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Making financial markets work for the poor

The role of mobile money in financial inclusion in the SADC region
Evidence using FinScope Surveys

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Executive Summary

This paper presents a cross-country comparison of mobile money ownership and its determinants together with the factors affecting mobile money adoption. The link between mobile money and financial inclusion will also be discussed. The following insights have been gained from the FinScope studies conducted in 11 countries across the SADC region.

The low penetration of mobile phones in countries with a large number of financially excluded population would be a serious setback to use mobile money to advance financial inclusion. Madagascar, the Democratic Republic of Congo, Malawi, and Mozambique have the lowest levels of financial inclusion and mobile phone penetration, implying that expanding financial services through the use of mobile money would be impeded by lower mobile phone penetration.

There may be a role for mobile money even in countries where financial inclusion is reasonably high. Countries such as Botswana, Zimbabwe, and Swaziland have a relatively high level of mobile money penetration despite nearly two-thirds of adults being formally included. This implies that the success of mobile money depends less on the level of financial inclusion per se and more on its ability to allow people to use financial services that are not provided by financial institutions.

Bank account ownership, access to ATMs, mobile banking and internet banking are inversely related to mobile money ownership. Mobile money adoption is lower among those that own a bank account and also those who use ATMs, mobile banking, and internet banking to access their bank account.

Lower levels of mobile money penetration in almost half the countries studied means that there is an opportunity for expanding financial inclusion through mobile money. Malawi, Mozambique, the Democratic Republic of Congo, Zambia, and Madagascar have high levels of financial exclusion but lower levels of mobile money penetration implying that there is opportunity for using mobile money in expanding financial inclusion provided that mobile telecom and mobile money infrastructure are developed.

Remittances are strongly related to mobile money adoption. Both descriptive analysis and regression results show a strong link between remittances and mobile money adoption. Most countries that have a higher level of remittances exhibit higher levels of mobile money adoption with the exception of Malawi, Mozambique, the Democratic Republic of Congo, and Zambia where mobile money penetration is not matched by the demand for remittances. This makes a good case for the expansion of mobile money services in these countries.

Mobile money ownership is low among women, the retired, low income groups, and rural people. Women, the retired, low income groups, and rural people have lower levels of

access to mobile money which is partly driven by lower levels of mobile phone ownership and lower levels of financial literacy.

Popularity of mobile money accounts among the unemployed provides an opportunity to expand financial services to this segment by increasing access to mobile phones. Despite the unemployed having lower levels of mobile phone ownership, they have higher levels of mobile money adoption than the employed. This shows the potential of mobile money to expand financial services to the unemployed and unbanked by promoting wider access to mobile phones.

Mobile money is mostly used to buy airtime, send and receive money and to a lesser extent to pay bills, to access saving, credit, and insurance products. Most adults in the region use mobile money to buy airtime, send or receive money and a few of them use it for paying bills. Accessing saving, credit and insurance products through mobile money is a rarity implying that further innovation in the sector is needed to make various financial products available to the financially excluded.

Lack of information is the most cited barrier to mobile money ownership. Most adults cite lack of information, lack of education and an absence of knowledge about mobile money as major barriers to mobile money adoption. This implies that financial education programmes aimed at enhancing people's understanding of mobile money will be important in promoting increased adoption among the financially excluded segments of the population. In addition, mobile money literacy programmes that educate people about various mobile money products, their usefulness in managing money, and their effective usage will be important.

Mobile money is likely to be owned by individuals who do not own formal or informal accounts. Mobile money adoption is negatively related to bank account ownership and informal access.

Expanding mobile telecom infrastructure and hence increasing mobile phone penetration is important in extending financial services to the financially excluded segments of the population. Mobile money is unlikely to succeed in Madagascar, the Democratic Republic of Congo, Malawi, and Mozambique unless mobile phone infrastructure is improved. Therefore, the expansion of mobile telecom infrastructure should precede any effort to expand mobile money adoption in these countries.

Mobile money should be further expanded to rural areas to increase financial inclusion among the rural people. Given that formal financial institutions have limited reach in rural areas in many countries in the region, mobile money will be critical in financial inclusion of the rural people that do not have access to ATMs, mobile and internet banking. Therefore, increasing mobile money adoption among the rural people by expanding mobile telecom infrastructure is important.

Mobile money should be user-friendly so that the uneducated are comfortable using it. Both the descriptive and logistic regression analysis show that mobile money adoption is low among those with no education, which calls for designing mobile money applications in a manner that can be used even by the uneducated.

Introduction of new financial products through mobile money will be critical in allowing the poor to access saving, credit, and insurance products. Most adults in the region use mobile money to buy airtime and make remittances which constitute only a fraction of financial products needed by people. Therefore, delivering financial services such as saving, credit, insurance, and investment through mobile money will allow people to manage their financial resources more effectively.

