology and accelerate its adoption |

**Box 7: UDok**

UDok is a telehealth model in South Africa. UDok has developed a digital ecosystem consisting of hardware and software to capture accurate medical information from patients, allowing medical practitioners to make diagnoses remotely in real time using an electronic medical record system that is integrated with a video-conferencing service.

UDok enables users to pay for their consultation using debit and credit cards through the mobile phone app, which is only available on smartphones. There is currently no monthly charge for making use of this model; instead, users would just need to pay the consultation fee specified by a particular doctor. The model adds value by creating an efficient ecosystem of medical resources for users. There are currently more than 50 independent doctors connected to the model, all of whom have been vetted for quality assurance by the model. There are also more than 4,000 users who have been reached through this model.

*Source: (UDok, 2020)*

**Box 8: Moyo**

Moyo was a three year multi-million-dollar initiative started in 2016 by the Vodafone foundation in partnership with the Ministry of Health, global partners, NGOs, and other private stakeholders. The programme was started to address the high HIV prevalence challenges facing Lesotho through an innovative m-Health model.

The aim of the project was to mobilize healthcare services particularly for women and children affected by HIV in hard-to-reach places in rural Lesotho. Mobile clinics travelled to these remote areas to provide onsite HIV testing for patients. Healthcare providers were provided with smartphones using an app to record the patients details and monitor their treatment and track their care. In addition, HIV positive patients were registered with M-Pesa to receive a travel grant to eliminate the travel barrier that patients had to reach their nearest health facility for treatment and care.

The initiative initially piloted in two districts and in less than a year became so successful that it was expanded to the rest of the country. However, poor network coverage and lack of infrastructure began to hamper the initiative eventually leading to it being discontinued.

*Sources: (Vodacom, 2020), (Chakamba, 2017), (ViiV Healthcare, 2016)*

## m-Health

***A mobile self-care solution.*** The m-health model refers to the concept of mobile self-care and involves the use of mobile devices such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices to enhance access to health information, improve the distribution of routine and emergency health services, or provide diagnostic tools. Today, countries such as Ethiopia, Kenya, Nigeria and South Africa are leading the way in using m-health solutions for health-service delivery. This is being driven by a number of factors, including the expanding penetration of mobile networks in rural communities, the reduced costs of mobile handsets, a general increase in non-food expenditure and innovative technologies that integrate mobile applications with traditional health-service delivery models. m-Health has found applications in treatment compliance, data collection and

disease surveillance, health-information dissemination, point-of-care support for health workers, and health promotion. An example of this type of model is Totohealth[24] in Kenya. This model has reached more than 39,000 subscribers via its SMS and pre-recorded voice messages (Guardian, 2018).

**Box 9: Mantsopa Institute**

Mantsopa Communications is an NGO in Lesotho that uses multi-media platforms to share health and educational information on HIV prevention, adolescent health, and pregnancy prevention. Initially the organisation relied on face-to-face interventions in public gatherings and community outreach programmes. However, since the start of the Covid-19 pandemic the organisation has pivoted to using social media such platforms as WhatsApp, as well as Television and radio channels to reach children.

In addition, in partnership with the Ministry of Health, and donors the institute is linked with all healthcare facilities to ensure that patients receive treatment and care.

*Source: (Mantsopa Institute, 2020)*

***Regulation a stumbling block to model sustainability.*** A challenge to the implementation of m-health on the continent is the lack of standardisation and regulatory frameworks to support its scalability. In addition, inadequate monitoring and evaluation on its cost-effectiveness may make it difficult to scale up m-health interventions. Although there has been a proliferation of m-health pilot projects across the continent, a large proportion of these projects are unsustainable and often expire once initial funding is exhausted. For example, in Uganda alone there were 23 m-health initiatives in 2008 and 2009 that did not scale up after the pilot phase. Therefore, business models and

[24] Totohealth is a digitally-enabled education model using mobile technology to detect child-development abnormalities and improve access to maternal and child-health information for the marginalised communities using mobile technology.

funding schemes for m-health need to be reviewed to support the scale-up of effective pilots. Conflicting health system priorities may also slow down the scale-up of successful m-health interventions in resource-poor countries (Folaranmi, 2014).

**Box 10: ChildCount+**

ChildCount+ is a community health events reporting and alerts platform aimed at empowering communities to improve child survival and maternal health. Using any standard phone, community health extension workers (CHEWs) are able to use text messages to register patients and send in health reports to a central web dashboard that allows a health team to closely monitor the health of their community and reduce gaps in treatment.

