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# Digital Technologies supporting health financing: a systematic review and expert discussion

NOURIA BRIKCI, KEVIN NJEFI-PENE, DARIUS ERLANGGA, DINA BALABANOVA  
AND KARA HANSON.

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## **Digital Technologies supporting health financing: systematic review and expert discussion**

Nouria Brikci, Kevin Njefi-Pene, Darius Erlangga, Dina Balabanova, Kara Hanson.  
London School of Hygiene & Tropical Medicine, London, UK.

Nouria Brikci (NB) developed the protocol for the search. Kevin Njefi Pene (KNP) and NB ran the search and selected articles based on pre-established inclusion and exclusion criteria. Darius Erlangga (DE) provided independent expert perspective on articles NB and KNP were unsure of. NB led on the writing of the article. KNP, DE, Dina Balabanova and Kara Hanson provided comments throughout.

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### **Competing interests**

None.

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## Abstract

**Background:** Digital technologies are often expected to provide novel solutions to raising revenue for health, pooling resources, and facilitating strategic purchasing. While there is growing evidence on the role and impact of digital technologies on service delivery and data reporting in health systems, little is known about how these have been used to enhance health financing. This review aims to answer two questions: (i) what is the evidence of effect of digital technologies in supporting health financing functions and (ii) what are the facilitating factors and barriers for using digital technologies in this area.

**Methods:** We systematically searched peer-reviewed journals to identify articles reporting on evaluations of digital technology interventions supporting any of the three health financing functions. We supplemented this with a targeted search of grey literature. Lastly, we convened an expert group discussion to help interpret and validate the findings of our review and to identify upcoming trends in the use of digital technologies for health financing.

**Findings:** We selected for narrative synthesis 10 out of 13,701 identified peer-reviewed articles and an additional 14 reports from the grey literature. Most explored digital interventions at pilot stage and were applied to support mobilisation of resources from individuals and purchasing of services. Of the 24 studies identified, only one used a randomised controlled trial design while others used mixed qualitative methods. Mobile phone technology dominated. Contextual factors were identified as potential facilitators or barriers to effective implementation of digital solutions for health financing. Finally, the expert group discussion confirmed the findings of our review and raised an additional issue: the need to integrate digital technology with existing national health financing arrangements to avoid misalignment with Universal Health Care (UHC) objectives.

**Interpretation:** Despite the proliferation of digital technologies to enhance service delivery, their use in facilitating health financing functions is very limited. We highlighted the need for a better understanding of the impact of digital technologies on health financing, and on UHC objectives.



## **Research in context**

### **Evidence before this study**

We searched Medline from inception to November 2020 to identify any systematic review that assessed the effectiveness of digital health intervention in improving health financing functions, namely revenue generation, pooling, and purchasing. We identified a 2018 review that explored the role of digital strategies in financing universal health coverage. That review did not systematically look at the effectiveness of those digital solutions under consideration.

### **Added value of this study**

This study brings together all the peer-reviewed literature on this topic supplemented by a targeted search of grey literature recognising the some of the evidence of digital health progress may not yet be published. To interpret and validate our findings, we also incorporated the perspective of practitioners through a rigorous qualitative process. We found that most studies only assessed the digital intervention at the pilot stage (small scale and early implementation), which limits our understanding of the effectiveness of digital solutions in improving the health financing system. We also identify the need to integrate digital technology with existing national health systems to avoid misalignment with UHC objectives.

### **Implication available evidence**

The use of digital technologies to facilitate health financing functions is still in its infancy, and not yet supported by robust evidence of impact. Ensuring that digital technologies support alignment with UHC objectives will not be automatic and will require a concerted effort from global and national actors.



# 1. Introduction

As countries work towards achieving Universal Health Coverage (UHC), there is a need for health systems to provide equitable and fair access to high quality services, responsive to people's needs. At the core of this effort is having an effective and efficient health financing system. Health financing is traditionally conceived to comprise three functions: mobilisation of resources to finance health care services, pooling of funds and risks (accumulation of prepaid health care revenue on behalf of the population), and purchasing of health services (transfer of pooled resources to service providers on behalf of the population for whom the funds were pooled) (1). Sustainable health financing remains a major challenge particularly in low- and middle-income countries (LMICs). Some of these challenges include significant out-of-pocket payments, a large informal sector and dependency on donor funding (2).

Much attention has been given to digital technologies and the potential they represent for transforming the delivery of health, and PHC in particular (3). Less well understood is whether and how digital technologies could support the three health financing functions (4).

This paper seeks to explore how emerging digital technologies are used in health financing, and what should the focus be going forward to ensure that these technologies support UHC-aligned health financing. We address two research questions: (i) what is the evidence of effect of digital technologies in supporting health financing functions and (ii) what are the facilitating factors and barriers influencing the use of digital technologies for this purpose.



## 2. Methods

We used a three-stage approach: We first conducted a systematic literature search of peer-reviewed journals; we then undertook a targeted search of grey literature. Finally, we convened a guided expert discussion to elicit gaps and emerging digital applications that may not have been reflected yet in the literature.

### 2.1 Search strategy and selection criteria

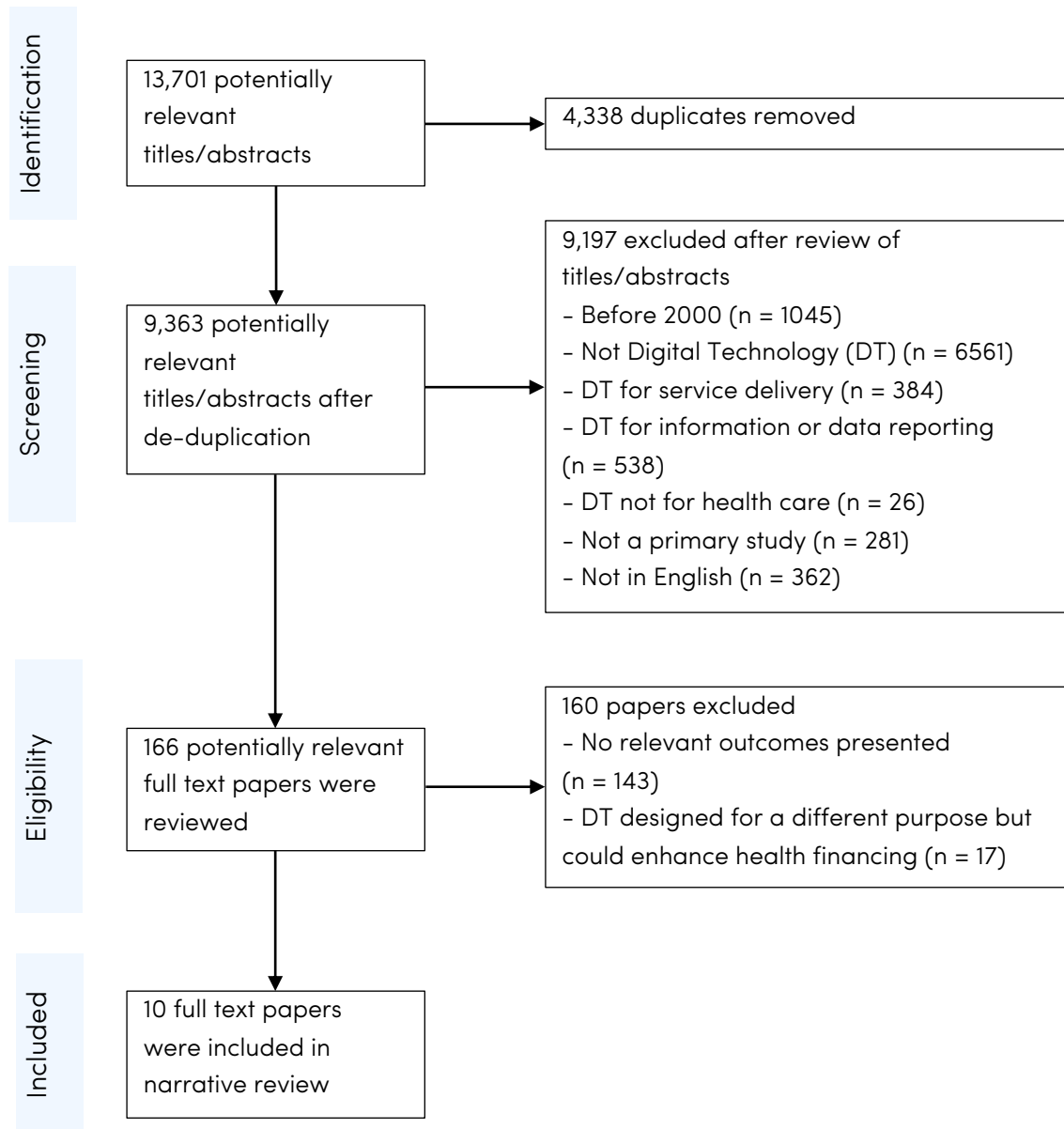
#### **Systematic literature review**

Six international electronic databases were searched in November 2020 using detailed, highly sensitive search strategies: Medline; Embase; Global Health; Econlit; Web of Science Core Collection Databases; and Global Index Medicus. A draft search strategy was compiled in the OvidSP Medline database. The search strategy included strings of terms, synonyms and controlled vocabulary terms (where available) to reflect three concepts: health financing, digital technologies and primary health care. No filters or limits were added.