1. Introduction

Financial exclusion is widespread in developing countries, as is evident from a recent report by the World Bank indicating that while bank account ownership is almost universal in high income OECD countries, only 54 percent of adults in developing countries have a bank account (Demuric-Kunt et al., 2015). Such a significant disparity in financial inclusion between the developed and developing world is driven by, among others, the inability of financial service providers to expand outreach to the poor at an affordable price due to the high cost of establishing and running "brick and mortar" branches. However, the advent of mobile technology is revolutionising access to financial services by changing the way people send/receive money, save, borrow, and manage risk. The ubiquitous nature of mobile phones and the lower cost of data use have made mobile phones ideal in expanding financial services to large number of financially excluded population in developing countries where the growth in mobile phone subscription is phenomenal.

Developing countries in South Asia and sub-Saharan Africa have seen rapid growth in mobile phone subscription since the onset of the millennium. This is evident from World Development Indicators data which shows that mobile phone subscriptions grew at an average annual rate of 954 percent in South Asia and 208 percent in sub-Saharan Africa. This is remarkably high compared to the annual growth of 46 percent in East Asia and Pacific, 23 percent in Central Europe and 15 percent in Europe and Central Asia, and 12 percent in North America. The fact that mobile phone subscriptions has been growing at a rapid rate in developing countries confirms the observation by the World Bank (2012) that the developing world is "more mobile" than the developed world. It further indicates that in some developing countries, more people have access to a mobile phone than to clean water, a bank account or even electricity. James (2014) attributes such a rapid growth in mobile phones in developing countries to the lack of technological infrastructure in the form of paved roads, post offices, taxis, public phones, rail transport and so on. The developing world followed the "mobile first" development approach while mobile communications have added value to legacy communication systems and have supplemented and expanded existing information flows in the developed countries (World Bank,2012). Innovations in the mobile phone sector such as multi-SIM card phones, low-value recharges, and mobile payments have originated in developing countries (ibid).

Widespread access to and penetration of mobile phones is linked to economic development (Lee et al., 2012) and the effect is greater where the incidence of landline phones is low. One area through which mobile phone penetration affects economic growth is through its effect on financial inclusion by expanding mobile financial services to the financially excluded (Andrianaivo & Kpodar, 2012). Mobile money[2] enabled a reduction in the need for location-specific distribution channels such as ATMs and branches by helping to reduce costs of providing new services (Anderson et al., 2000). The importance of mobile technology in expanding financial services to the poor at affordable costs is driven by the fact that its major cost relates to initial development and other fixed costs, with very low marginal costs per transaction or per new customer (Honohan and Beck, 2011). This gave rise to the rapid expansion of mobile money in developing countries leading to increased financial inclusion.

According to GSMA (2015, p. 8), 'mobile money has done more to extend the reach of financial services in the last decade than traditional "bricks and mortar" banking has in the last century'. For instance, in Tanzania, mobile account ownership increased by 33.8 million in the period from 2009 to 2014 compared to the increase in formal account ownership by only 9.9 million in the same period (GSMA, 2015). GSMA also reported that at least 19 countries in the world have more mobile money accounts than bank accounts, and 37 countries have 10 times more registered agents than bank branches. A recent Global Findex showed that the growth in mobile money accounts which is particularly noticeable in sub-

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[2] Mobile money service is often confused with mobile banking service, but the two are quite different. An excellent distinction between the two was made by Porteous (2006) who distinguishes between "additive" and "transformational" services. While additive" services such as mobile(cell phone) banking allows people to manage their bank accounts through a cellphone, "transformational" services allow people to obtain financial services such as saving, credit, and insurance through their cellphones without a need to have a bank account. Mobile money service is transformational because it significantly changes the way financial services are provided, and it promises expansion of financial services to the excluded. According to FinMark Trust (2016) mobile money refers to the electronic representation of conventional money, the value of which is on par with the official currency of the licensing SADC member state, which may be transferable, redeemable for cash and is a generally accepted means of payment. FinMark Trust distinguishes between mobile money and e-money (generally called crypto currency such as BitCoin) based on the grounds that while the former has value which is on par with conventional currency the latter is devoid of such a characteristic. Mobile money service refers to services provided by the mobile money service provider to support the utility of mobile money for the consumer which includes, among others, cash in, cash redemption at various channels and mobile payments services such as person-to-person, business-to-person and government-to-person (FMT, 2016). Notwithstanding the above distinction between mobile money and mobile money services, for the sake of simplicity, we use the two terms interchangeably throughout the paper.

Saharan Africa, is a major driver of increased financial inclusion in the region. Mobile money was the principal driver of the increase in account ownership to 34 percent in 2014 from 24 percent in 2011 (Demirgüç-Kunt et al., 2015). With more than 20 million adults having mobile money accounts, mobile money is already proving important in the SADC region. The region has a 15 percent mobile money penetration rate which is higher than the SSA average of 12 percent. The fact that the region is home to close to 20 million adults that own a mobile phone but have no access to financial services means that there is potential for the growth of mobile money services.