The model was initially piloted in Sauri, Kenya, and started in July 2009. A mobile application, initially known as ChildCount, was used by 100 CHEWs to actively monitor 9,500+ children under five. ChildCount supported the delivery of community-based management of acute malnutrition (CMAM) programmes; home-based testing for malaria using Rapid Diagnostic Test (RDT) kits and the immediate dispersal of treatments; and home-based treatment of children with diarrheal illness.

CHEWs used SMS messages to register patients and have them send in their data. At Sauri, ChildCount+ covered more than 65,000 people with child and maternal healthcare services. The system has also been deployed at Dertu in Kenya's Garissa County. ChildCount+ is in the process of being rolled out across the remaining 14 project sites representing approximately 500,000 people – 100,000 of which are children under five. UNICEF aimed to roll out a variation of ChildCount+ in Senegal and is considering it for activities in other countries.

*Source: (Actevis Consulting Group, 2011)*

## Digital marketplace

***Streamlining connection between consumer and supplier.*** A digital marketplace model acts as a multi-sided platform to streamline the process of

purchasing medical and healthcare-related products and, in a number of instances, to resolve the distribution challenges present in markets such as Lesotho. A successful example of the digital marketplace model is Kasha.[25] Kasha, first launched in Rwanda in 2016, has since expanded into Kenya. The company says it has served more than 55,000 customers, of which 75% are low-income, and delivered close to 600,000 products (Techcabal, 2020).

***Digital payments supported.*** In Africa, as access to mobile devices becomes more widespread, there is a growing case to be made for the use of mobile payment channels to enable greater participation in the digital platform economy. Digital marketplace models such as Kasha support a variety of payment channels, including mobile money or bank card/credit card. In offering users the option of paying for health products digitally, these models create greater certainty around the transaction and enable the user to build a digital transaction footprint which could be used to qualify for additional financial services such as insurance or credit.

**Box 11: Kasha**

Launched in July 2016 in Rwanda, Kasha sells menstrual care products, contraceptives, pharmaceuticals and a range of beauty products, and delivers to customers confidentially. The digital marketplace model allows customers to place orders for products via its website, a mobile app, SMS shortcode or phone call. It does not require a smartphone or internet connection, and is focused on female empowerment and self-care.

Kasha expanded to Kenya last year and has now raised funding from Finnfund, a Finnish development financier and professional impact investor for further growth. So far it has served more than 55,000 clients and delivered close on 600,000 products across its two markets. It now plans to expand into new markets.

*Source: (Kasha, 2020)*

[25] Kasha is a digital marketplace that allows customers to place orders for products via its website, a mobile app, SMS shortcode or phone call. It does not require a smartphone or internet connection and is focused on female empowerment and self-care.

The table below summarises relevant international health model examples, their cost and reach:

**Table 11: Examples of health models, including costs and reach**

| Model | Provider | Cost to consumer | Reach |
|---|---|---|---|
| Telehealth | Hello Doctor | USD3 per month (subscription) + Consultation fee | > 500,000 users |
| m-Health | Totohealth | USD0.25 per month (subscription) | 39,000 users |
| Digital marketplace | Kasha | USD1 delivery cost + product cost | 55,000 users |

*Source: Techcabal (2020); Guardian (2018); IOL (20173)*

## 6.4 Feasibility assessment

Table 12 summarises the feasibility assessment for each of the three digital health models in the Lesotho context, compared to the public health system. This assessment is conducted against the same four feasibility assessment criteria introduced in Section 3.

**Table 12: Feasibility of health models**

| | Telehealth | M-health | Health marketplace | Public healthcare |
|---|---|---|---|---|
| | • Remotely extends the reach of healthcare practitioners<br>• Improved access and use of existing human resources<br>• Reduces time and cost for consumer<br>• Physical mediator plays a role | • Enables remote health data capture, diagnosis and information sharing<br>• Preventative healthcare solutions<br>• Builds local capacity to address health issues | • Online marketplace for medical products<br>• Effectively connects suppliers and consumers<br>• Includes distribution of products<br>• Structural cross-border trade challenges e.g. road infrastructure | • Universal health coverage for citizens accessing primary healthcare services<br>• Secondary and tertiary healthcare services require payment fees<br>• In 2014 a typical consultation fee was USD1.50<br>• <9 healthcare centres per 100 000 people in Lesotho |
| Affordability | ✓✓ | ✓✓✓ | ✓✓ | ✓✓✓ |
| Access | ✓✓ | ✓✓ | ✓ | ✓ |
| Regulatory feasibility | ✓✓ | ✓✓ | ✓✓ | ✓ |
| Market dynamics | ✓✓ | ✓✓ | ✓✓ | ✓ |
| | | | ✓ Low ✓✓ Medium | ✓✓✓ High |

This study estimates that approximately **303,000** adults could afford a USD1 monthly subscription for a health product or service under the following models (see Appendix for the calculations).