The search strategy was adapted for each database to incorporate database-specific syntax and controlled vocabularies. Inclusion and exclusion criteria are available in Table 1 in Annex.

A total of 13,701 results were retrieved and of these, 4,338 (32%) were identified as duplicates. The remaining 9,363 articles were screened by two independent researchers by titles and abstracts, excluding 9,197. Full texts of the remaining 166 articles were reviewed and references scanned for additional interventions. 10 articles were included in the final review (5-10) (see Figure 1 below and Table 2 in Annex).

Figure 1: PRISMA diagram







### **Targeted review of grey literature**

Given that this is a field under rapid development and which is driven by implementers who may not have incentives to publish in peer reviewed journals, we also conducted a targeted search of grey literature. Through discussions with leading experts in the field of digital technologies and health financing, we identified 18 organisations that carried out digital health projects related to health financing. The organisations' websites were searched to identify any form of documentation (including blogs, policy briefs or case studies) of the role and impact of these digital technologies in financing health. This led to the identification of 14 additional interventions. For each of these interventions, we specifically searched these websites for any associated evaluations of its impact or research of its operation (see Table 3 in Annex).

An update of the search was run in February 2022. No further papers were identified in the peer reviewed literature. One was identified in the grey literature and included in the discussion (11).

### **Expert group discussion**

We sought to validate the findings of our reviews and to identify emerging trends in the field of digital technologies for health financing not yet captured in the literature, through a virtual technical discussion with leading digital health financing experts. The experts were selected purposively: we conducted a mapping exercise to identify globally recognised experts in the field of digital health financing (academics, practitioners and policy makers). The mapping involved three steps: a) identification of authors of key papers in this field (4, 12), through which we identified a professor in digital health recognised for his contribution in formulating WHO's strategy in digital health, two senior WHO staff in health financing who had written WHO reports on digital tools for health financing, and a global leader in the application of digital tools for health, b) referral of several other practitioners by some of the previously mentioned experts, and c) the authors' network of key practitioners in digital health (e.g. BlueSquare, IntraHealth, Digital Impact Alliance and PATH). Through this mapping, we identified 12 experts (7 women, 5 men). All agreed to take part in the discussion.

A thematic guide was developed for the expert group discussion which asked: do the findings of the literature review resonate with what you know of this field? How do digital technologies support each of the health financing functions (mobilisation, pooling and purchasing)? Where have such digitally supported models been implemented, with any level of success? What are the emerging key trends in relation to health financing and digital technologies? The discussion was chaired and facilitated by one of the authors (KH). We used a structured approach to avoid bias, first collecting the views of experts following a round robin technique and providing equal time to each, interspersed with discussion of the key questions noted above, and moving on to the next theme once saturation was reached (13).



Ethical approval was obtained from the LSHTM's ethics committee (Ref: 22645 - 1). All participants gave written consent to be recorded and agreed for the data to be used and analysed for external publication.

## 2.2 Data analysis

**Peer reviewed and grey literature:** All citations identified by our searches were imported into EndNote X9 software. Duplicates were identified and removed using the method described on the London School of Hygiene & Tropical Medicine Library & Archives Service blog (14). The remaining citations were then exported into Mendeley software V1.19.3 for review.

Two independent reviewers (KN and NB) screened the titles and abstracts of the studies to identify potential studies relevant to the research question. For potentially eligible studies, KN and NB assessed the full text against the inclusion and exclusion criteria. Additionally, the references of all potentially eligible studies were thoroughly reviewed to identify other potentially eligible articles. In cases of uncertainty, the details of the studies were discussed with an independent researcher (DE) and a consensus was reached on the eligibility of the studies through discussion.

A data extraction table was designed in Microsoft Excel V.2016 and relevant data from all included studies were recorded. These included: type of intervention; description of the Intervention; country where it was implemented; summary of the primary findings; whether a robust evaluation (i.e., based on rigorous methods, assessment of risk of bias and sensitivity analysis) had been undertaken.

The expert discussion was recorded and transcribed using Zoom. A focused coding tree was generated (see Annex 2). Transcripts were analysed using NVIVO software and a write up of the analysis was shared with participants to ensure the emerging key themes of the discussion were correctly identified and nothing important was missed.

## 2.3 Role of funding agency

This work was funded by the Bill and Melinda Gates Foundation (BMGF).

## 3. Results

Findings have been structured by dominant themes, bringing together the results of both reviews and experts' discussion (see Table 4 in Annex for a summary of evidence by information source).

### **Little documented robust evidence**

The peer-reviewed and grey literature on this topic is limited. Overall, we identified only one study that employed a robust evaluation approach (randomised controlled trial)(10). All other selected published evidence used a combination of cross sectional and qualitative methods without presenting a clear evaluation framework or control group. This dearth of robust published evaluations was recognised as problematic by the technical experts consulted.

### **An area of experimentation**

The studies identified were mainly pilots: seven out of the ten peer-reviewed studies were pilot studies (6, 7, 9, 10, 15) while the remaining three reported digital technology that had been scaled up nationally (5, 6, 16). The grey literature was more balanced, with 6 out of 14 interventions that were pilot projects. The technical experts confirmed that the limited documentary evidence reflected their understanding of the current evidence base.

### **Dominance of mobile phone technology**

Of the 24 studies included in this review, only two reported on the role of a digital technology that did not involve mobile phone services (8) (17). The two main mobile technologies used were mobile money payments and mobile health wallet (for example through M-tiba(18) or the Changamka Maternal Health Smartcard(19)). Three studies reported on the use of an online software for the payment of community health workers through mobile money transfer (5, 7, 20). The online software acted as a streamlined process for transferring payment from the purchasers to health workers' accounts. Another study reported the use of 'mobile money' as a conditional incentive for mothers to improve timely immunisation in rural Kenya(10). Mobile phone technologies were also used to improve the efficiency of drug purchasing in Tanzania (16), to cover transport costs for pregnant women in Zanzibar (20) and Kabul (21), to provide insurance coverage for mobile phone users (22), and to provide e-vouchers for bed net purchasing (23).

### **A focus on individuals' ability to manage funds and purchasing of services**

Digital technologies have so far mainly focused on demand side financing mechanisms, aimed at making it easier for individual patients to pay providers out-of-pocket, or accumulate savings to pay for health care, rather than on facilitating purchasing of services through the use of pooled resources. Mtiba for example provided a mobile health wallet which allowed users and their relatives to save and pay for services (18); M4Change supports Conditional Cash Transfers (CCTs) to pregnant women (24). To incentivise savings, donors provided bonus payments to women reaching a specific savings target (25). Mobile phone usage was also associated with insurance coverage



(the more airtime the customer used, the more insurance he/ she would receive)(22). Only 2 interventions identified supporting any form of pooling. Experts confirmed this pattern.

### **Support for greater transparency**

Digital technologies in financing health have the potential to increase the transparency of transactions for both the purchasers (in these cases individual patients) and providers. Mtiba for example allows patients to know exactly how much they are paying for the services received (18). ASHA-soft allowed providers (Maternal Health Workers in India) to quickly and clearly understand what they were being paid and why (5, 7), and improved the resolution of grievances related to payments (6). Similarly, Pona na Tigo Bima in Tanzania improved the management and repayment of insurance claims (17).

### **Support for better performance of healthcare providers although vested interests need to be considered**

The payment of incentives through digital technologies had a positive impact on the motivation and performance of health workers. In India for example, the fact that ASHAs were able to compare the incentives received with those of their peers motivated them to compete and perform better (5), and improved the quality of their work life (6). In Tanzania, a SMS based reporting system allowed pharmaceutical outlets to report on service delivery related indicators, which led to better communication between pharmacy personnel and accredited drug delivery outlets (ADDO)(26). These positive impacts, however, could be jeopardised in contexts where these new payment methods reduced informal revenue obtained by healthcare workers. In Madagascar for example, this potential loss of income was identified as a barrier to the use of mobile health wallets (MHW)(25). The competition that the MHW also represented for traditional birth attendants who offer similar services often at lower prices should also be considered, and was identified as a barrier in Madagascar (25).

### **Positive impact on health indicators**

D-Tree, which uses mobile money to enable Community Health Workers (CHWs) to pay for transport for women to deliver in health facilities, has led to an increase in facility deliveries from 40% to 78% within the first five months of the project (20).