Having recognised the importance of mobile money in expanding financial services to the poor, the SADC region commissioned the development of mobile money guidelines that seek to provide, among others, guidance on regulatory approaches required to create an enabling environment for mobile money to reach its full market potential and to provide a mechanism for domestic and regional interoperability via regulations harmonised on similar principles. However, the success of mobile money differs across countries. Mobile money has significantly grown in Tanzania and Zimbabwe while it only had an additive rather than a transformational effect in South Africa. Recently, Vodacom, one of the major mobile money service providers in South Africa, terminated its M-Pesa offering after finding it not commercially viable (Reuters, 2016). MTN has also halted new mobile money sign-ups (fin24, 2016). Thus, the South African experience is similar to that of developed economies where mobile money has had an additive effect using Porteous' (2006) definition.

Both macro-level and individual-level factors affect the success of mobile money. At a macro-level, the availability of mobile telecommunication infrastructure and hence wider access to mobile phones coupled with a conducive regulatory environment are important. However, the availability of mobile money services does not guarantee uptake because people's decision to adopt mobile money depends on whether or not they have access to the conventional financial services such as a bank account, mobile banking and internet banking bank. From a theoretical perspective, perceived usefulness, ease of use, education, perceived risk, attitude, trust and cost are important in determining people's decision to adopt mobile money (see for details Tobbin, 2012; Upadhyay, 2016; Nyirenda, 2014; Osei-

Assibey, 2015; Siddik et al., 2014; Ting et al., 2016; Gutierrez and Choi, 2014). However, no study has so far been conducted to uncover either the determinants of mobile money adoption or the link between mobile money adoption and financial inclusion in the SADC region.

This paper therefore aims at providing insights into factors that affect mobile money adoption at an individual level using FinScope surveys from 11 countries across the SADC region. The paper documents mobile money penetration levels across countries, and identifies factors affecting mobile money adoption. It also examines the link between mobile money and financial inclusion.

The rest of the paper is organised as follows. Section two describes the data and methodology, while section three presents the analysis and discussion. Section four concludes and the last section presents policy recommendations.

2. Data and methodology

2.1. The data

Data for the study were obtained from nationally representative FinScope Consumer surveys conducted in different years in 11 SADC member countries listed in Table 1 below.

Table 1: Sample size and year survey was conducted

No.	Country	Year of survey	Sample size	Total adult population to which the survey applies
1	Botswana	2014	1,503	1,324,572
2	Democratic Republic of Congo	2014	5,000	21,698,341
3	Madagascar	2016	5,040	11,327,321
4	Malawi	2014	3,005	8,025,052
5	Mauritius	2014	4,000	921,007
6	Mozambique	2014	3,905	14,431,915
7	South Africa	2015	5,000	37,320,003
8	Swaziland	2014	3,440	565,043
9	Tanzania	2013	7,987	24,231,763
10	Zambia	2015	8,479	8,129,450
11	Zimbabwe	2014	4,000	6,998,144
	Total		**51,359**	**134,972,612**

2.2. Methodology

The analysis of data comprises descriptive statistics including graphical analysis and logistic regression analysis. Cross-country comparisons are made on mobile phone penetration, mobile money account ownership, formal inclusion, informal inclusion, mobile banking usage, internet banking usage, ATM penetration, remittances (inward and outward), and remittances frequency. To obtain a better picture of differences in mobile money account ownership across demographic characteristics, we analysed mobile money account ownership across gender, age, level of education, employment status, personal monthly income category, location of residence. In addition, we analysed drivers and barriers of mobile money adoption along with the types of financial transactions completed through mobile money.

Logistic regression analysis is conducted to examine the determinants of mobile money adoption and the link between mobile money and financial inclusion. The first model was employed to identify individual level factors such as mobile phone ownership, sending/receiving money, using ATM, internet and mobile banking services that affect mobile money adoption. The second model examined the relationship between mobile money adoption and bank account ownership while the third model assessed the link between mobile money and informal inclusion (please refer to Appendix A for detailed model specification).

## 3. Analysis and results

3.1. Descriptive analysis

3.1.1. Cross-country comparison of mobile money penetration and covariates

Mobile phone penetration is a requisite for the expansion of mobile money. Higher penetration of mobile phones is an opportunity to expand financial services through mobile money. The fact that mobile money is useful for the provision of financial services to the financially excluded groups of society is likely to lead to higher penetration of mobile money in countries with higher levels of financial exclusion. A cross-country comparison of mobile phone ownership shows marked differences among the countries in the region. As shown in Figure 1, while Swaziland is ranked first with 92 percent of adults owning a mobile

phone, Madagascar is ranked the lowest with only a third of the adult population owning a mobile phone. The fact that Swaziland and Zimbabwe have a higher mobile phone penetration rate than Mauritius and South Africa despite the latter having higher per capita income than the former two countries suggests that there are factors at play other than income that explain mobile phone penetration across the countries. More than 60 percent of the adult population own mobile phones in most of the countries, and lower mobile phone penetration is observed in Madagascar, the Democratic Republic of Congo, Malawi and Mozambique. Lower mobile phone penetration in these countries is likely to pose a serious challenge to the use of mobile money as a panacea to financial exclusion especially in Madagascar and Mozambique where formal financial inclusion is the lowest.

