Research Article

Impact of Mobile Financial Services in Low- and Lower-Middle-Income Countries: A Systematic Review

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Abstract

Considerable optimism exists regarding the potential of using mobile phones as a conduit for reaching the unbanked, given the ubiquity of mobile phones in developing countries and the development of mobile-phone-based financial services. As such, use of mobile financial services is seen as a strategy for increasing financial inclusion. This systematic review was conducted to determine the impact of mobile financial services in developing countries based on the most robust quantitative studies available. In particular, this systematic review looked at the impact of mobile financial services on the volume, frequency, and diversity of sources of remittances received by mobile money users; on household savings and consumption of goods and services; and on livelihoods and income.

Keywords: mobile money, mobile financial services, systematic review

Lack of access to financial services can exclude people with need of capital (Johnston & Morduch, 2008). Improving access to financial services is important for development because it can facilitate economic growth by allowing more people to participate in markets and help reduce inequality. More inclusive financial systems can also help the poor smooth the flow of income and provide safeguards against economic vulnerabilities such as illness, accidents, theft, and unemployment. It can allow them to save and borrow, build assets, and make investments for their livelihoods (World Bank, 2012). It can also improve people's credit-risk profiles, lower costs for accessing financial services, reduce personal stress, and provide access to lower cost sources of credit (Caskey, 2002).

Much of the world's people are unbanked and do not use formal financial services to save or borrow. The number is even lower in middle-income countries (43%) and in low-income countries (23%; Chaia et al., 2009; World Bank, 2012). Absent access to credit and insurance, individuals and households (HHs) depend on informal arrangements with family and friends to manage the risks they face (Suri, Jack, & Stoker, 2012).

In 2009, a billion people had no access to banks, but had access to mobile phones (Pickens, 2009). The ubiquity of mobile phones in developing countries has generated hope in its potential for use as a conduit for reaching the unbanked. Significant investments have been made in mobile technologies to deliver financial services (Bångens & Söderberg, 2008; Porteous, 2006; Porteous & Wishart, 2006; Vodafone, 2007). In 2012, it was reported that there were already 150 live mobile money deployments in 72 countries, with 41 deployments launched in 2012 alone (Pénicaud, 2013).

Among the foreseen benefits are the ability to transfer funds, especially small amounts, over distance at low cost. It is seen as having the potential to improve the efficiency of payment systems and reduce reliance on cash (Porteous, 2006). Improved savings rates, increased income, and resilience when subjected to financial shock are seen as benefits (Donner & Tellez, 2008). More recent evidence shows that the number of unbanked has dropped by 20%, with the decline attributed to a 13% growth in penetration in developing countries due to mobile money (Demirguc-Kunt, Klapper, Singer, & Oudheusden, 2015).

The uses for mobile financial services are also diverse and expanding. They can allow individuals to deposit, send, and withdraw funds using a mobile phone, as well as pay for goods and services (Alampay & Cabotaje, 2016; Jack & Suri, 2011), with the more common services being domestic and international remittances (Jenkins, 2008). Given the expanding applications, varied models, and contexts, no one knows what the mobile financial ecosystem will look like in five years (Jenkins, 2008). In addition, the norms and expected behaviors surrounding mobile financial services will also evolve over time and differ from place to place (Donner & Tellez, 2008).

It is from this premise, that mobile financial services have evolved and are being practiced, adopted, and sustained differently in various contexts, that this systematic research proceeds.

Defining the Object of Study

The livelihoods approach recognizes that those who are poor have their own portfolios of assets and strategies to cope with vulnerability, while also acknowledging external factors that can transform their lives (Duncombe, 2006). In the field of information communication technologies and development (ICTD), one factor is referred to as *digital enablers.* These transformational digital technologies can be inclusive and efficient and allow innovation (World Bank, 2016).

One enabler made possible through the advances in mobile-phone technology is digital finance. Digital finance includes mobile financial services, which have led to reasonably sophisticated financial functionality in economies that previously supported only rudimentary systems (e.g., sub-Saharan Africa; Suri et al., 2012). As such, given a widespread roll-out in many countries, the empirically measured impact of mobile financial services on development has been demanded (Duncombe & Boateng, 2009).

Mobile financial services cover a broad range of financial activities over mobile phones (Boyd & Jacob, 2007, p. 6). These include electronic payment systems (person-to-person transfers, person-to-business payments) and mobile banking services (Dolan 2009) (Figure 1).

M-banking is a form of electronic banking. Electronic banking (e-banking) involves

> the provision of retail and small value banking products and services through electronic channels (e.g., deposit taking, lending, account management, the provision of financial advice, electronic bill payment and the provision of other electronic payment products and services such as electronic money). (Basel Committee on Banking Supervision, 1998, p. 3)

In turn, m-banking is defined as "financial services delivered via mobile networks and performed on a mobile phone" (Bångens & Söderberg, 2008, p. 7). Types of mobile banking are also classified as being *additive* or *transformational* (Porteous, 2006). Additive m-banking is considered an additional channel for existing clients to access banking services. Transformational m-banking is meant to bring the currently unbanked into the formal banking system (Bångens & Söderberg, 2008).

M-money is a form of electronic money. Electronic money refers to

> stored value or prepaid payment mechanisms for executing payments via point-of-sale terminals, direct transfers between two devices, or over the computer networks, such as the Internet. Stored value products include hardware or card based mechanisms (electronic wallets), and software or network based cash (digital cash). (Basel Committee on Banking Supervision, 1998, pp. 3–4)