### **Overcome public financial management (PFM) systems limitations**

The use of digital technologies allowed for faster payments to providers. In India for example, delays of between 2 to 6 months for the payment of ASHAs were common, with some programmes suffering from three years of payment back log (7). The introduction of the ASHA soft payment system allowed for timely processing and disbursement of funds. The elimination of cheque payments, as a result of the introduction of ASHA soft, meant that ASHAs did not have to wait in long queues to deposit cheques in bank accounts, nor have to wait up to 15 days for funds to be cleared (7).

### **Support for greater efficiency**

Digitalisation of payments held the potential to improve efficiency of resource use in various ways: in India for example, an estimated 983 days of accountants' work was



saved per year as a result of the introduction of ASHA soft (7). ASHA soft also reduced the number of visits ASHAs had to make to get paid (from 3 to 4 visits a month per ASHA to none)(7). In Tanzania, the use of a web-based database providing information on private sector drug outlets, and facilitating payment and communication between accredited drug dispensing outlets (ADDOs) and pharmacy personnel, led to ADDO owners saving time and money(26). Also in Tanzania, the replacement of paper vouchers with e-vouchers for bed nets facilitated the expansion of the programme to 80% coverage nationwide (23).

### **Support for health insurance market development**

Mobile phone usage has been used in 7 African countries to increase health insurance coverage: the more a customer spent with the telecom provider, the more health insurance could be earned (22). A pilot project in Nigeria demonstrated that the use of mobile phones to provide insurance could lead to the expansion to new clients, with great interest expressed from mobile network operators and health management organisations, despite the high cost associated for its set up and operation (9).

### **Institutional and individual factors to support implementation**

The success of the digital technologies in supporting health financing initiatives relied on multiple factors.

Firstly, considering the dominance of mobile phone technologies in the projects identified, access to mobile phones and high mobile phone coverage was identified as a major factor that facilitated the implementation and achievements of mobile phone-related digital technologies (5, 6, 8). In a study focusing on the users of health care (pregnant women), the high level of mobile phone use among pregnant women (80.3%) facilitated MHW implementation and success (8). Likewise, in another study to improve timely immunization in rural Kenya using conditional cash transfers through mobile money payments, the high access to mobile phones among mothers or within their immediate circle facilitated the pilot programme (6). In Madagascar, the implementation of the MHW was supported by the distribution of mobile phones and tablets to healthcare providers (25). On the other hand, limited experience in using mobile technologies, as in Madagascar for example where only one respondent had previous experience of mobile technologies for payment, represented a barrier to the successful roll out of the MHW (25).

On the other hand, the lack of internet connection was identified as a barrier. For example, the lack of internet facilities made the use of ASHA-soft quite challenging, as ASHAs had to travel long distances to have access to internet services for data entry (5, 6).

Trust and transparent management of digital technology services were also found to be facilitating factors. For example, the fact that the “ASHA-soft” software increased transparency in the payment of ASHAs contributed to its acceptability and use (5). On the other hand, the MHW in Madagascar suffered from cultural reluctance towards savings due to a general distrust in financial services among the population (25).



The lack of training for users (health workers, pharmacists or patients), compounded by low levels of population literacy in certain contexts, also represented a barrier: In the payment of ASHAs, insufficient orientation and training of PHC staff on mMoney payments resulted in confusion and delays in the adoption of ASHA-soft (7). Even after training, some ASHAs were still unable to operate ASHA-soft (6). Low levels of education among ASHAs made it difficult for them to understand and accept mobile money transfers since it was an entirely new concept (27). In the case of ADDOs, the inadequate training of some pharmacy personnel limited the impact of the initiative (26). In Madagascar, the high level of illiteracy amongst the target population hampered the success of the MHW.

The importance of the initiative being locally driven rather than donor supported was also identified as a key factor behind the success of the novel purchasing approach used in Tanzania (16).

Several cultural factors influenced the use of digital technologies for health financing. Mismanagement in the work culture and corruption were identified as barriers to the implementation of ASHA-soft for example, where some Auxiliary Nurse Midwives (ANM) demanded money to enter the data of the ASHAs (6).

### **Longer term concerns**

The experts' discussion brought forward two additional concerns. Firstly, the difficulty in integrating digital solutions within existing health systems structures (for example, limited interoperability between new digital approaches and existing data systems). Secondly, the experts warned that digitally supported financing projects encouraging individuals' mobilisation and purchasing approaches sat at odds with the UHC objectives of equity and efficiency. Indeed, achieving UHC implies a replacement of OOP payment with pre-payment mechanisms (supported by digital solutions), which in turn require a pooling at sub-national or national levels to facilitate cross-subsidisation between population groups. These pooled funds should thereafter be used to increase the strategic nature of purchasing, thereby improving equity and efficiency of spending. The fact that the digitally supported solutions were not yet focused on this population level effort jeopardised their potential to support UHC.



## 4. Discussion

This study sought to review the evidence for the use of digital technologies to enhance health financing functions. We first highlighted the dearth of robust evaluations and detailed studies (whether descriptive or observational) on this issue, despite global level enthusiasm for digital solutions across sectors, including health. This review also highlighted the dominance of pilot projects over scaled up national approaches in the peer reviewed literature, although more scaled up initiatives were found in the grey literature. We showed that digital technologies were being used to support each of the health financing functions, although there was more of an emphasis on purchasing and revenue mobilisation than on pooling. We also found that the focus was on individuals' resource mobilisation and purchasing rather than governments or public purchasing agencies such as health insurance agencies.

Mobile phone technologies were, at the time of this literature review, the main platform used. We found that developing and implementing digital technologies for health financing required a supportive environment to facilitate any of the health financing functions: access to mobile phones, users' knowledge and previous experience with digital technologies, transparency of the programme and trust in the tools and service providers as well as the availability of sustainable funding were identified as the main factors that facilitated the use of digital technologies for health financing. In contrast, poor internet and network infrastructure, insufficient training on the digital tools introduced, low level of education, poverty and cultural and religious factors hampered the implementation and achievements of digital technologies for health financing.

The literature did not touch upon the need for these digitally supported interventions to integrate into existing health systems. Yet the donors and academics in our expert group were concerned that unless digital technologies were supported by functioning health systems, these digital interventions would bypass national systems or simply fail as not supported by sustainable systems. A difficulty in integration of these digital tools into existing national data systems and a potential misalignment between the digital approaches proposed and UHC objectives were also identified as a cause for concern. The use of pilot projects may suggest that digital solutions for financing are implemented on a piecemeal basis, lacking a national strategy for scale up and an overarching policy framework. These issues are not specific to health financing but could apply to any sector attempting to integrate digital approaches in its systems.

This review is limited by the lack of evidence identified. The field of digital technologies has not been sufficiently studied in the peer reviewed literature(28), which limited the evidence available on how they support health financing. To counter this limitation, we extended our approach to include targeted grey literature search and expert discussion. However, this field is fast moving, and we may not have captured the numerous pilots and initiatives taking place in different LMICs. Given the possibly limited breadth of the review, we included the expert feedback in order to capture trends that were not yet possible to document and evolving perspectives. We sought to minimise bias by identifying key



stakeholders and opinion formers in the field according to clear criteria, thus seeking to represent diverse views.

The focus of the available evidence on the revenue mobilisation and purchasing of services by individuals and households, rather than pooling of these resources across populations may be due to the fact that many of these initiatives are led by private organisations with commercial, rather than social, objectives. Individual firms are unlikely to pursue collective objectives such as solidarity and cross-subsidy that are necessary to achieve UHC. The individual firms spearheading the digital innovations described in this article are less intent on achieving public health objectives such as cross subsidisation at national level, and more focused on achieving greater market penetration and capture. This focus on revenue mobilisation and purchasing may also be explained by the greater difficulty in harmonising distinct approaches across population groups and integrating these into national health financing systems.

From a policy perspective, the potential dangers of using unevaluated digital technologies have been highlighted, as have the risks of failing to align these with UHC objectives, is a key finding. The risk of fragmentation of revenue sources associated with multiple digital technologies, of creating multiple pools rather than harmonising existing ones, as well as facilitating individual purchasing approaches rather than consolidating them into one payment stream, were all highlighted as concerns in our expert discussion. For example, the increasingly wide application of mobile wallets by some telecommunication companies might contribute to proliferation of small pools with limited redistributive capacity (WHO 2021). The use of digitalised information management systems in strategic purchasing could also perpetuate health inequalities if the partial digitalisation leads to unintentionally excluding populations that have more limited access to digital technology (i.e. vulnerable groups<sup>(11)</sup>). The lack of coherence and harmonisation between digitally facilitated interventions and more traditional management systems could run counter to UHC objectives of moving away from individual savings account towards pooled contributions, and could jeopardize equity as only those able to access these technologies would be able to benefit from the cover associated with them. While UHC aims to achieve greater harmonisation in pooling and purchasing, the development of digital technologies to date has led to standalone initiatives supporting revenue collection or purchasing through individual, parallel systems, which are not well integrated or aligned with the existing health financing systems, and which fail to achieve the cross-subsidy needed for UHC.