The comparison of mobile phone penetration and mobile money usage in light of the extent of formal financial inclusion provides important insights about the relationship between the three factors and also cross-country differences. While South Africa and Mauritius have the lowest mobile money penetration rates that can be attributed to high levels of formal financial inclusion, the lower levels of mobile money penetration in Mozambique, Malawi and Democratic Republic of Congo may be due to a lack of adequate development of the mobile infrastructure or unfavorable regulatory environment. Tanzania has an exceptionally high penetration rate of mobile money with 83 percent of mobile phone owners having a mobile money account. This implies that further development of mobile money in the country requires the development of mobile telecom infrastructure on the one hand and expansion of mobile money access on the other. Mobile money could also be useful in markets such as Botswana, Zimbabwe, and Swaziland where financial inclusion is reasonably high (two-thirds of adults are formally included in each country).

Figure 1: Mobile phone penetration, formal inclusion, and mobile money usage across countries
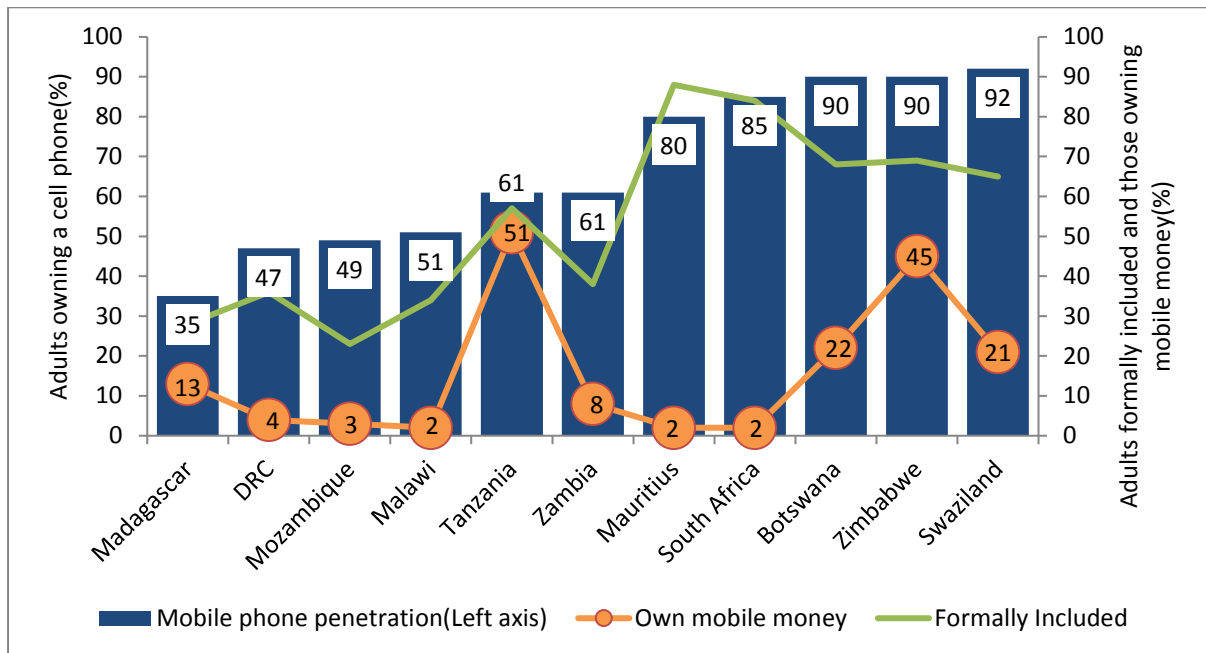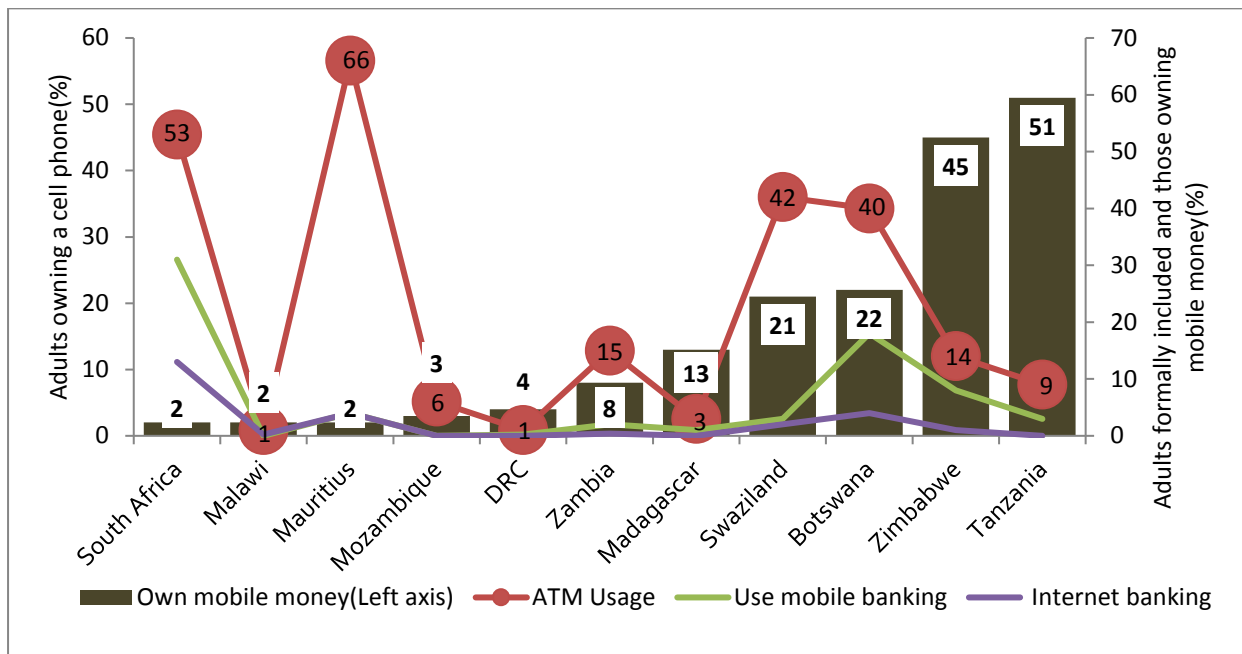