New electronic payment systems based on the mobile phone are now commonly referred to as mobile money (Maurer, 2012).
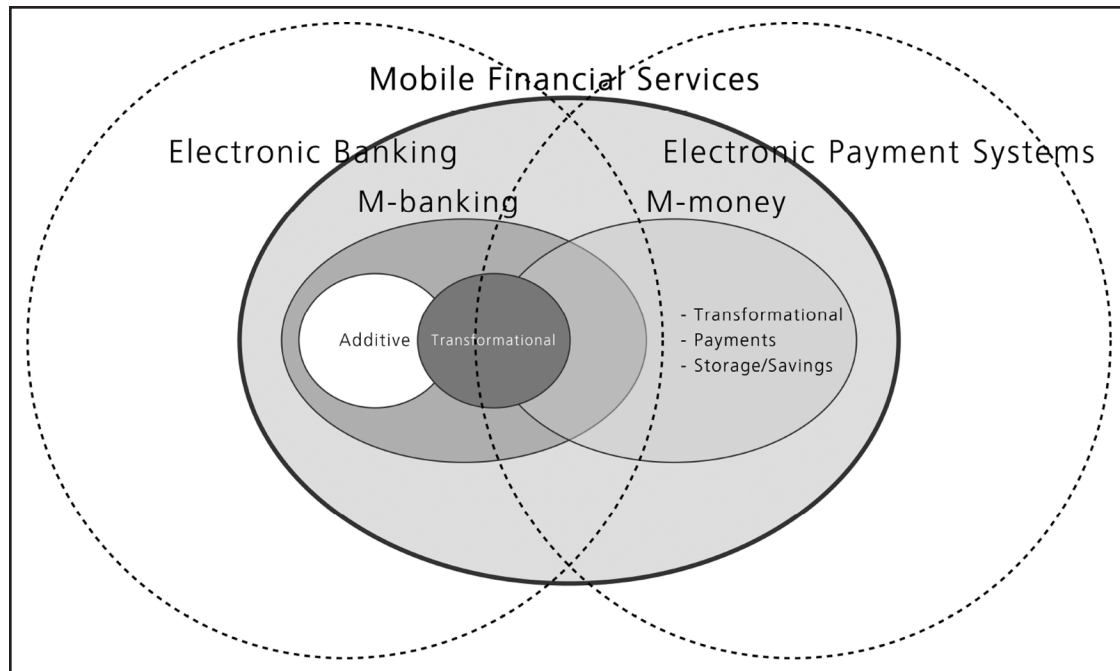
Figure 1. Locating m-financial services in the electronic banking and electronic payment space.

> M-money refers to
>
> services that connect consumers financially through mobile phones. Mobile money allows for any mobile phone subscriber—whether banked or unbanked—to deposit value into their mobile account, send value . . . to another mobile subscriber, and allow the recipient to turn that value back into cash easily and cheaply. (GSM Association, 2009, p. 7)

It can be used for both transfers (m-money transfer) and payments (m-payments).

The mobile financial service ecosystem has many stakeholders. It includes mobile network operators (MNOs), banks, m-money cash-in/cash-out agents, retailers, microfinance institutions, employers, civil society organizations, donors, and, of course, end users (Jenkins, 2008).

The ecosystem takes different forms in different countries. Lyman, Pickens, and Porteous (2008) observed two distinct models: (1) bank led and (2) nonbank led. Others have also noted variations in how the banks, telecom operators, and other partners work together to deploy services (Goswami & Raghavendran, 2009; Porteous, 2006).

Mobile financial services may allow individuals to deposit, send, and withdraw funds and pay for goods and services (Alampay & Cabotaje, 2016; Jack & Suri, 2011). One of the more common services is its use for domestic and international remittances. Given the expanding applications, varied models, and contexts, the mobile financial ecosystem is seen as being in flux (Jenkins, 2008).

Theoretical Framework

The mobile infrastructure is more inclusive than the financial system. The main value proposition of mobile financial services is the ability to send money more easily, cheaply, and securely (Jenkins 2008). The provision of mobile financial services as an intervention is expected

- to enable poor HHs to access salient financial instruments and, therefore, pools of funds;
- to reduce transaction costs of conducting financial acts such as remitting, borrowing, and saving; and
- to enable HHs to have more freedom to participate in the financial landscape and markets.
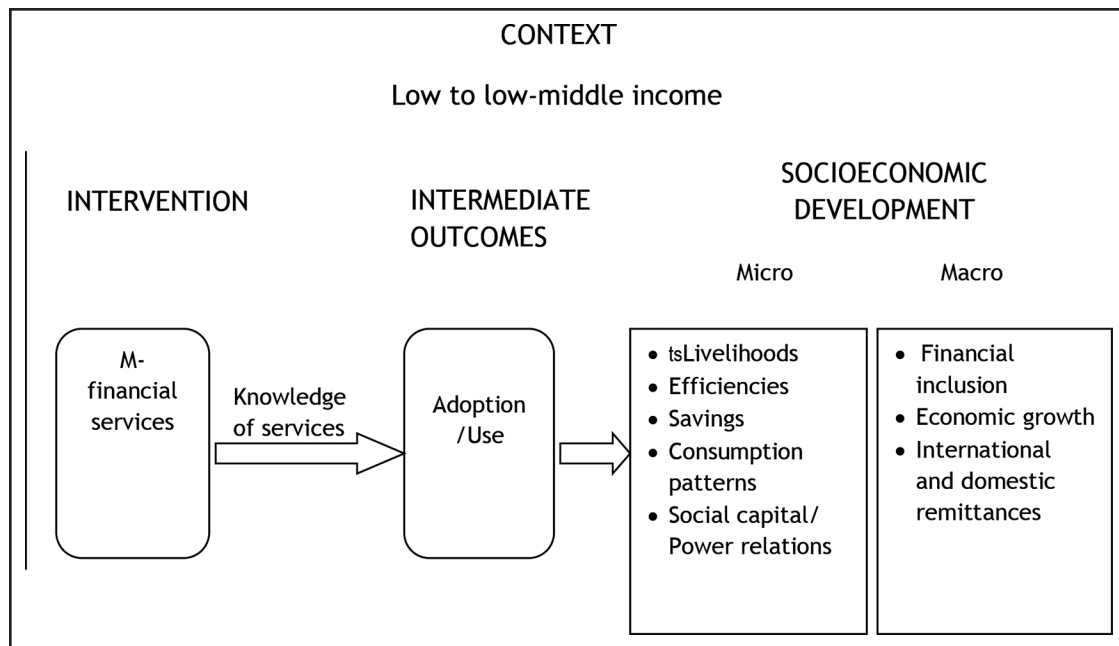
Figure 2. *Theoretical framework.*

These expectations are presented in Figure 2.

The question this systematic review investigates is whether using m-financial services has contributed to the aforementioned goals, and thereby to larger developmental objectives. This will happen if efficiencies lead to more funds remaining with users that can be used for consumption, investments, or savings. It is also assumed that social network connections supported by the ability to communicate and use m-money allows for increased access to funds when needed. These advantages may be more pronounced in developing countries, where access to financial services and banks is limited.

Behavioral changes related to m-financial services have to be contextualized for different cultural, technological, infrastructural, and regulatory country conditions. Unique applications of m-money may emerge as people subvert, innovate, and repurpose it (Maurer, 2012). The use of m-financial services may stimulate economic activities, greater investment, more employment, and higher income in communities. Hence, its impact would reach beyond individual users to the larger community.