## Telehealth

***Affordability: Consultation fee a cost-driver for telehealth models.*** The telehealth model is able to utilise digital intermediation to reorganise existing health resources in a way that is more efficient and inclusive. However, the reliance of this model on the expertise of healthcare practitioners is likely to add a significant cost layer to the overall service, one that may be prohibitive for users. For low-income rural households the trade-offs in terms of savings in time and cost of transport would need to be weighed up against the healthcare practitioner's consultation fee.

***Access: Telehealth opportunities limited to urban areas.*** In Lesotho, smartphone penetration remains low and largely confined to urban hubs such as Maseru due to the cost of devices and the limited mobile connectivity in rural areas (Lesotho Communications Authority, 2017). Telehealth models that rely on mobile apps, such as Hello Doctor, are therefore unlikely to be accessible to the majority of households, undermining their scalability in the short term. Furthermore, the telehealth model requires users to be near a clinic or an intermediary health facility that can collect data and interpret the diagnoses of doctors on behalf of the patient. In Lesotho, such health centres are largely confined to the eastern region of the country, making it difficult for those based in rural areas to access them.

***Regulatory feasibility: Lack of public policy to support telehealth.*** In Lesotho, there is a lack of a clear regulatory and licensing framework needed to govern the operations of digitally enabled delivery models in the healthcare sector. For the telehealth and m-health models in particular, this raises concerns about the confidentiality of user and patient data and suggests that there may not be the required quality-assurance mechanisms when it comes to either patient education or consultation. It is important to keep in mind, however, that Lesotho subscribes to a common-law legal system, meaning that unless a model is explicitly prohibited by regulation, it should be permitted with the approval of the regulator.

***Market dynamics: Telehealth still facing a number of challenges in Lesotho.*** Telehealth in Lesotho is currently limited by the availability of basic infrastructure such as steady electrical power, cellular network coverage and broadband internet service. While the level of competition in the country remains low, a further consideration is the cost drivers for this model, these being the subscription cost and the consultation fees charged by doctors for their services, which is likely to hamper large-scale uptake and usage.

## m-Health

***Affordability: m-Health a more affordable digital health solution.*** The m-health model differs from telehealth in that its primary function is to facilitate the transfer of healthcare information and access to tools that the user can apply for self-care and diagnosis. There is therefore a greater focus on digital tools and content than on expertise from medical practitioners. Without this cost driver, m-health models are able to operate at lower cost margins, potentially benefitting individuals in Lesotho. Totohealth, for example, charges users USD0,25 per month to access its service, whereas MomConnect has absorbed the costs of end-users, currently making it a free service.

***Access: SMS and USSD channels support access to M-health.*** In Lesotho, the mountainous terrain combined with an already limited mobile connectivity capacity suggests that more robust and widespread communication channels may be needed to support digitally enabled delivery models. SMS and USSD are possible solutions in this context as they are both easy to interact with and familiar to many mobile device owners in Lesotho. In other countries in SSA, such as Kenya and South Africa, SMS/USSD-based m-health solutions are becoming more prevalent as they provide a relatively simple solution to reaching previously unserved population segments with key health-related information.

***Regulatory feasibility: Lack of clear regulatory guidance.*** m-Health models are likely to face the same regulatory challenges as telehealth models in the Lesotho market. As mentioned above (see telehealth), the primary challenges relate to the lack of a clearly defined m-health regulatory framework that

provides guidance on key issues such as quality assurance and consumer data protection.

***Market dynamics: The market dynamics in Lesotho appear to lend themselves to the m-health model.*** First, the m-health model is geographically agnostic, relying on USSD and SMS channels rather than mobile internet, which can be affected by the mountainous terrain in the country. Secondly, there is a clear need for low-cost alternative solutions that help to address the existing gaps in the healthcare sector. Finally, the digital payments landscape in Lesotho may be becoming more enabling of digital health models such as m-health, or for payment of health services more broadly. For example, consultations indicate that Vodacom allows payment disbursements via M-Pesa while private health facilities already use M-Pesa as a form of payment. Prior to COVID there was not much appetite from the government to collect via M-Pesa, however the government's appetite in this regard has grown as the pandemic has developed.