We propose that future research should fall into two main areas. First, more robust evaluation of the effectiveness of digital technology initiatives in health financing is needed to ensure that these approaches are effective in achieving streamlined and effective operation of health financing functions, whether this is resource mobilisation, pooling or facilitating provider payment. Second, research should examine the extent to which digital technologies facilitate financing of health in line with UHC objectives, and are beneficial from health system perspective.





## 5. Conclusion

Our article has highlighted the need for a better understanding of the impact of digital technologies on health financing, and on UHC objectives. The field remains nascent and offers potential to facilitate revenue mobilisation, pooling and eventually purchasing of services, but the actors in this field must carefully design their digital approaches with the goals of equity and efficiency in mind, and ensure that their efforts contribute to harmonisation of pools and purchasing approaches rather than further increase fragmentation.

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## Annex

Table 1: Inclusion and exclusion criteria

Attribute	Inclusion Criteria	Exclusion Criteria
Population (Study Participants)	Studies involving human beings irrespective of whether they were consumers or providers of PHC services.	Studies involving non-human populations.
Interventions	<ul style="list-style-type: none"> <li>- Studies involving digital technologies designed specifically to enhance either the collection (mobilisation) of revenue, the pooling of resources and risks or the purchasing of health care services.</li> <li>- Studies that describe impact or evaluate effect.</li> <li>- Studies that describe the facilitators or barriers to using the digital technologies in health financing</li> </ul>	<ul style="list-style-type: none"> <li>- Digital technologies designed for a different purpose, but which could enhance health financing components e.g. Electronic Health Records, electronic prescribing, robotic dispensation machines.</li> <li>- Digital technologies used only service delivery, or data reporting, or for communication.</li> <li>- Digital technologies not used in health care and/or precisely PHC.</li> </ul>
Comparisons	<ul style="list-style-type: none"> <li>- Studies comparing digital technologies to other previously used non-digital systems of financing health care.</li> </ul>	<ul style="list-style-type: none"> <li>- No comparison</li> </ul>
Outcomes	<ul style="list-style-type: none"> <li>- Primary outcomes: These include: impact in revenue collection, pooling, and/or purchasing (proportion increase in revenue collection, pooling and payments, timely payments, accuracy in payment); Facilitators and barriers to the use of the digital technologies.</li> <li>- Secondary outcomes: These include: acceptability of digital tool by stakeholders, health care consumers and providers, improved efficiency, improved transparency.</li> </ul>	<ul style="list-style-type: none"> <li>- Outcomes such as impact on access to health care, impact on service delivery, impact on data reporting, without any associated health financing component.</li> </ul>
Study Designs	Observational and Interventional studies	Expert opinion, descriptive case studies and case series, and technical reports and reviews were excluded.



Setting	Studies conducted or implemented related to health	Studies not related to health
Language	Only studies reported in English	Studies not available in English translation
Time Period	Studies published between the 1st of January 2000 to the 18th of January 2021	Studies published before the 1st of January 2000 and after the 18th of January 2021

Table 2: Peer reviewed literature extracted

Reference	Study Type/Design	Intervention	Primary Findings	Underlying conditions that facilitate or hamper the achievements?
Rose AF, Kumar A. Perception and Performance: Impact of ASHA-soft on ASHA Workers in Rural Field Practice Area of a Medical College in Central Karnataka. Annals of Community Health. 2020;8(2):14-8.	Cross-sectional Study (Mixed Methods Approach)	"ASHA-soft", an online system which allows the user to capture beneficiary wise details of services offered by Accredited Social Health Activists (ASHA) to the community. A supervisor or data entry operator input details of services offered into the software following verification of the data by Auxiliary Nurse Midwives (ANM). The ASHAs then receive an online payments according to their performance (pay-for-performance) into their bank accounts. The software then generates reports to monitor progress of the	Increase in payments released to ASHAs from 2014 to 2018, associated with an increase in the performance of ASHAs. > Being able to compare their incentives received with that of their peers motivated them to compete and perform better. ASHAs perceived "ASHA-soft" as a good tool for getting their payments on time for the various activities done	<u>Barriers</u> > ASHAs expressed their dissatisfaction regarding the non-availability of a computer or internet facility at the PHC level. The ASHA has to travel a long distance to where there is internet services for data entry.



Reference	Study Type/Design	Intervention	Primary Findings	Underlying conditions that facilitate or hamper the achievements?
		<p>program. Through this online system, ASHAs can monitor their performance and assess progress made.</p>		
<p>Rathore S, Rai M. An empirical study on performance monitoring and online payment system (with special reference to ASHA soft). SJCC Management Research Review. 2018 Jun 2;8(1):33-45.</p>	<p>Empirical Study (Mixed Method Approach)</p>	<p>As above</p>	<ul style="list-style-type: none"> <li>&gt; "ASHA-soft" reduces delay in payments (Rejects Null Hypothesis).</li> <li>&gt; "ASHA-soft" is a proper performance monitoring tool</li> <li>&gt; "ASHA-soft" makes full payment according to my performance</li> <li>&gt; "ASHA-soft" has improved quality of work life</li> <li>&gt; "ASHA-soft" reduces the exploitation done at various levels</li> <li>&gt; "ASHA-soft" has not helped in solving grievances regarding payment system</li> </ul>	<p><u>Barriers</u></p> <ul style="list-style-type: none"> <li>&gt; Lack of internet facility in the area.</li> <li>&gt; Corruption: Some ANMs and data entry operators demanded money to enter data.</li> <li>&gt; Some ASHAs were unable to operate the "ASHA-soft" software even after training.</li> <li>&gt; Data entry errors by data entry operators.</li> <li>&gt; Lack of Top management support.</li> <li>&gt; Mismanagement in the work culture</li> </ul>





<p>Muller N, McMahon SA, De Neve J-W, Funke A, Bañrighausen T, Rajemison EN, et al. (2020) Facilitators and barriers to the implementation of a Mobile Health Wallet for pregnancy-related health care: A qualitative study of stakeholders' perceptions in Madagascar. PLoS ONE 15(1): e0228017. <a href="https://doi.org/10.1371/journal.pone.0228017">https://doi.org/10.1371/journal.pone.0228017</a></p>	<p>Cross-sectional Study (Qualitative)</p> <p>N = 21 Stakeholders (8 community representatives, 8 health care providers, 3 health officials and 2 phone provider representatives)</p>	<p>Mobile Health Wallet (MHW) is a software platform that allows users, namely pregnant women, to save and pay for health care services using Mobile Money (MM) at participating health care providers.</p>		<p><u>Facilitators</u></p> <p><u>1) Institutional Factors</u></p> <ul style="list-style-type: none"> <li>&gt; Previous personal use of mobile devices.</li> <li>&gt; Transparent management of program activities.</li> <li>&gt; Motivation by distribution of mobile devices for program specific activities.</li> </ul> <p><u>2) Interpersonal &amp; Community Factors</u></p> <ul style="list-style-type: none"> <li>&gt; Previous experiences with health saving groups.</li> <li>&gt; Involvement of community health workers and community leaders since these are people the local population trust.</li> <li>&gt; Use of illustrations rather than texts for community sensitization.</li> </ul> <p><u>3) Individual Factors</u></p> <ul style="list-style-type: none"> <li>&gt; Direct financial incentive scheme (bonus payments) for health savings.</li> <li>&gt; Technical support by community health workers.</li> <li>&gt; Household visits for community sensitization</li> </ul> <p><u>Barriers</u></p> <p><u>1) Institutional Factors</u></p> <ul style="list-style-type: none"> <li>&gt; Limited experience with mobile technologies.</li> <li>&gt; Loss of income through suspension of informal payments.</li> <li>&gt; Competing interests with established health care providers.</li> <li>&gt; Inconsistency in service fees.</li> </ul> <p><u>2) Interpersonal &amp; Community Factors</u></p> <ul style="list-style-type: none"> <li>&gt; Competitive medical practices of traditional birth attendants who offer services, often at lower prices ;</li> <li>&gt; Cultural reluctance towards savings in general</li> </ul> <p><u>3) Individual Factors</u></p> <ul style="list-style-type: none"> <li>&gt; High poverty rate among the population.</li> <li>&gt; Low rates of mobile phone ownership.</li> <li>&gt; Perception of medical care being restricted to emergency care only.</li> <li>&gt; Illiteracy</li> </ul>
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Reference	Study Type/Design	Intervention	Primary Findings	Underlying conditions that facilitate or hamper the achievements?
Muller N, Emmrich PM, Rajemison EN, De Neve JW, Bärnighausen T, Knauss S, Emmrich JV. A mobile health wallet for pregnancy-related health care in Madagascar: Mixed-methods study on opportunities and challenges. JMIR mHealth and uHealth. 2019;7(3):e11420.	Cross-sectional Study (Mixed Methods Study)  N = 412 Pregnant women and new mothers/ 24 participants in FGDs	As above		<u>Facilitators</u> > High willingness to save > Broad mobile phone usage (80.3% of population made regular use of mobile phone with 96.3% having registered with a mobile phone service provider. > Cultural acceptance of a mobile payment and saving tool (almost all had heard of mobile payments, however, only 35.7% had used mobile payment services). > Perceived usefulness of the system by pregnant women.  <u>Barriers</u> > Lack of transparency about free health care services and prices of services. > High OOP costs for basic treatment.