Theories of Change

Figure 3 illustrates theories of change discussed in the literature. For instance, m-money is seen as enabling HHs to reach out to networks outside the immediate family across longer distances, thereby increasing access to credit and insurance-like transactions (Jack, Ray, & Suri, 2013). HHs that are subjected to a shock of some kind can manage the risk by receiving larger total amounts or more frequent remittances (Jack & Suri, 2014). Adoption of m-money can increase frequency of mobile transfers, decrease the use of informal saving arrangements, and lead to increased demand for banking services (Mbiti & Weil, 2011).

Some qualitative studies have examined the impact of m-money services, especially in East Africa. For instance, Morawczynski and Pickens (2009) found that M-Pesa users in Kenya were using the service to accumulate lump sums for unexpected consumption shocks (e.g., funerals), thereby altering existing savings patterns. Ghosh (2012) reported that low-income, rural populations in Uganda were using m-money wallets in three ways: (1) as a transaction account, where people used m-money wallets for short-term savings; (2) as an ongoing savings account, where people either built up a reserve before remitting it or depleted an incoming remittance slowly over time; and (3) for targeted savings, where people built up a lump sum in their wallets
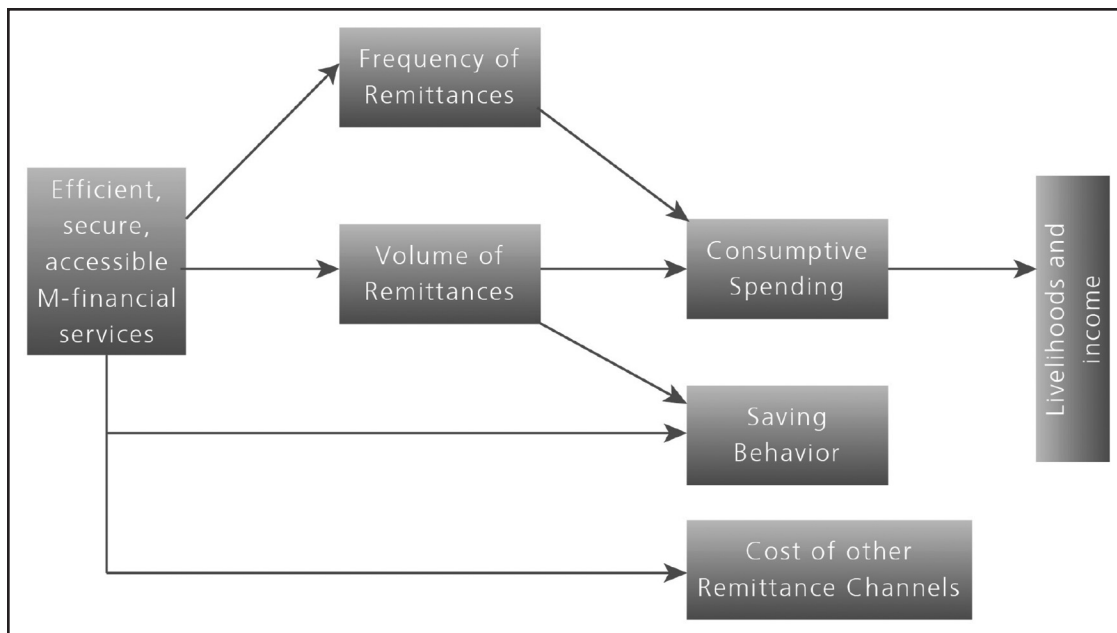
Figure 3. Mapping the theory of change.

with a specific goal in mind. Morawczynski and Pickens (2009) found that the income of their sample increased from 5% to 30% after adoption of the service. They observed that M-Pesa was empowering rural women in Kenya by simplifying the process of soliciting money from their husbands. When the husbands refused to remit money, these women were now able to reach out to other contacts easily. Donovan (2012) questions the impact of M-Pesa on human freedom and argues that the use of m-money has given rise to a potentially dominant entity capable of new forms of control, compulsion, and "unfreedom."

Figure 4. Expected outcomes and impact of access to m-financial services.

Figure 4 synthesizes the expected effect of using m-money illustrated in Figure 3. It is assumed that using m-money provides efficiency gains (e.g., easier and faster access, less costs). This can translate to intermediate outcomes such as more-frequent and larger remittances. Intermediate outcomes can, in turn, impact how the remitted money is used. This may be in terms of how it is spent and the portion that is saved. Long-term impacts pertain to how the expected increase in remittances and change in consumption patterns affect livelihoods, through investment in businesses, participation in markets, and changes in income.

Review Questions

Based on the expected impacts discussed in the previous section, this systematic review (SR) synthesizes evidence gathered in low- and lower-middle-income countries in the form of answers to the following research questions:

RQ1: What is the impact of mobile financial services on the volume and frequency of remittances?

RQ2: What is the impact of use of mobile financial services on consumption by the poor?

RQ3: *What is the impact of use of mobile financial service on livelihoods in terms of increased productivity and income?*

Methodology

Systematic reviews use explicit methods to identify, select, and critically appraise the most methodologically robust evidence pertaining to clearly defined research questions.

Study Selection Criteria

The inclusion criteria were limited to quantitative research studies that document the impact of m-financial services in low- and lower-middle-income countries as classified by the World Bank.

Defining Relevant Studies: Inclusion and Exclusion Criteria

The following inclusion criteria informed the search of electronic databases (see Table 1). A search of online gray literature was also conducted.

Table 1. Population, Intervention, Comparisons, Outcomes, Study Design (PICOS). Inclusion Criteria.

PICOS	Description
Population and context	Eligible participants included individuals or households, living in low- or middle-income countries.
	Geographical location: Low- and lower-middle-income countries in 2014 (World Bank)
	Individuals: Any age group, any gender, any ethnicity, any income group
	Households: Rural or urban
	Macro: Studies that provide quantitative data comparisons between countries; within-country regional quantitative comparisons
Intervention	Eligible interventions were those identified as "mobile financial services" that refer in particular to the use of m-money through mobile phones.
	Mobile financial services: transformative m-banking for the unbanked; m-money transfers; m-money payments; use of m-money for conditional cash transfer programs
Comparisons (any one of these)	Urban versus rural
	Intervention group versus control group
	Country comparisons (m-money systems integration)
	M-money users versus nonusers
Outcomes	All outcomes reported were eligible for the review.
	Primary outcomes were remittance outcomes, including volume and frequency of transfers. Secondary outcomes included how these transfers were used (e.g., savings, investments, consumption) and intermediate outcomes, including farmer knowledge and adoption of practices. Purely qualitative studies were excluded.
	Economic outcomes:
	Individual/HH: Change in financial behaviors (remittances/savings, consumption/expenditure patterns); livelihoods (efficiency gains, transaction costs, access to new markets, productivity, income change)
	Community: Economic indicators of growth, financial inclusion, remittance flows
	Macro: Country-level indicators of financial inclusion, economic growth
Secondary outcomes	Social outcomes:
	Individual/HH: Gender/power relations/family connectedness
Study design	Eligible study designs for the impact of mobile financial services were measurable using counterfactual impact evaluations, including experimental or quasi-experimental study designs and methods of analysis.
	Experimental (e.g., randomized control trials, controlled trials)
	Quasi-experimental designs (panel studies, difference in difference, propensity score matching)
	Longitudinal studies (time series, panel studies, regression)
	Natural experiment where the counterfactuals have been addressed
	Comparisons eligible for this review were individuals and households who received no intervention, or did not use m-money for a similar application or service for the period studied.
Date, language, and form of publication	English language studies from 2000 to 2014
	Academic journals
	Theses and dissertations
	Gray literature