## Digital marketplace

***Affordability: Cost still a concern for individuals.*** Although Digital marketplace models enable consumers to realise some efficiency gains such as greater certainty about payment, access to a wider range of products than would be available locally and a lower cost of transportation, the model does not guarantee a reduction in the price of the healthcare product itself. For lower-income households this is likely to represent a significant barrier to uptake and usage of this model.

***Access: Last mile distribution remains a challenge for Digital marketplace model.*** Structural constraints may hamper the effectiveness of the Digital marketplace model in enhancing access to medical and healthcare supplies in Lesotho. While supplies may be aggregated in urban hubs such as Maseru for distribution, the physical network of roads, agents and storage facilities in more rural regions of the country is not yet developed to sustainably support the last mile of the distribution network for this model to be a success.

***Regulatory feasibility: South Africa a key healthcare product supplier.*** South Africa's proximity to Lesotho suggests that it could form a valuable link in the supply chain for health products as part of the Digital marketplace model. Currently, Lesotho imports approximately 90% of the goods it consumes from South Africa; these arrive duty-free as part of intra-South African Customs Union (SACU) trade. This suggests there are regulatory frameworks in place to support cross-border trade between the two countries, making this section of the value chain a more realistic undertaking. These imported products would, however, need to be scrutinised under Ministry of Health directives to ensure they are not prohibited and that quality standards are met.

***Market dynamics: Low competition but other challenges remain.*** While there are few sustainable digital marketplace models currently operating in Lesotho, suggesting low levels of competition from other providers, other key challenges may undermine the viability of this model. For example, one challenge remains the limited road infrastructure outside of Maseru and the extent to which an agent network can be established to service more rural distribution routes or whether aggregation hubs can be established to make these more viable. It is also not clear whether sufficient demand for these products exists outside of urban centres. This suggests that even if these and other challenges are overcome, the scalability of this model in Lesotho is likely to remain limited at present.

## 6.5 Recommendations for Lesotho's health sector

***Health sector highly complex to operate in.*** As in other countries in SSA, the health sector in Lesotho remains largely underdeveloped, making it a difficult environment to navigate where digitally enabled service delivery is concerned. There are a number of challenges regarding both the regulatory environment in Lesotho and related to the models themselves as highlighted above that are likely to limit the success of digital delivery of health services in Lesotho. One of the challenges is that, given the irregular nature of health expenditure by households coupled with already limited disposable income, there is not yet a strong market case for offering these services and scaling them will be difficult

unless products are either free or low-cost. In the cases of digital marketplace and telehealth, for instance, the need to pay for products and also to pay the consultation fee for the doctor remain in place. This may make them prohibitive for local residents.

Should supporting digitally enabled delivery models in the health sector remain a priority, the m-health model may be a key model to consider for the Lesotho market. The reasons for this are that:

1. it has low-tech requirements, making it more accessible to a larger segment of the population;
2. this model is geographically agnostic and can be operated in most parts of the country; and
3. the lower cost to set up and the variations in services that can be offered make it a more scalable option for this market, at least initially.

**Table 13: Health-sector recommendations overview**

| Proposed solution | M-health |
|---|---|
| **Partnership opportunity** | • Ministry of Health, the Vodafone foundation, the Mantsopa Institute, Totohealth (Kenya) |
| **Intervention areas** | • Support partnerships between MNOs and m-health platform providers, for zero rating apps and scaling<br>• Regulation issues unclear at this point |

***Education tool on benefits of digital health.*** Considering the current state of healthcare in Lesotho, it may still be some time before there is significant uptake and usage of digitally enabled delivery models. In the interim, however, it is important to consider what steps can feasibly be taken to begin preparing individuals and households for this scenario. M-Health represents a potentially low-risk, low-cost model that can be used as a demonstration case for educating individuals about the way that digital healthcare can work. This would be a way of building up trust in medical advice communicated digitally.

Furthermore, to have a more immediate impact, this model can be scaled more easily than the telehealth and digital marketplace models because of the range of functions it can perform, including a help desk, a content push model, a diagnostic health tool or an interactive input/output service.