Reference	Study Type/Design	Intervention	Primary Findings	Underlying conditions that facilitate or hamper the achievements?
<p>Nyati-Jokomo Z, Dabengwa IM, Chikoko L, Makacha L, Nyapwere N, Makanga PT. The Potentials of a Maternal Mobile Wallet: a Qualitative Case Study on Opportunities and Challenges From Zimbabwe.</p>	<p>Cross-sectional Study (Qualitative)</p> <p>&gt; N = 193 (pregnant women, women of child bearing age, men, grandparents and health care providers)</p>	<p>RoadMApp is a Maternal Healthcare Mobile Wallet (MHMW) facility fused into a geographically enabled transport (geo-mHealth) technology for accessing care. It allows women to save money/crowd source savings for maternity using a mobile service provider of their choice, communicates the level of saving to date and reduces travel risk to access maternal healthcare using the total savings to date.</p>		<p><u>Facilitators</u> <u>Individual Factors</u> &gt; Low coverage of health insurance. No health insurance in the informal sector. <u>Community/Institutional level Factors</u> &gt; The availability of Rotating Saving and Credit Associations (ROSCA) throughout the district. &gt; Existing mobile money services. <u>National Factors</u> &gt; Availability of funding for maternal healthcare</p> <p><u>Barriers</u> <u>Individual Factors</u> &gt; Low/unstable incomes. &gt; Women's lack of autonomy over finances. &gt; No access to mobile phones. &gt; Financial illiteracy. <u>Community/Institutional level Factors</u> &gt; No formal follow-ups on maternal savings &gt; Culture/Religious beliefs which encouraged women to seek spiritual healing instead of health facilities. Women subscribed in these religious sect deliver in member(s) home(s)/shrines assisted by church midwives. &gt; Poor network coverage &gt; Banking practices (high transaction charges, low interest rates on savings) <u>National Factors</u> &gt; High cost of living due to hyperinflation, severe unemployment and food shortages. &gt; Power outages</p>



Reference	Study Type/Design	Intervention	Primary Findings	Underlying conditions that facilitate or hamper the achievements?
<p>Lezadi S, Tabrizi JS, Ghiasi A, Farahbakhsh M, Gholipour K. Improvement of the quality payment program by improving data reporting process: an action research. BMC health services research. 2018 Dec;18(1):1-0.</p>	<p>Cross-sectional Study (Qualitative with action research approach)</p>	<p>A computerised web-based system for data reporting and calculation of payment amounts within the context of a Pay-for-Quality (P4Q) program. This system was implemented to replace the previously used Excel software.</p>	<p>&gt; With the Excel software, there was room for manipulation of data. At district health centres, in some cases, they changed the original formula for calculating incentives resulting in inaccuracy in payment amounts. However, with the web-based software, the problem was resolved.</p> <p>&gt; Using papers of excel to prepare managerial reports regarding percentage of payments and variations in payments was problematic. However, with the web-based system, any change or contrast in payment information alerted and was corrected automatically.</p>	<p><u>Facilitators</u></p> <p>&gt; Inaccuracy and manipulation of formula for calculation of provider payment amounts.</p> <p>&gt; Impossibility to track the progress of health care providers' quickly since there was a separate file for each data reporting process. As such, it was challenging to compare variations in payments across providers.</p> <p>&gt; Health care providers had more confidence in the web-based software compared to the manual methods like paper and Excel.</p> <p><u>Barriers</u></p> <p>&gt; Training users on the new system.</p>



Reference	Study Type/Design	Intervention	Primary Findings	Underlying conditions that facilitate or hamper the achievements?
Chukwu E, Garg L, Eze G. Mobile health insurance system and associated costs: a cross-sectional survey of primary health centers in Abuja, Nigeria. JMIR mHealth and uHealth. 2016;4(2):e37.	Analytic Cross-sectional Survey (Mixed Methods Approach)  N = 200 (100 health workers and 100 health facility clients)	Document costs associated with a mobile technology-supported, community-based health insurance scheme	This study demonstrates a case for the implementation of enrolment, encounter management, treatment verification, claims management and reimbursement using mobile technology for health insurance in Abuja, Nigeria. Available data show that the introduction of an electronic job aid improved efficiency.	<u>Facilitators</u> > Possibility to enrol for health insurance using SMS. > Business priority interest for mobile network operator.  <u>Barriers</u> > Mobile money business was neither lucrative nor widespread in reach to support the enterprise.
Wakadha H, Chandir S, Were EV, Rubin A, Obor D, Levine OS, Gibson DG, Odhiambo F, Laserson KF, Feikin DR. The feasibility of using mobile-phone based SMS reminders and conditional cash transfers to improve timely immunization in rural Kenya. Vaccine. 2013 Jan 30;31(6):987-93.	Randomised Trial  N = 72 mothers with children 0 - 3 weeks of age. 48 were randomly assigned to the mMoney arm and 24 to the airtime arm	Reminder sms + Mobile Money payments or Airtime voucher.	> All mothers stated they preferred CCTs as cash via mobile phone rather than airtime. > 61% claimed mMoney was "worth more", 30% said it was "better to have cash than airtime" and 9% said it was "easier."	<u>Facilitators</u> > Access to mobile phones among participants or within their immediate circle was high. > 86% of mothers in the mMoney group were already registered in mPESA (mobile money financial service) and 35 95% had used mPESA previously.  <u>Barriers</u> > Some women had to travel long distances to get their cash from an mPESA agent.



<p>Battle JD, Farrow L, Tibaijuka J, Mitchell M. mHealth for Safer Deliveries: A mixed methods evaluation of the effect of an integrated mobile health intervention on maternal care utilization. Healthc (Amst). 2015 Dec 1;3(4):180-4.</p>	<p>The intervention was evaluated using both qualitative and quantitative data. Quantitative data were collected as part of the intervention between January 2013 and December 2014. Quantitative data came from all 13,231 women who were enrolled and gave birth in the project. No control group for quantitative analysis. The qualitative component included 27 mothers, 25 CHWs, and 12 health facility workers.</p>	<p>As part of a wider intervention, a mobile phone app was developed that facilitated better delivery of ANC and delivery care to women in Zanzibar, included the use mobile banking to pay for transportation to the health facility when the woman was referred, paying for transport without ever touching cash.</p>	<p>None outlined in relation to purchasing approach</p>	
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Reference	Study Type/Design	Intervention	Primary Findings	Underlying conditions that facilitate or hamper the achievements?
Rutta et al. Journal of Pharmaceutical Policy and Practice (2015) 8:23	Case study description	Web-based regulatory database and website for the Pharmacy Council. The database uses unique identification numbers for ADDOs and pharmacies as well as for all personnel. ITIDO trained Pharmacy Council staff on maintenance and use of the database and handed over to them the necessary equipment.	Case study shows that products and services in underserved areas of Tanzania can be provided through public private partnership and is a scalable, sustainable, and transferable approach.	Local engagement was crucial as was the fact that this was not a donor driven initiative, but rather driven by local expertise.