Searching

The comprehensive search strategy included academic publications and bibliographic databases (e.g., Econlit [Ovid], Business Source Premier from EBSCO, CAB Abstracts, Public Affairs Index, Web of Science [WoS search], ToC [Table of Contents] Premier from IDRC, Proquest dissertation [UK and U.S.], and Scopus). The relevant titles and abstracts were extracted by an information scientist in April–May 2014.

A gray literature search was conducted for ICTD and mobile money in relevant websites (e.g., Consultative Group to Assist the Poor [CGAP]; Institute for Money, Technology and Financial Inclusion). Citation searches of references and bibliographies of relevant studies, particularly with recent reviews (e.g., Duncombe & Boateng, 2009), were also conducted. Reviewers also used personal contacts to look for relevant primary studies.

Screening

Exclusion criteria were applied successively to titles and abstracts and full reports. The rules were as follows:

1. Exclude publications before 2000.

2. Exclude high income and middle income.

3. Exclude not using mobile phones.

4. Exclude paper not on m-money.

5. Exclude not on impact.

6. Exclude theoretical only.

7. Exclude qualitative only.

8. Exclude feasibility/potential only.

Full reports were obtained for the surviving studies that appeared to meet the criteria or where the abstract alone was insufficient. The inclusion/exclusion criteria were reapplied to full reports.

Assessing Quality

The results were critically analyzed by three people. Studies were assessed for possible risks of bias and quality of research design. The assessment included consideration sampling bias, the mechanism of assignment of samples, group equivalence, Hawthorne and John Henry effects, spillovers, selective outcome reporting, selective analysis, and other sources of bias (Waddington & Hombrados, 2012).

For the quantitative synthesis, the group extracted effect size estimates, calculating standard errors and 95% confidence intervals using data provided in the studies.

Synthesis

Use of m-money was the intervention considered in all studies. However, studies differed on the impact variables investigated. Impact variables could be grouped into four categories: frequency and volume of transactions, consumption, savings, and livelihoods.

For each study in the final list, effects, their direction (positive or negative), and measure of statistical significance were collected. These measures were used to calculate effect size. Across all studies, HH was the unit of analysis.

Because of the various study designs, it was not possible to synthesize using the standardized-mean method. Instead, the response-ratio method was used to calculate comparable effect size and the corresponding standard errors from heterogeneous studies for meta-analysis.

Average effects of mobile financial services on each outcome were estimated when at least two studies were available. Because this synthesis included studies covering all low- and lower-middle-income countries, some variation was expected. Therefore, the random-effects meta-analysis model was adopted, which allowed for various effect sizes for each study, depending of the underlying background socioeconomic conditions.

Results

The electronic search yielded 2,759 records. Screening yielded 109 studies, along with 22 other studies considered from the gray literature search. Excluding overlaps, 102 remained for full-text screening and critical analysis.

The 10 studies in the final list had been produced after 2011. All were about m-financial services in Africa. Six were on M-Pesa in Kenya. Absence of studies from Latin America may have been caused by nonuse of Spanish, which was a limitation of this SR. The dearth of empirical m-money research from Asia was noteworthy.

Many studies on mobile financial services are about the M-Pesa service in Kenya, which is considered as perhaps the most successful m-money service. Some of the studies looked at observable primary impact with respect to effect on remittance support (Jack et al., 2013; Jack & Suri, 2014; Mbiti & Weil, 2011), on savings practices and demand for banking services (Demombynes & Thegeya, 2012; Mbiti & Weil, 2011), and on livelihoods and income (Kikulwe, Fischer & Qaim, 2014; Kirui, Okello, Nyikal & Nyiraini, 2013).

Jack et al. (2013) looked at how M-Pesa enabled HHs to reach out to friends and relatives across longer distances for expansion of credit and insurance transactions. They measured the impact of m-money on routine family support, credit remittances, and remittances for emergency purposes or insurance based on panel-survey data from 2008 to 2009. Jack and Suri (2014) looked at how the m-money service enabled HHs, when affected by a shock, to share the risks by receiving remittances from larger social networks. The study looked at the volume and frequency of remittances. Mbiti and Weil (2011) combined multiple sources of data, including microlevel survey data from FinAccess, and applied regression analysis to a panel of respondents. They examined how adoption of m-money increased frequency transfers, decreased use of informal saving arrangements, and increased demand for banking services. They also looked at how M-Pesa affected prices of competing services and the frequency of remitting money.

Linking m-money to savings and as a means for the unbanked to gain access to banking services are perceived advantages of mobile financial services. Demombynes and Thegeya (2012), for instance, investigated whether the nature of m-money (spending money for a purpose, not as liquid as cash, and hidden from others) leads to greater savings. Aker, Boumnijel, McClelland, and Tierney (2011), conversely, looked at how the privacy afforded by the technology increases control over how money is used, not only for consumption but also for savings.

Kikulwe and colleagues (2014) focused on a sample of small-holder farmers in Kenya receiving cash transfers for agricultural use. It is one of the few studies that investigates how m-money use impacts livelihoods. Their investigation was based on the premise that m-money increases remittances received and can increase use of farm inputs/technology. In turn, this can lead to a rise in sales of outputs, which yield increased profits. This contributes to more employment. In aggregate, the above mechanisms are assumed to increase household income.

Another study connected to livelihoods was conducted by Kirui and colleagues (2013), who studied M-Pesa use in Kenya through a natural experiment. They investigated whether adoption of the service enables farmers to access more funds for buying agricultural inputs, selling a larger proportion of their output, and whether this, in turn, increases farm income.