***Understanding local contexts in support of appropriate m-health implementation.*** In planning and designing an m-health model in Lesotho, FMT may consider supporting implementing partners to understand the local conditions, including about the existing healthcare infrastructure, the mobile network signal reach, literacy levels, language requirements and cultural practices, since all of these can have a significant impact on the success of this model. The goal would be to identify the current barriers and challenges so as to tailor the model to best serve the population's needs, given the local conditions. Understanding the environment the m-health solution is being brought into is key, and requires local assessments to acquire a concrete understanding of the health system environment and the norms within which the system will be operating. For example, if there is a gender gap in mobile phone ownership, this may render an m-health model ineffective if its target audience – women – do not have regular access to a mobile phone. Creating a program with skilled designers together with local community and end-user input can bring a more user-focused approach to the model while also adding a perspective that can support the long-term sustainability and potential scale-up of the program.

***Connecting m-health providers to strategic partners in Lesotho.*** Strategic partners, particularly relevant industry partners such as mobile network operators and other innovative technology companies, can provide their technical know-how and core competencies, resources and network to contribute to the scale-up of m-health models in Lesotho. A model that works well in one context may be ineffective in another if partners are secured but not engaged in a meaningful way so as to make best use of their skills and knowledge. FMT may be in a position to facilitate impactful partnership engagements and ongoing discussions with various players in the value chain: the Ministry of Health, the Vodafone foundation, the Mantsopa Institute and

Totohealth in Kenya, for example, to ensure that m-health can grow beyond the pilot phase in Lesotho.

# 7 Conclusion

This document assessed the scope for digital delivery to enhance access to education, energy and health in Lesotho. The research highlights a clear need for digital delivery given the socio-economic profile, challenges to public sector reach and delivery, and topography of the country.

Though none of the global best-practice delivery models outlined in this report are yet operating at scale in Lesotho, some innovation is already happening across the three sectors. The experience to date shows the need to start small[26] and the importance of patience to create the right enabling environment[27]. It also underscores the importance of the payment system leg of any model, as well as, in the case of energy, the need for a physical agent network. Physical infrastructure, connectivity and hardware (access to devices or equipment) are all likely to remain important factors to the success of digital delivery in the foreseeable future.

A key take away is the important role of partnerships for the funding, hardware, distribution and mobile payment links to digital innovation, plus good relationships and partnerships with the regulatory authorities. Donors such as UNICEF already fulfil a significant role in partnering with government, and several of the innovation examples rely on donor funding, but there is further scope for a market systems facilitator such as FinMark Trust to facilitate partnerships and support specific innovations. This may take the form of paving the way for successful models from elsewhere in Africa to enter, or helping existing homegrown initiatives to scale. Either way, enhancing access to basic services in Lesotho will be a long-term game, requiring a presence in-country to support initiatives and drive partnerships on the ground.

[26] As illustrated by the case study of the Learning Hub in the education sector

[27] As the OnePower example in the energy sector illustrates

The analysis suggests some considerations or hypotheses for the role of development agencies and market system facilitators in expanding access to basic services via digital delivery, that cut across the three sectors and the individual country context. These hypotheses will be built out further as the research is rolled out in additional countries:

- **Building an enabling environment.** The stage of digital maturity of a country matters. As the Lesotho context illustrates, there are a number of structural issues that may need to be resolved, such as the cost of devices and data and access to the internet. Thus, there is a need to consider policy interventions (like removing tariffs on digital devices and services) that may help to increase the feasibility of digital delivery models. There is also a need technical assistance to regulators in creating an enabling regulatory framework that will ensure a level playing field with clear and facilitative regulatory parameters.

- **Working within the context parameters.** The most far-reaching innovation may be innovation that happens at the margin (to connect or integrate digital channels with existing services, institutions and functions and enhance efficiency of delivery), rather than innovation focused on introducing new and independent solutions. It is therefore important to start with a baseline assessment of existing infrastructure, be it health professionals to provide inputs, the ability of national power utilities to extend the reach of the grid, or the digital literacy of educators to leverage online tools.

- **Convening ecosystem actors to facilitate dialogue.** There are often silos across the public sector as mandate holder for basic services delivery and private sector innovators and delivery partners who can solve challenges of extending reach on the ground. This highlights the role for a market system facilitator in establishing forums for open and ongoing dialogue between market incumbents, potential innovators and regulatory authorities across different relevant spheres[28], to ensure a joint understanding of the market needs and imperatives. This need takes on a new dimension in light of the COVID-19 pandemic, where physical convenings are challenged.

[28] Notably, the sector regulator as well as telecommunications or ICT authorities.

- **Brokering partnerships.** For innovation to happen, broad-based dialogue needs to translate into concrete partnerships[29]. The most far-reaching role for a market systems facilitator may therefore be to identify and act on high impact-potential partnerships as outlined in the sector recommendations in this report.