Source: FinScope Surveys

Technology has significantly changed the way people access financial services. The advent of the Automated Teller Machines (ATMs) has improved access to bank accounts by allowing account holders 24 hour access to their money instead of confining access only during branch trading hours. ATMs are therefore important in giving people anytime access. The recent move by banks to introduce mobile banking and internet banking further revolutionised the way people access their bank accounts. Mobile and internet banking allows the banked to access their accounts whenever and wherever they want to giving them both time and locational freedom. Mobile money took the innovation further by allowing people access to financial services without a need to own a bank account. It can therefore be expected that mobile money is likely to be popular where access to ATM, mobile and internet banking is low. Figure 2 shows the relative penetration of ATMs, mobile and internet banking across the countries in the region. South Africa, Mauritius, Botswana, and Swaziland have ATM use of 40 percent or more compared to Malawi, Mozambique, Tanzania, the Democratic Republic of Congo, and Madagascar where less than 10 percent of adults use ATMs. ATM penetration is particularly low in Malawi,

Mozambique, and Madagascar where less than 5 percent of adults access their bank accounts through ATMs.

Mobile banking penetration is generally lower than ATM penetration. South Africa and Botswana have relatively high levels of mobile banking users while it is accessed by negligible percentage of adults in the rest of the countries. Internet banking is even less common with a little more than 10 percent of adults using it in South Africa, where internet banking usage is the highest in the region, while it is negligible in the rest of the countries. A comparison of mobile money usage on the one hand and ATM penetration, mobile banking, and internet banking on the other hand shows that higher ATM penetration is generally related to lower level of mobile money usage and vice-versa except in Malawi, Democratic Republic of Congo, Mozambique and Madagascar where both ATM penetration and mobile money usage are low. For mobile banking and internet banking, the picture is quite different because the usage of both is low across countries except in South Africa and Botswana.

**Figure 2:** Mobile money, ATM usage, mobile and internet banking

Source: FinScope Surveys

The ubiquitous nature of mobile phones coupled with affordability of mobile money services (compared to conventional financial services) means mobile money is a useful

avenue towards increased financial inclusion, making it important in countries where financial exclusion is high or where people are informally served. As shown in Figure 3, mobile money penetration is generally low in countries with lower levels of financial exclusion and informal provision. For instance, mobile money penetration is low in both South Africa and Mauritius, where there are low levels of financial exclusion and informal access. Lower levels of mobile money penetration in Malawi, Mozambique, Democratic Republic of Congo, Zambia and Madagascar in light of the significant number of adults financially excluded show the opportunity of using mobile money in expanding financial access in these countries.