One study looked at a mobile cash transfer system in Niger called Zap (Aker et al., 2011). It used an experimental design to study the impact over eight months of using m-money in a conditional cash transfer program in Niger. They found that the m-money intervention reduced funder's distribution and recipient's collection costs, provided more privacy, and potentially changed intrahousehold decision making, which led to the observed outcome differences in consumption choices. Batista and Vicente (2013) looked at the introduction of mKesh in Mozambique. The primary intervention was training a group of people to use the technology. The design was experimental, and they looked at secondary outcome effects on consumption and investment. J. Blumenstock, Eagle, and Fafchamps (2014) also looked at risk sharing based on a panel study involving the case of Rwanda immediately after an earthquake.

M-Pesa is also being adopted in other African countries. Munyegera and Matsumoto (2014) looked at panel evidence from Uganda comparing household M-Pesa users with household nonusers. They also looked at whether the adoption of m-money increased flow of remittances, especially from family members working in cities, and also whether this increased household consumption.

Scholarly work by J. E. Blumenstock, Callen, Ghani, and Koepke (2015) and Renteria (2015) were located later. Their studies are noteworthy because they were based on non-African data, though there were some
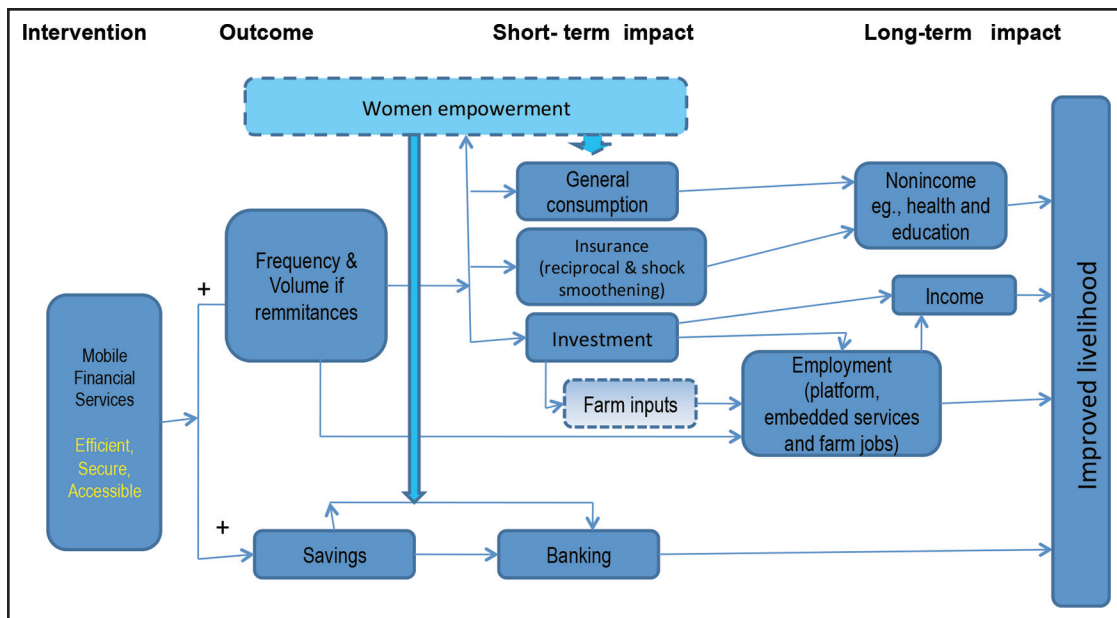
Figure 5. Outcome and impact of m-financial services.

issues concerning their design in terms of controlling for risks of bias. For instance, J. E. Blumenstock et al. (2015) looked at an m-money salary payment program in Afghanistan. There were concerns about the sample being limited to employees and most of the benefits flowing to the organization in terms of efficiency and savings. All in all, the sampling excluded the receiving end of the population, and it did not have any significant impact that could be included in the meta-analysis. Renteria's (2015) quasi-experimental study looked at a mobile banking pilot project in Mexico. His investigation saw no change in homecare, education, and fuel and energy consumption. The design was not able to control for the impact of the mobile phone separately from m-money.

In-Depth Review: Results

A number of themes emerged about m-financial services' impact. These include remittances, savings, consumption and investment, income, credit, commercialization, employment, and banking.

How m-financial services led to these outcomes and how they relate to each other is illustrated in Figure 5.

Synthesis of Evidence

Mobile financial services are assumed to be more efficient and secure than alternative systems for sending and receiving money. They could then lead to more frequent remittances, and more funds. Greater access to money can lead to possible differences in how it used, whether for basic needs or for investment or savings. These impacts may be expected to affect employment, income, and livelihoods.

Meta-analysis, however, could not be applied to all these reported impacts, because not all of the studies measured the same thing, or operationalized them in the same way. Meta-analysis could be conducted only on secondary outcomes (savings, consumption, informal loans, income, and farm yield sold), and not on primary outcomes (volume and frequency of remittances).

Primary Outcomes: Impact on Remittances

Many of the studies examine remittance flows that result from adoption of mobile financial services. In particular, they look at frequency and direction of flows, volume, and diversity of remittance sources.

Frequency

M-Pesa users engage in more remittance activities than do nonusers. With respect to frequency of remittances, mobile money users are likely to experience 2.024 transactions ($p < .01$). Using a mobile financial service in Kenya increases the likelihood of receiving and sending remittances by 37.4% and 34.3%, respectively (Jack & Suri, 2013). Mbiti and Weil (2011, p. 16) also report a positive relationship between mobile-financial-service (M-Pesa) adoption and frequency of sending and receiving money in Kenya. Only the estimate for sending transfers was reported as being statistically significant.

Munyegera and Matsumoto (2014) reported a 56% difference between users and nonusers in terms of frequency of remittances received. Aker et al. (2011) also reported that the frequency and amount of remittances by people with mobile phones with Zap were higher than those without the service; they found no statistically significant difference (placebo).

Volume

Jack, Ray and Suri (2013) reported higher amounts of remittance sent and received (KSh 33.1 and 32.6, respectively) by HHs with M-Pesa in Kenya ($p < .01$ for both). Also in Kenya, Kikulwe et al. (2014) reported that m-money using HHs received KSh 12,697 more than nonuser HHs (equivalent to 66%, $p < .05$).

Similarly, Munyegera and Matsumoto (2014) reported users receiving 43% more than nonusers in terms of total value of remittance received ($p < .01$).

J. Blumenstock et al. (2014) noted that airtime transfers increase during shocks. However, the change could have simply been because of the shock and not a function of m-money. The study could not distinguish airtime transfer effect from that of competing alternatives during the shock. This is important because other money-transfer channels could be used. Thus understanding their effect is important to capture the effect of airtime transfer in the overall money flows to areas subjected to the shock.