Table 3: Grey literature extracted

Intervention	Description of Intervention	Primary findings	Sources
<p>Mtiba Morgan L. CASE BRIEF: M-TIBA DIGITAL HEALTH PLATFORM. <a href="http://www.impactinsurance.org/sites/default/files/CB24%20-%20EN_1.pdf">http://www.impactinsurance.org/sites/default/files/CB24%20-%20EN_1.pdf</a>: Impact Insurance, 2020.</p>	<p>Mtiba is a three way platform connecting patients, healthcare providers and healthcare payers (governments, insurers, donors and solidarity payers). Mtiba also provides a mobile health wallet that allows users to save, send, receive, and spend money for health expenses.</p>	<p>&gt; Over 4.7 million users with over 1048 million KES worth of transactions handled so far. Over 1,400 health care clinics enrolled.</p> <p>&gt; Governments and donors can also use M-TIBA to top up individuals' health savings accounts. Therefore, if vulnerable groups (such as pregnant women living with HIV/AIDS in deprived areas) can be identified, M-TIBA allows payers to allocate money or entitlements for treatment directly to their mobile phones. M-Tiba has also partnered with The National Hospital Insurance Fund (NHIF) to provide healthcare insurance to 2,000 households.</p> <p>&gt; Donors, employers and insurers can also use M-TIBA to offer healthcare financing products, such as vouchers, managed funds and low-cost hospital cash insurance, directly to specific segments of the Kenyan population.</p> <p>&gt; The digital platform connects patients, payers and healthcare providers at close-to-zero transaction costs, benefiting all stakeholders. Other benefits of the platform, such as efficiency, transparency and access to digitally generated data.</p> <p>&gt; Mtiba Trial: M-Tiba was introduced to 5,000 mothers with children under 5 years of age (around 10,000 beneficiaries in total) living in informal settlements in</p>	<p><a href="http://www.impactinsurance.org/sites/default/files/CB24%20-%20EN_1.pdf">http://www.impactinsurance.org/sites/default/files/CB24%20-%20EN_1.pdf</a></p> <p><a href="https://mtiba.com/">https://mtiba.com/</a></p> <p><a href="https://www.healthcareglobal.com/technology-and-ai-3/m-tiba-app-revolutionising-healthcare-kenya">https://www.healthcareglobal.com/technology-and-ai-3/m-tiba-app-revolutionising-healthcare-kenya</a> [27th February 2020]</p> <p><a href="https://www.pharmaccess.org/wp-content/uploads/2016/05/Mtiba-brochure-FINAL1.compressed.pdf">https://www.pharmaccess.org/wp-content/uploads/2016/05/Mtiba-brochure-FINAL1.compressed.pdf</a></p>





Intervention	Description of Intervention	Primary findings	Sources
		<p>Nairobi. Potential users were identified through SMS blasts sent out by Safaricom, and by field agents working with community health workers. Each eligible registered user received KES 1,000 (~US\$ 10) in their wallet. The money earmarked for treatment for children up to the age of 5 years only. A total of 44 selected healthcare providers, screened for quality of care, participated. More than 90% of the users and participating facilities responded positively to the health wallet. 63% used the wallet during the six month test period. In 14% of the cases they sought help sooner. 77% of the women indicated that they were willing to save for health in their wallet. This trial shows at relatively small scale what kind of impact M-Tiba can have for these mothers and their children on accessibility and affordability of healthcare</p>	
m4Change + mCCT	<p>A CommCare mobile application is used to track pregnant mothers through ANC, delivery and child's first year of life who are enrolled in the CCT scheme, improving health workers' ability to collect data and verify that mothers are receiving services. A data dashboard was built to support the government to easily access the data, facilitating client payment approvals, decision making and reporting. The program is designed for clients to receive their payments via mobile money.</p>	<p>&gt; Overhead funding is saved by foregoing cashbased transfers of incentives, time is saved because the mobile mechanism transfers the funds to the beneficiaries efficiently, and security risks are decreased because the mobile transfers are more secure than handling cash.</p>	<p><a href="https://lib.digitalsquare.io/bitstream/handle/123456789/77577/m4change_mcct.pdf?sequence=1&amp;isAllowed=y">https://lib.digitalsquare.io/bitstream/handle/123456789/77577/m4change_mcct.pdf?sequence=1&amp;isAllowed=y</a></p> <p><a href="https://www.pathfinder.org/projects/m4change-mcct/">https://www.pathfinder.org/projects/m4change-mcct/</a></p>



Intervention	Description of Intervention	Primary findings	Sources
<p>Airtel Insurance with MicroEnsure</p>	<p>Airtel rewards loyal customers (who registered for the product by dialing a shortcode) with free insurance as long as they spent a minimum amount of airtime (usually \$2). The more a customer spent with the telecom, the more health insurance could be earned. MicroEnsure and Airtel launched their first simple health insurance product in Ghana in January 2014 and have since launched in seven other African markets. The product is relatively straightforward: Airtel rewards loyal customers (who registered for the product by dialing a shortcode) with free insurance as long as they spent a minimum amount of airtime (usually \$2). The more a customer spent with the telecom, the more health insurance could be earned. Customers were educated as to how the product works. The health insurance offered a simple benefit, consistent across every market: qualifying customers received one month of hospital cash as a lump sum of up to \$150 paid to them via mobile money if they spent three nights or more in any hospital across the nation, for any medical reason, with no exclusions. Airtel paid the premiums to MicroEnsure and its partner insurance companies in various markets. The customer’s airtime was not deducted but rather the cover was provided for free and paid by the telecom on the basis of the overall increase in value to their core business (via airtime spend).</p>	<p>&gt; The major objectives for this project concerned scaling health microinsurance, financial sustainability, and creating new market penetration by offering customers their first-ever health insurance policies. While health insurance enables access to inpatient hospital care, the impact of this product on health outcomes is not yet known.</p> <p>&gt; In 2014, more than 3.1 million customers enrolled in simple, free health insurance through Airtel and MicroEnsure. As of May 2014, the product has expanded to eight African markets and all products are still available. Surveys across operating markets have indicated that for 86 percent of Airtel/MicroEnsure’s customers, Airtel Insurance was their first insurance policy of any kind.</p>	<p><a href="https://healthmarketinnovations.org/program/airtel-insurance-microensure">https://healthmarketinnovations.org/program/airtel-insurance-microensure</a></p> <p><a href="https://www.msh.org/sites/default/files/2015_08_msh_mhealth_compendium_volume5.pdf">https://www.msh.org/sites/default/files/2015_08_msh_mhealth_compendium_volume5.pdf</a></p> <p><a href="https://www.openroomevents.com/presentations/51/Peter%20Gorss,%20Regional%20Director,%20MicroEnsure.pdf">https://www.openroomevents.com/presentations/51/Peter%20Gorss,%20Regional%20Director,%20MicroEnsure.pdf</a></p>



Intervention	Description of Intervention	Primary findings	Sources
<p>The Mobile Health Research Lab: Mobile Wallet</p>	<p>The Mobile Health Research Lab in Nairobi was established in 2013 to investigate how mobile money can be leveraged to pre-pay for health-care. It aims to enable users to pay and save funds for healthcare with a mobile wallet. The application aims to increase health spending and decrease cash out-of-pocket costs, for example through risk pooling and digitizing healthcare payments. The mobile health wallet facilitates same-day payments and lowering of transaction (overhead) costs for healthcare providers, the creation of a trusted brand for the mobile network operator, increased access to services for the user, and proper accountability of the usage of funds for payers (including reporting).</p>	<p>&gt; Mobile payments help cut-down on “leakage” at providers (i.e. money disappearing)—estimated at 20–25 percent in the private sector.</p> <p>&gt; Visibility of cash flows opens up possibilities for granting loans and advances to further strengthen the financial position of health facilities, allowing them to invest more in better care.</p> <p>&gt; Mobile wallet has positive effects on the ability to save and pay for healthcare—women, for example, can no longer be robbed of their cash when walking to a maternity clinic after dark. As a result, more women now come to the clinic for safe delivery, which has a positive effect on maternal and child health.</p> <p>&gt; Group savings (“chamas”) as well as dedicated health remittances can be stimulated as well.</p> <p>&gt; By channeling funds directly to the patients, they are empowered to vote with their feet, demanding better care at lower prices (strategic purchasing). Providers are encouraged and incentivized to deliver quality services, given access to quality improvement programs, business training and affordable loans</p>	<p><a href="https://lib.digitalsquare.io/bitstream/handle/123456789/77552/mobile_wallet.pdf?sequence=1&amp;isAllowed=y">https://lib.digitalsquare.io/bitstream/handle/123456789/77552/mobile_wallet.pdf?sequence=1&amp;isAllowed=y</a></p> <p>Mobile Health Research Lab Update, March 2014 <a href="http://www.tinyurl.com/mHealthUpdateMarch2014">www.tinyurl.com/mHealthUpdateMarch2014</a></p> <p>Chuma J. and Okungu V. Viewing the Kenyan health system through an equity lens: implications for universal coverage. <a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3129586">www.ncbi.nlm.nih.gov/pmc/articles/PMC3129586</a>. Accessed 09/19/2014</p> <p>Open Capital Advisors: the Next 33,000,000, October 2012 <a href="http://opencapitaladvisors.com/wp-content/uploads/2013/08/The-Next-33-Million-Open-Capital-Advisors.pdf">http://opencapitaladvisors.com/wp-content/uploads/2013/08/The-Next-33-Million-Open-Capital-Advisors.pdf</a></p>