Figure 3: Mobile money penetration, financial exclusion, and informally served
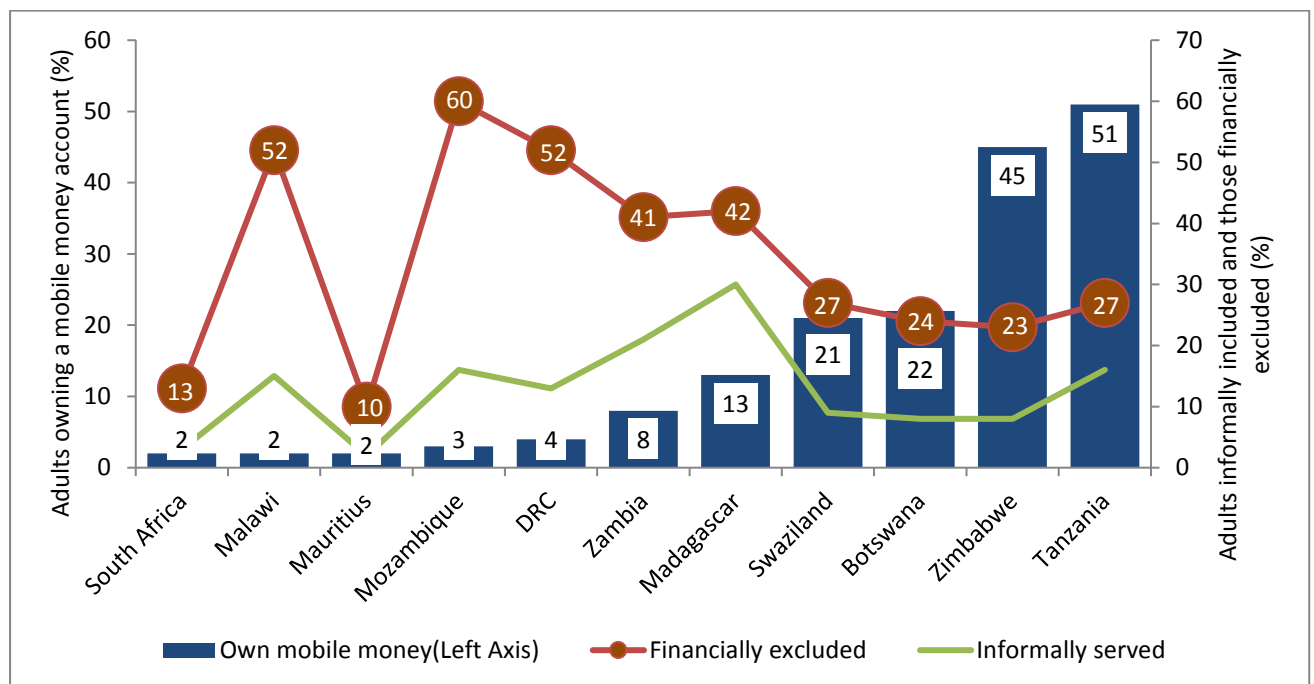
Source: FinScope Surveys

Mobile money and remittances[3]

The utility of mobile money comes to the fore in the ability to allow people to send or receive money easily and at affordable cost. This leads to a link between the usage of mobile money and remittances with mobile money usage increasing with increased demand for remittances. Figure 4 shows divergence in remittances across countries in the region. With a third of adult population either sending or receiving money, remittance use

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[3] We examined both local and cross boarder remittances

is high in Tanzania and Zimbabwe while it is the lowest in Mauritius, where only 2 percent of adults send or receive money. The other apparent trend is that more adults in the region receive than send money and the gap between sending money and receiving is narrow except in Swaziland and Zimbabwe, which may imply that there is a relatively higher level of adults who depend on family and friends as a source of income. Countries with a higher level of remittances exhibit higher levels of mobile money penetration. However, mobile money penetration is not matched by demand for remittances in Malawi, Mozambique, the Democratic Republic of Congo, and Zambia which makes a good case for pushing further mobile money expansion in the countries.