Batista and Vicente (2013) reported that the volume of remittances among targeted individuals was no different that of untargeted individuals. However, in their case, an intervention to help people use m-financial services was being investigated (mKesh), rather than the m-financial service itself.

Distance of Remittance During and After Shocks

Several studies looked at remittance flows through m-money during and after shocks (Aker et al., 2011; J. Blumenstock et al., 2014). These situations allowed observation of differences, whether the intervention was a cash transfer (e.g., agricultural interventions during droughts) or a possible change in flows going to individuals and households in general.

J. Blumenstock et al. (2014) hypothesized that those outside the community experiencing the shock were more likely to send money, largely because they were unaffected. This is not necessarily a function of m-money's impact, but m-money is likely to increase the effect.

There was no significant difference found between owners of mobile phones and those who had a mobile phone and ZAP, on whether they would communicate during a shock (Aker et al., 2011). Hence, the possibility of asking for assistance might be more due to being connected by the mobile rather than the m-money service itself.

Diversity of Remittance Sources/Destination/Direction

Jack et al. (2013, p. 357) reported that 21% of transactions were "reciprocal," compared with only 11% for nonusers. Jack et al. (2013, p. 359) also reported that it was 13.2% more likely for m-money users than for nonuser households to engage in at least one short-term reciprocal transfer. These short-term reciprocal exchanges are likely to be repayment of short-term credits.

J. Blumenstock et al. (2014) also considered reciprocal relationships and distance as possible factors, especially in times of shocks (e.g., earthquake). In these instances, remittances were sent from longer distances, but they were more likely to be from wealthy individuals. They showed that the flow came to those with a history of strong reciprocal exchange. In other words, they found that an individual who has sent more airtime in the past receives more help from his or her network during the period after the shock.
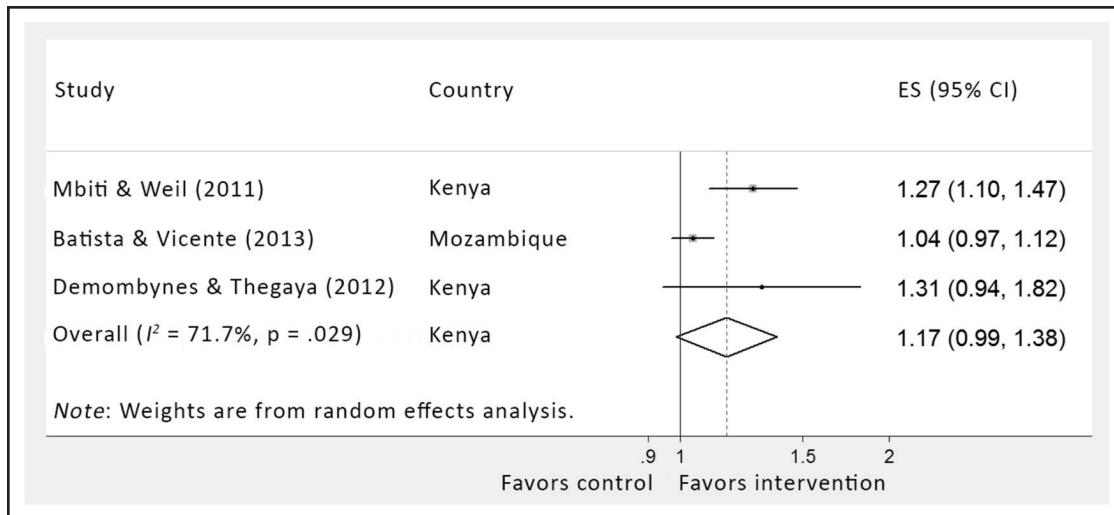
Figure 6. Response ratio impact of mobile money on saving.

Secondary Outcomes: Impact on Savings, Consumption, and Investments

Savings

Three studies looked at impact on savings (Batista & Vicente, 2013; Demombynes & Thegeya, 2012; Mbiti & Weil, 2011). The studies are relatively homogenous (I^2 = 7.06, df = 2).

It was found that 35% of banked individuals in Kenya use M-Pesa to save, while only 19% of the unbanked use it this way (Mbiti & Weil, 2011). There appears to be a positive association among M-Pesa adoption, bank use, savings, and employment (Mbiti & Weil, 2011, p. 16). The service also affects other practices: It reduces informal savings (−38.3%, p < .05), the practice of hiding money for saving (−77.2%, p < .01), but, interestingly, it also translates to a positive increase in formal saving (+27.3%, p < .01). In Mozambique, Batista and Vicente (2013) had mixed results and reported a positive but insignificant increase in general savings, but also a positive and significant increase in mKesh savings (+24.9%, p < .01). Demombynes and Thegeya (2012) found a positive increase in the amount of monthly saving (Ordinary Least Squares [OLS]): +11.8%, p < .05l l Instrumental Variable (IV): +31%) and the likelihood of saving (+19%, p < .01).

Employees who received their salaries on MPAISA, in Afghanistan, were more likely to use MPAISA's platform to retain savings as a substitute for informal saving (J. E. Blumenstock et al., 2015). The study found no evidence to support the claim that the use of MPAISA has increased overall saving behavior.

Figure 6 shows effect size in response ratio computed from meta-analysis for each study as a horizontal line, and the combined effect of all studies indicated by the diamond. Resulting effects beyond 1 indicates that the results favor intervention, otherwise the results favor control. As depicted in Figure 6, the meta-analysis of the three studies shows m-money as an intervention leads to greater savings (+17%), although the overall difference between control and treated groups is not statistically significant at a level of 5% (z = 1.81, p = .071).

Consumption

Several studies looked at the impact of remittances through mobile phones on how the money was used. Some of the underlying assumptions were that efficiency gains led to more funds that can be reappropriated or used, and also that the social network allows for a wider sourcing of funds to smoothen cash flows over time.