Intervention	Description of Intervention	Primary findings	Sources
<p>Pona na Tigo Bima ("Get Well with Tigo Insurance")</p>	<p>In October 2012, the social business MicroEnsure, in partnership with mobile network provider Tigo, sales and technology facilitator Bima and insurer Golden Crescent, piloted the Pona na Tigo Bima ("Get Well with Tigo Insurance") health insurance product in Dar es Salaam, Tanzania, offering life insurance and hospital cash for hospital care at a defined network of hospitals. MicroEnsure designed the insurance product and processes to manage and deliver it to consumers. They perform daily overall administration and oversight, including claims processing and customer service. Bima developed the technical platform for enrollment and manages the agent network, and Tigo distributes the product under its local brand. The health insurance product offers six tiers of life and hospitalization coverage paid via three monthly installments that are deducted from the customer's airtime balance. The claims process is handled via a call center and most documents are submitted digitally in Tigo shops. MicroEnsure assists claimants throughout the claims process. Once the claim is approved by MicroEnsure and Golden Crescent Assurance, the claim is paid immediately via mobile money transfer using the Tigo Cash service.</p>	<p>&gt; By switching from paper to mobile claims payments, MicroEnsure reduced claims processing time from 11 to 3.2 days.</p> <p>&gt; Claimants were willing to register for mobile money payments and expressed interest in learning about the details of the payment process.</p> <p>&gt; The timely and reliable nature of the payment has built client trust in both mobile payments and MicroEnsure's health product.</p> <p>In Ghana,</p> <p>&gt; Tigo customers receive free life insurance for themselves and one family member, ranging from \$104 to \$520 depending on how much airtime they use in a month: \$2.60 for the lowest level of coverage and \$20.80 for the highest. The customer can stay on this free plan indefinitely provided the monthly airtime requirement is met, but can also choose to double it by paying a fee of \$0.68 per month for what is called Xtra-Life, giving them up to \$1,040 of insurance cover.</p> <p>&gt; At the launch in 2010, only an estimated 5.4% of adult Ghanaians—around 720,000 people—had any kind of insurance, a quarter of which was informal. Tigo Family Care today provides insurance cover for nearly a million clients, an estimated 93% of whom have no other insurance cover. Thus Tigo Family Care has more than doubled the size of the insurance market and extended basic life</p>	<p><a href="https://lib.digitalsquare.io/bitstream/handle/123456789/77677/pona_na_tigo_bima.pdf?sequence=1&amp;isAllowed=y">https://lib.digitalsquare.io/bitstream/handle/123456789/77677/pona_na_tigo_bima.pdf?sequence=1&amp;isAllowed=y</a></p> <p><a href="https://www.cgap.org/blog/can-phones-drive-insurance-markets-initial-results-ghana">https://www.cgap.org/blog/can-phones-drive-insurance-markets-initial-results-ghana</a></p>



Intervention	Description of Intervention	Primary findings	Sources
		<p>coverage to 978,000 Ghanaians that are otherwise uninsured.</p> <p>&gt; In terms of reaching the bottom of the pyramid, 22% of Tigo Family Care subscribers earn less than US\$ 100 per month and 80% earn less than US\$ 300.</p>	



Intervention	Description of Intervention	Primary findings	Sources
JAMII SMART/KimM NCHip - Referrals, mSavings and eVouchers	Jamii Smart (meaning “smart families”) aims to convert the huge success of M-Pesa, Safaricom’s mobile wallet solution adopted throughout Kenya, into an effective mHealth solution that significantly improves MCH by modeling on existing, sustainable mobile technologies with inputs from end users. Through the Kenyan integrated mobile Maternal and Newborn Health information platform (KimMNCHip), this national-scale mHealth initiative offers pregnant women more choices, control and medical care for them and their babies during and after their pregnancy. Jamii Smart promotes mSavings and eVouchers for pregnant mothers, leveraging the existing M-Pesa solution which also offers micro-insurance services.	> The program has created mSavings for mothers through Linda Jamii (meaning “family protection”), an innovative and affordable healthcare insurance option targeting 35 million uninsured Kenyans. For Kshs.12,000 (\$150) per family a year, families will be able to register on a mobile phone and access comprehensive medical coverage. Coverage also includes support for the birth planning process which requires expectant mothers to establish a financial plan.	<a href="https://www.msh.org/sites/default/files/usaids_mhealth_compendium_vol_2_us_letter_final_desktopprint_with_infogr.pdf">https://www.msh.org/sites/default/files/usaids_mhealth_compendium_vol_2_us_letter_final_desktopprint_with_infogr.pdf</a>  <a href="#">Germann, Stefan, et. al. “The Illness of ‘Pilotitis’ In mHealth – Early Lessons from the KimMNCHip Partnerships in Kenya.” Global Health Forum. n.d. Web. Admin. “Linda Jamii, Affordable Healthcare Insurance.” Tuvuti. 28 November 2012. Press Release.</a>



Intervention	Description of Intervention	Primary findings	Sources
Tanzania National eVoucher Scheme	The eVoucher was designed to both mimic and streamline the current processes of the Tanzanian National Voucher Scheme (TNVS) paper voucher. The transition to eVoucher eliminates about half of the steps required for the paper voucher.	<p>&gt; From its October 2011 launch through the first year of operation, 453,486 eVouchers were issued and 257,148 of them were redeemed for a Long-lasting Insecticide Treated Mosquito Nets (LLIN).</p> <p>&gt; By the end of 2011, evidence suggested that Tanzania had achieved bed net coverage rates exceeding 80% nationwide.</p>	<a href="https://lib.digitalsquare.io/bitstream/handle/123456789/77654/tanzania_national_e_voucher_scheme.pdf?sequence=1&amp;isAllowed=y">https://lib.digitalsquare.io/bitstream/handle/123456789/77654/tanzania_national_e_voucher_scheme.pdf?sequence=1&amp;isAllowed=y</a>



Intervention	Description of Intervention	Primary findings	Sources
<p>TransportMYpatient: Facilitating access to treatment for Obstetric Fistula</p>	<p>transportMYpatient uses a network of Comprehensive Community Based Rehabilitation in Tanzania (CCBRT) Ambassadors who are aware of the services offered by CCBRT, specifically doctors, nurses, other healthcare workers, non-governmental organization staff or members of the general public living in the community all over Tanzania. Ambassadors receive an incentive of TSH 10,000 (USD\$6.13) for each patient that successfully arrives at CCBRT with the correct transport receipts.</p>	<p>&gt; Since 2010, 725 women suffering from fistula were transported to CCBRT via the transportMYpatient initiative. The number of annual surgeries at CCBRT has increased by more than 300% from 162 in 2009 to 501 in 2012, largely due to the transportMYpatient scheme.</p>	<p><a href="https://lib.digitalsquare.io/bitstream/handle/123456789/77657/transport_mypatient.pdf?sequence=1&amp;isAllowed=y">https://lib.digitalsquare.io/bitstream/handle/123456789/77657/transport_mypatient.pdf?sequence=1&amp;isAllowed=y</a></p> <p><a href="#">Fiander, Alison, and Tom Vanneste. "transportMYpatient: An Initiative to Overcome the Barrier of Transport Costs for Patients Accessing Treatment for Obstetric Fist." Royal College of Obstetricians and Gynecologists. n.d. Web.</a></p> <p><a href="#">CCBRT. Comprehensive Community Based Rehabilitation in Tanzania. n.d. Web.</a></p>





Intervention	Description of Intervention	Primary findings	Sources
Changamka Maternal Health Smartcard	Changamka MicroHealth Limited ('Changamka') introduced the medical smartcard, a mobile technology solution that enables users to save money over an extended period of time to gain access to primary health care services. Clients save for health care expenses using a medical smart card combined with mobile money transfer service systems such as M-PESA and make payments at designated providers for goods and services at pre-contracted prices.	<p>&gt; The average card user made 4.3 ANC visits, 14 percent more than comparison group (statistically significant difference across education and income subgroups).</p> <p>&gt; Card users were more likely to have at least four ANC visits (the WHO recommendation).</p> <p>&gt; Among card users:</p> <ul style="list-style-type: none"> <li>- 78 percent found the smartcard convenient to use;</li> <li>- 60 percent said the smartcard helped them to pay for services and leave the hospital more easily;</li> <li>- 80 percent said that it was safer to carry the smartcard than to carry cash;</li> <li>- 87 percent thought it was more convenient than MPESA;</li> <li>- 75 percent said the smartcard helped them save money by not letting them spend it on other things;</li> <li>- 15 percent said the smartcard helped by preventing their families from spending the money on other things;</li> <li>- 97 percent gave birth at a health facility.</li> </ul> <p>&gt; In total, six percent of smartcard users engaged in genuine savings and two-thirds of savers used cards for deliveries. While discontinuation of card use was high, and only a small portion of card recipients made savings deposits on the card, the study highlights substantial latent demand and appreciation for certain features of the card.</p>	<p><a href="https://lib.digitalsquare.io/bitstream/handle/123456789/77625/changamka_maternal_health_smartcard.pdf?sequence=1&amp;isAllowed=y">https://lib.digitalsquare.io/bitstream/handle/123456789/77625/changamka_maternal_health_smartcard.pdf?sequence=1&amp;isAllowed=y</a></p> <p><a href="https://www.shopsplusproject.org/sites/default/files/resources/Saving%20Money%20C%20Saving%20Lives%20-%20An%20Evaluation%20of%20Changamka%27s%20Maternity%20Savings%20Card.pdf">https://www.shopsplusproject.org/sites/default/files/resources/Saving%20Money%20C%20Saving%20Lives%20-%20An%20Evaluation%20of%20Changamka%27s%20Maternity%20Savings%20Card.pdf</a></p>