Figure 4: Mobile money and remittances
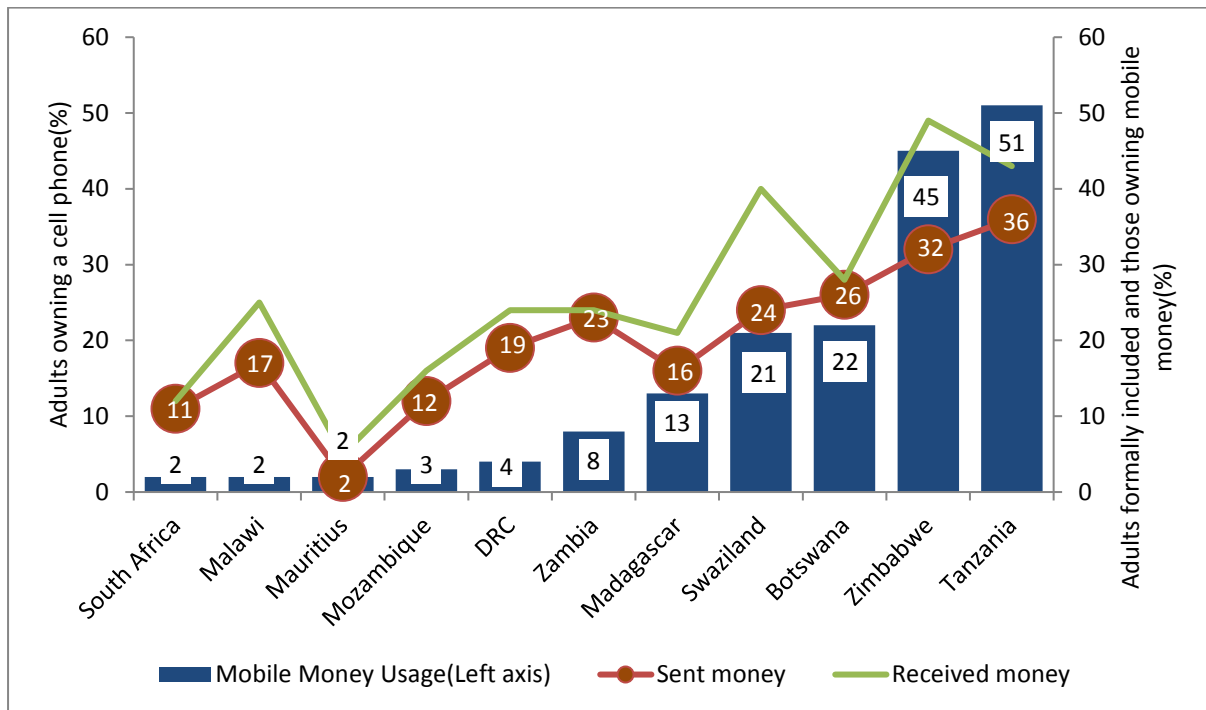
Source: FinScope Surveys

Mobile money and frequency of sending/receiving

While the percentage of adults who send/receive money is a measure of the incidence of remittances, another way to look at it is the frequency of remittances. The frequency of remittances is based on whether people send/receive money weekly, fortnightly, monthly, or annually. We developed a weighted average of the frequency of remittances for each country by assigning a higher weight to those sending/receiving weekly and lower weights

to those sending/receiving annually. A comparison of remittance frequency shows that Malawi and Mozambique exhibit higher frequency of remittances than the rest of the countries. We also notice that sending and receiving frequencies are highly correlated in these countries except in Mauritius, Madagascar, Tanzania and Zimbabwe. Sending frequency is higher than receiving frequency in Mauritius, Madagascar and Tanzania while receiving frequency is higher than sending frequency in Zimbabwe. A lower penetration of mobile money in Malawi and Mozambique, not matched with high frequency of remittances, shows that there is greater opportunity for expanding mobile money services in the two countries.

Figure 5: Mobile money penetration and frequency of sending/receiving money
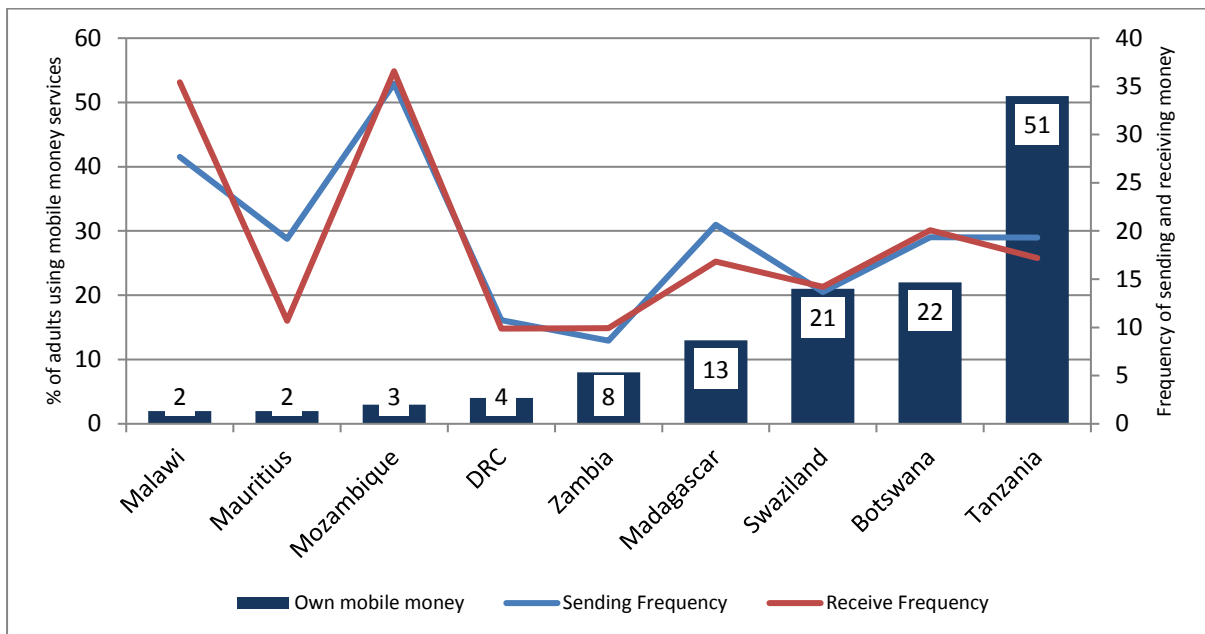
Source: FinScope Surveys