Increased Consumption of Goods

Munyegera and Matsumoto (2014) found that per-capita consumption can increase with m-money use. In their study, it rose from US$29 in 2009 to US$47 by 2012. According to the authors, this translates to a 13% increase in per capita consumption for m-money users.
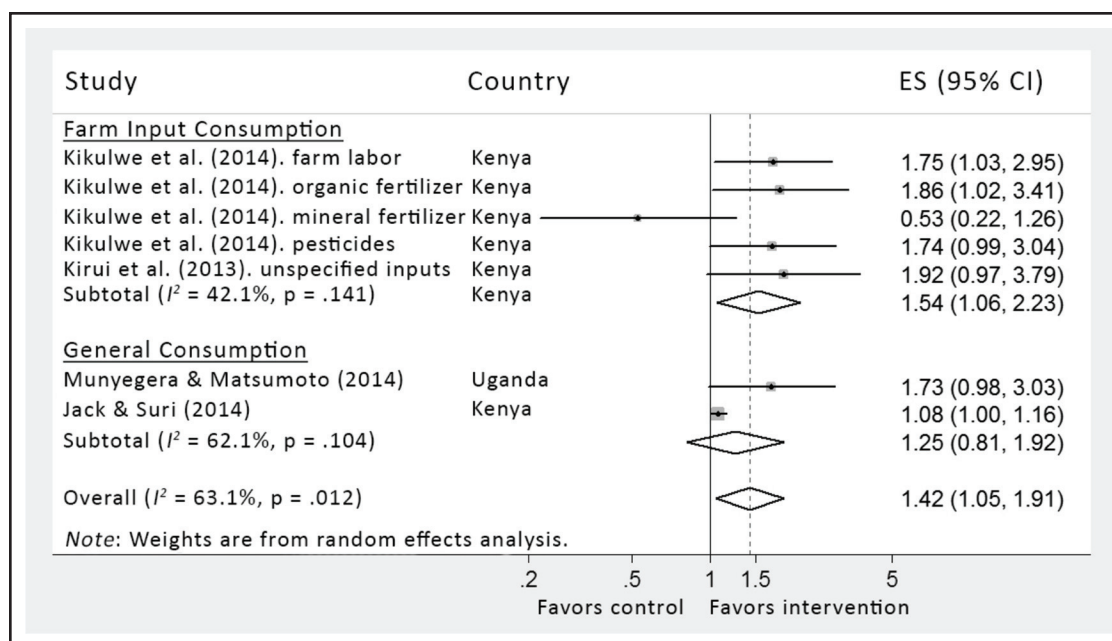
Figure 7. Response ratio impact of mobile money on consumption.

Another study reported a significant increase in the types of food and nonfood items consumed (+20.1%, $p < .01$) by m-financial service users (Aker et al., 2011). They also had a more diverse diet (+14%, $p < .05$). Households in mobile money using villages had more nondurable assets (e.g., lamps, flashlights; +20.3%, $p < .01$). They also had 78% more types of goods purchased and were 20.2% more likely to purchase nonstaple grains and more likely to consume fats. But they found no evidence of whether the remittance would be spent within the community or outside it. However, no generalizations can be made on how the savings are used because not all studies measure the same alternative uses for it.

Jack and Suri (2014) documented the impact of m-money on the smoothening of consumption patterns even in times of shocks. In particular, they reported that per capita consumption fell for nonusers when they experience negative income shock as well for those who do not have good access to the agent network ($-7.37%$, $p < .1$), whereas no M-Pesa user HHs experienced such a drop in terms of consumption. In case of an illness, shock users increase consumption (+7.81%, $p < .1$). Other findings include a decrease in nonhealth consumption in case of an illness shock for nonusers ($-8.68%$, $p < .1$), and higher consumption among poor users in case of a general shock (+12.7%, $p < .01$).

The use of remittances for agricultural inputs were examined in some of the studies (Kikulwe et al., 2014; Kirui et al., 2013). Kirui et al. (2013) reported a significantly higher amount used for agricultural inputs among M-Pesa user HHs (KSh 3,079 [US$42]) more than nonuser HHs ($p < .05$). Significantly higher spending for hired labor, organic fertilizer use, and pesticide use was reported (Kikulwe et al., 2014). Higher spending for nonmineral fertilizer also occurred, but was not significant.

Meta-analysis of the two studies that looked at consumption of farm inputs shows that m-money is responsible for a 54% increase in farm inputs consumption in m-money user HHs compared with nonuser HHs. The results are significant at the 5% level ($z = 2.28$, $p = .023$). Overall, the impact on general consumption is positive (+25%). However, it is not significant at the 5% level ($z = 1.02$, $p = .306$). Combining the effects of all kinds of consumption (specified for farm input and unspecified) meta-analysis shows that m-financial services cause an increase of 42% to user HHs compared with nonuser HHs, statistically significant at the 5% level ($z = 2.31$, $p = .021$).

Study	Country	ES (95% CI)
Kikulwe et al. (2014)	Kenya	1.24 (0.99, 1.56)
Kirui et al. (2013)	Kenya	2.04 (1.29, 3.24)
Overall (I^2 = 71.8%, p = .06)		1.53 (0.95, 2.46)

Note: Weights are from random effects analysis.

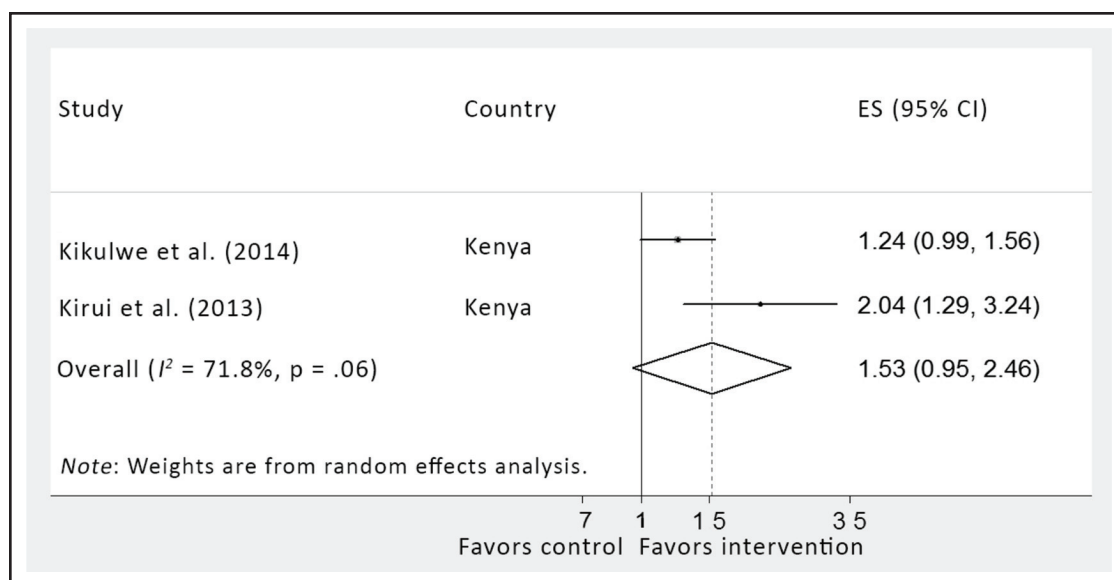7   1   1 5   3 5
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Figure 8. Response ratio impact of mobile money on income.