Intervention	Description of Intervention	Primary findings	Sources
<p>Mobile Finance to Reimburse Sexual and Reproductive Vouchers</p>	<p>Marie Stopes Madagascar (MSM) established a subsidized voucher program to increase poor people’s access to voluntary family planning services. Clients could give the voucher to one of MSM’s 42 social franchisees in Itasy or Bongolava, two rural regions in Madagascar, in exchange for family planning services that would normally cost between 4,000 and 10,000 Ariary (between US\$2 and US\$5). MSM used mobile phone-based short message service (SMS) money transfer systems instead of traditional payment methods to reimburse service providers</p>	<p>&gt; Between February 2011 and the end of July 2011, MSM distributed 5,950 vouchers. By the end of July 2011, the unique code of 1,737 (29%) of the vouchers distributed by MSM had been submitted using SMS by social franchisees for reimbursement.</p> <p>&gt; In total, 599 (35%) of the 1,737 claims for reimbursement sent by MSM’s social franchisees were reimbursed within 48 hours.</p>	<p><a href="https://lib.digitalsquare.io/bitstream/handle/123456789/77617/mobile_finance_to_reimburse_sexual_and_reproductive_vouchers.pdf?sequence=1&amp;isAllowed=y">https://lib.digitalsquare.io/bitstream/handle/123456789/77617/mobile_finance_to_reimburse_sexual_and_reproductive_vouchers.pdf?sequence=1&amp;isAllowed=y</a></p>
<p>Paywast mHealth Call Centre</p>	<p>Health workers contact the mHealth call center in Kabul to ask for medical information to help them manage cases of obstetric emergencies. For low-risk cases, call center staff provide instructions and suggestions to health workers concerning safe maternal health practices. In high-risk cases, the call center encourages the health worker to refer the patient to a health facility and will provide emergency transport through informal transportation partners (local car or motorcycle owners) to ensure patients go to clinics that provide the appropriate medical services to address their needs. In these high risk cases or in the event of an emergency, the call center utilizes an SMS-based cash voucher reimbursement system to pay drivers for emergency transportation. When an emergency arises, the health workers contact the</p>	<p>&gt; During its first year of operation, the Paywast/CAF mHealth call center enrolled more than 2,000 citizens into the program, of which approximately 65 percent were women. The call center made transportation referrals to more than 1,800 women and their families – all facilitated by mobile money transactions. The center also observed an improvement in the ratio of childbirths that took place in a clinic versus at home in affected areas.</p>	<p><a href="https://www.hfgproject.org/wp-content/uploads/2014/06/HFG-Mobile-Money_CASE-STUDY-5-PAYWAST.pdf">https://www.hfgproject.org/wp-content/uploads/2014/06/HFG-Mobile-Money_CASE-STUDY-5-PAYWAST.pdf</a></p> <p><a href="http://paywast.af/">http://paywast.af/</a></p>



Intervention	Description of Intervention	Primary findings	Sources
	<p>call center, and the center identifies an available driver and makes travel arrangements for the patient to go to an appropriate health facility. After the driver has brought the patient to the health facility, the call center sends a voucher directly to the driver to cover the costs of his or her services via a proprietary mobile money system built by Paywast specifically for this purpose. The mobile money vouchers can be sent through any of the mobile operators integrated with the Paywast platform. The driver, in turn, shows the SMS voucher to a local Paywast mobile money dealer, who verifies it by contacting the call center, and then pays out the driver in cash. The mobile money dealers are typically trustworthy small businesses operating in the covered districts.</p>		
<p>Kenya National Health Insurance Fund</p>	<p>To facilitate timely remittance of member contributions and maintenance of up-to-date payment information for individual accounts, NHIF has partnered with Safaricom Limited, a leading telecommunications company in Kenya, to provide a flexible and convenient platform for remittance of monthly insurance premium contributions from informal sector populations. NHIF no longer transacts in cash for premium collections but uses mobile money payments (mPESA). For self-employed and other informal sector workers, membership is</p>	<ul style="list-style-type: none"> <li>&gt; M-Pesa platform has helped to reduce the frequency of NHIF's penalty charge – 5 times the monthly contribution amount for those who default in remitting contributions.</li> <li>&gt; Since launch in 2010, the number of NHIF members using M-Pesa to make monthly premium contributions has grown nearly ten-fold from 10,000 to close to 100,0000 in 2014.</li> <li>&gt; Revenue collection for NHIF grew from 1M KES per month at the end of the 2011, to an average of 35 M KES per month in 2013.</li> </ul>	<p><a href="https://www.hfgproject.org/wp-content/uploads/2014/06/HFG-Mobile-Money_CASE-STUDY-12-KENYA-NATIONAL.pdf">https://www.hfgproject.org/wp-content/uploads/2014/06/HFG-Mobile-Money_CASE-STUDY-12-KENYA-NATIONAL.pdf</a></p>



Intervention	Description of Intervention	Primary findings	Sources
	contributory (voluntary) and available at a fixed premium rate of 160 Kenya Shillings per month. Overall membership enrollment for formal and informal sector populations has reached 4.5 million people (11% of the Kenyan population). While coverage is high for the formal sector (98%), coverage of the informal sector which accounts for over 80% of Kenya's workforce has proven to be more challenging, and remains low at 16% of the informal sector population.		
l'Union Technique de la Mutualité Malienne	Health insurance mutuelles in Mali use Orange Cash to collect and manage premium payments. They are also working with Orange Mali to promote the mutuelles via Orange communication channels to other network subscribers.	> As of June 2014, 300+ mutuelle members from across the country had paid premiums via mobile money, resulting in 500+ mobile money transactions.	<a href="https://www.hfgproject.org/wp-content/uploads/2014/06/14-0624-Mutuelles-Mali_Case-Study_Final.pdf?">https://www.hfgproject.org/wp-content/uploads/2014/06/14-0624-Mutuelles-Mali_Case-Study_Final.pdf?</a>  <a href="https://healthmarketinnovations.org/blog/mobile-money-microinsurance-health">https://healthmarketinnovations.org/blog/mobile-money-microinsurance-health</a>



Intervention	Description of Intervention	Primary findings	Sources
Bayadload	BayadLoad allows mobile phone subscribers to buy load from their airtime retailer and use this to make their mandatory social payments. By allowing airtime to be used for mobile payment, it provides low income people the opportunity to pay into government programs which provide health, pension, maternity leave, workman's compensation, and housing support services. This program uses all airtime agents (1 million) as opposed to only certified mobile money agents (10,000) expanding the scope of mobile money.		<a href="https://healthmarketinnovations.org/program/bayadload">https://healthmarketinnovations.org/program/bayadload</a>  <a href="https://www.cgap.org/blog/innovation-person-government-payments-philippines">https://www.cgap.org/blog/innovation-person-government-payments-philippines</a>

Table 4: Summary of evidence by information source

Themes	Peer reviewed literature	Grey literature	Experts' discussion	Interpretations/ recommendations
Emerging area with little documented evidence of impact	7 pilot projects and 3 national scaled up project documented, only one robust evaluation published	6 pilot projects and 8 scale up/ national level projects.	Lack of evidence discussed and accepted as an issue	Robust evaluations are needed to assess impact of digital technologies on health financing.
Digital technology used focuses on mobile technologies	7 out of 10 interventions documented used mobile phone technology, 3 used web based platforms.	All interventions (14) used mobile phone technology	Dominance of mobile technology acknowledged.	Ensure availability of mobile phone technology and internet for all
A focus on purchasing and revenue mobilisation.	All articles focused on revenue mobilisation and/ or purchasing by individuals. None documented pooling efforts.	2 interventions on pooling in Mali and Philippines. 12 on some form of revenue mobilisation and/ or purchasing by individuals	Focus on individual purchasing accepted.	Better analysis of the interaction between digital technologies and health financing is needed.



<p>Barriers to implementation</p>	<p>Barriers discussed in every article, and focused on: lack of computer availability, lack of internet access, institutional barriers such as lack of training of health workers in the use of digital technologies or high out of pocket payments associated with seeking care, poor communication about new system, amongst others.</p>	<p>Very scarcely discussed, although lack of training of users was identified as a barrier for ADDO, as was the importance of such of local engagement as a facilitator.</p>	<p>Health system barriers were the focus of the discussion (difficulty in integrating digital platforms in existing health financing systems for example), although barriers identified by the literature review were recognised and accepted.</p>	<p>Analysis of how to integrate</p>
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