- **Making the in-person connection.** The analysis showed that few digital models are purely digital – often some in-person engagement is still required to onboard customers and familiarise them with the service. There is a role for the donor community in building digital skills among the target population, as well as to facilitate the in-person service engagement, for example by supporting partnerships for the roll-out of agent networks for sales and maintenance of equipment.

- **Creating feedback loops.** Field research to understand behavioural challenges around customer uptake and usage frictions, as well as likely future demand trends, is important to support the ongoing evolution of digital models. For example, SHS experience suggests that failures arise when people are using the systems incorrectly. There is also scope for data analysis to inform model refinement. For example, to tap learnings from agent mobile applications to improve the product and customer journey.

- **A focus on the consumer.** Field research can also help to give the consumer a 'voice' in matters of policy and market practice. Digital innovation may bring data protection challenges and, if unregulated local monopolies are established (as with a mini-grid solution), it may give rise to consumer protection concerns. The development community has an important role in building an understanding of consumer needs and realities through market research, thereby bringing the consumer perspective into the public-private dialogue on access to basic services.

[29] Partnerships are key to resolving access challenges – for example, zero rating fee partnerships between MNO and basic services providers may help to reduce usage frictions.

# Appendix

## Feasibility assessment assumptions

As part of this research, a feasibility assessment was conducted to identify those digitally-enabled delivery models with the highest potential for impact and reach in Lesotho. The potential market was estimated that could be reached for the energy, education and health sectors by drawing on FinScope data, national CPI data and market research on product prices across SADC and by making several assumptions to ensure the data reflected the current reality in Lesotho.

To estimate the potential market that could be reached for each of the sectors, the following data was used:

- **FinScope data was used to estimate household and individual incomes along with mobile access.** As the latest available dataset was several years old, the income brackets in the data were adjusted using inflation and GDP growth separately and after a comparison of the two the GDP-adjusted figures were used as it is unlikely that incomes grew at the same rate as inflation while GDP growth remained comparatively low. The intention was to arrive at a conservative estimate of the potential market and therefore a conservative approach was taken in the assumption on likely income growth during recent years.
- **Token costs for each of the sectors are based on a desktop scan of products within the sectors from across SADC.**
    - For the energy sector, solar home systems were divided into two tiers. Tier 1 includes basic products that offer lighting and phone charging, while Tier 2 products offer these capabilities along with the ability to power one or more devices, such as a radio or TV. For the market estimate, a price was taken that reflected the typical cost of a Tier 1 product: USD6.40 per month. Data points on the upfront costs and ongoing monthly payments for the SHS model were drawn from the public websites of SHS providers including Sunfire Solutions, The Solar Company, African Clean Energy, Suntransfer, Zonful energy and Solar Works.

    - For the education and health sectors, many products offered free access, making their potential markets theoretically equivalent to all adults who have access to the required type of phone. However, many services that have free access have additional costs, that are carried by the user, and these vary considerably, making it difficult to estimate the size of these markets. Therefore, a USD1 subscription service was chosen as this is sufficiently close to the cost of many subscription services that are available in these sectors.

- The Lesotho Statistics Bureau's monthly CPI calculations were used to estimate the portion of household and individual income that is allocated various expenditure categories, including electricity (8%), education (4%) and health (1.5%). The assumptions that they draw on to calculate CPI includes a breakdown of expenditure categories which is kept up to date.

The analysis proceeded in the following steps:

- Estimate household and individual income levels and create a grid with numbers and percentages of adults within specified income brackets (the brackets are predefined by FinScope).

- Adjust incomes using GDP growth and convert to dollars.

- Adjust the income grid further by reducing cells to reflect access to feature or smart phones (as a digital connection is required to make use of these services).

- Use the resultant grid to create three new grids for each of the sectors, by multiplying the figures in each cell with the percentage that households and individuals have available to spend on products from each sector.

- Calculate the total number of adults who could afford a product at various price points, using the sector-specific grids.

- Create ranges for the number of adults who would have access to products at different price points and income allocation per sector to test the sensitivity of the results to the assumptions.

The final single figures for each sector are:

- **Energy:** 242,000 adults could afford a Tier 1 SHS based on their likely income, access to a phone, product cost and available income for electricity consumption.
- **Education:** 557,000 adults could afford a USD1 monthly subscription for an EdTech product.
- **Health:** 303,000 adults could afford a USD1 monthly subscription for a health tech product.

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# Expanding Access to Education, Energy and Health Services Through Digitally Enabled Delivery in Lesotho

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