Impact on Livelihoods and Income

The studies that looked at consumption of farm inputs also looked at how this translated to higher farm yields, commercialization, and eventually higher income (Kikulwe et al., 2014; Kirui et al., 2013).

According to Kirui et al. (2013), the higher use of inputs by US$42 in m-money-user households has led to a significant difference in terms of commercialization, which was 37% higher (p < 5%). A significant HH income increase of US$224 ($p$ < 1%) was reported. Kikulwe and colleagues (2014) also saw increases in over-all income and increase in farm income in terms of proportions of outputs and profits, although the difference was not significant (p < .1).

The meta-analysis shows that m-money services caused a 53% increase in household income (z = 1.74, p = .083) as well as a 41% (z = 1.52, p = .123) increase in the farm yield sold. However, both of these effects are not statistically significant at the 5% level. Because the results are not conclusive, it leaves the door open for further research.

Summary of Results of Synthesis

A number of studies in Africa have demonstrated that significantly higher volumes of remittances are received by m-financial service users compared with nonusers. Overall, m-money use also leads to greater savings, although the overall difference is not statistically significant (z = 1.81, p = .071).

In cases where it was used for cash transfers in farm inputs, m-money has been found to be significantly responsible for a 54% increase in farm input consumption for users compared with nonusers. In turn, this has also contributed to an increase in household income and farm yield sold.

Implications

Policy

In terms of cash transfers in general, the emerging evidence is promising. In places such as Kenya, where the m-money ecosystem is well developed, there is evidence that the frequency and volume of remittances is higher for m-money users. Evidence suggests that use of m-money leads to greater savings, although the dif-ference varies across studies and is not statistically significant overall.

The evidence on how these transfers are used is encouraging. Because the volume and frequency have increased, there is a smoothening of cash flows and more stable consumption patterns, especially in times of
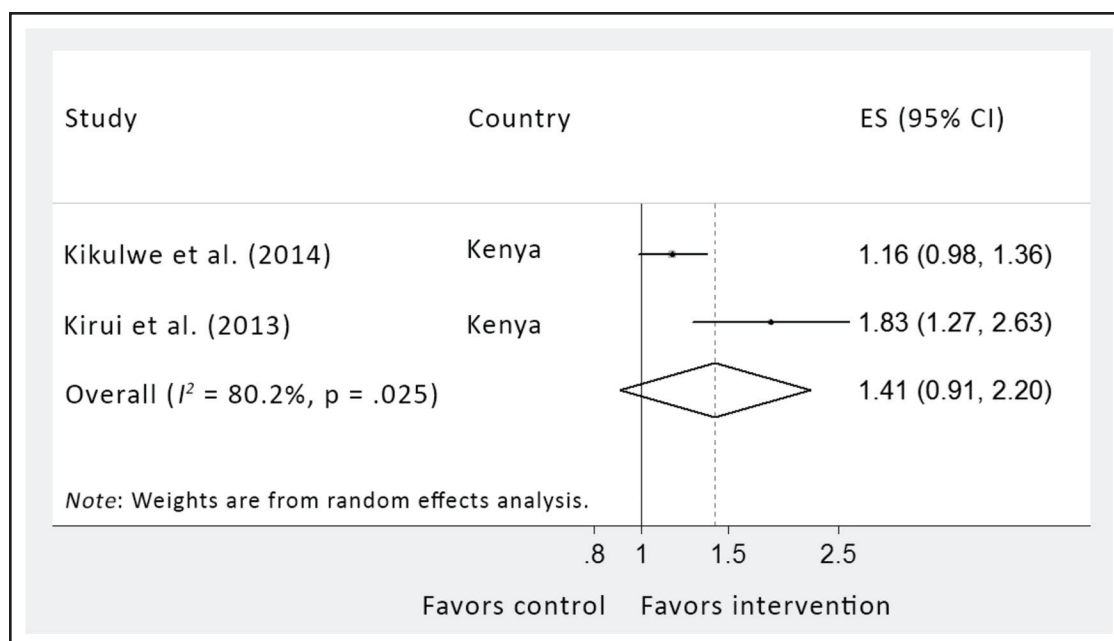
Figure 9. Response ratio impact of mobile money on percentage of farm yield sold.

disasters (e.g., drought, earthquakes). Strengthening the m-money ecosystem will help stabilize the access of people to needed financial resources. Articulating government outreach programs to these "natural" support systems is likely to yield better developmental outcomes.

Practice

A number of high-quality research studies, identified by the SR process, were about the use of m-money for very specific interventions. Among these were conditional cash transfer programs (e.g., Aker et al., 2011) and salary payments (J. E. Blumenstock et al., 2015). The realized efficiency gains often accrue to the implementing agencies. When designing such programs, it would be good to ensure that the burdens are not shifted to the individuals accessing the transfers (J. E. Blumenstock et al., 2015). The studied conditional cash transfer programs show positive results, such as diversity of diet and higher investments in agricultural inputs. When additional receipts are invested in livelihoods, productivity and incomes increase—a good thing in terms of development.

Research

All studies discussed in this SR were published after 2011. It appears that Duncombe and Boateng's (2009) call for more empirical evidence on the impact of m-financial services has been heeded. However, much remains to be done. Some of the results are positive but remain inconclusive, justifying further research. There are lacunae in the locations where the studies have been conducted. Most are in Africa (in Kenya, in particular). Research on Latin American and Asian m-money deployments are just beginning to emerge.

Some qualitative aspects that touch on power and gender relations have also been documented (e.g., Aker et al., 2011). This points to some of the limits of SR, because many qualitative impacts also mentioned in the m-financial services literature have not been operationalized quantitatively.

Even from this short list of empirical evidence, some lessons may be learned for future impact assessments. Promising areas of research are development initiatives that incorporate the use of m-money in the design. Notable here are initiatives on conditional cash transfers and payments. Often, the conditions may be related to education, health, and agriculture. In such cases, introducing experimental and quasi-experimental designs that also look at identifiable developmental objectives (e.g., health, education, livelihoods) are possible, and

perhaps even replicable given the growing popularity of conditional cash transfers in the developing world. Even though the problem of conducting a meta-analysis in the development field is challenging because multiple, diverse goals are pursued and are operationalized in different ways, the prospects for aggregating results in m-financial services, as shown in this systematic research, are promising. ∎

Acknowledgments

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