Mobile money penetration along demographic characteristics

Mobile money and gender

A recent paper by Fanta and Mutsonziwa (2016) shows that the gender gap in financial inclusion in the SADC region is 10 percent and it narrows down to 5 percent when South Africa (where more women than men are financially included due to usage of SASSA-linked bank accounts) is factored in. In contrast, a 2 percent gender gap in mobile money account ownership implies that mobile money accounts are likely to serve as a useful tool to close the gender gap in financial inclusion in the region.

Figure 6: Mobile money account ownership by gender
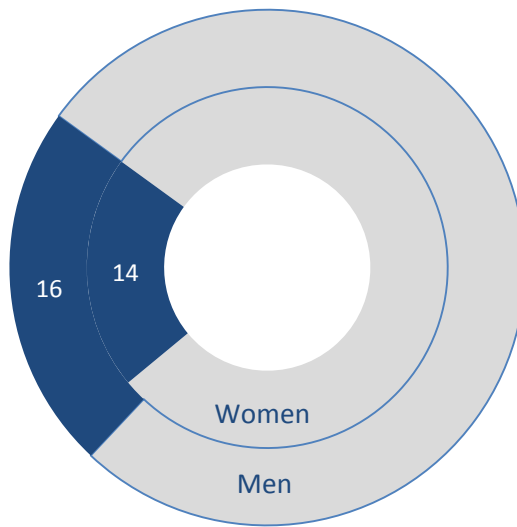
Source: FinScope Surveys

A comparison of mobile phone ownership across the age groups shows that ownership is higher among the youth, those working with children and adults during pre-retirement age and it is lower among the retired. Similarly, mobile money account ownership is higher among the youth, those working with children and adults during pre-retirement age and it is lower among the retired. A comparison of mobile phone penetration and mobile money account ownership shows a strong correlation between the two suggesting that mobile money ownership can be expanded by expanding mobile phone usage among adults.

Figure 7: Mobile phone, mobile money accounts across age categories
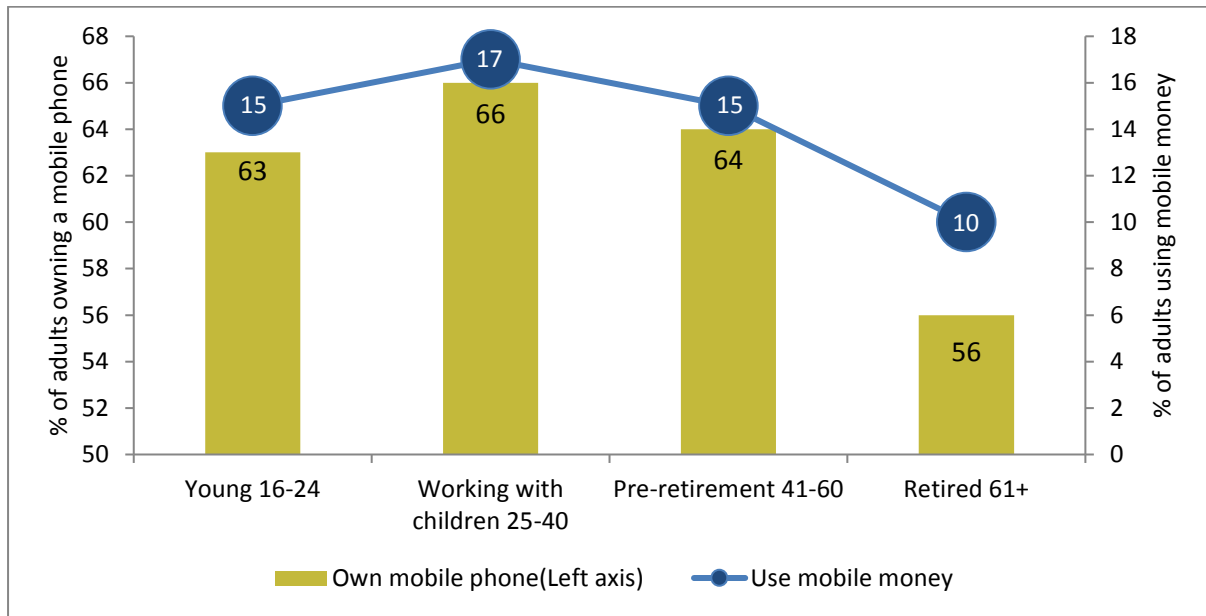
Source: FinScope Surveys

Mobile phone ownership is correlated with the level of education, as it increases with increased levels of education. This is apparent from Figure 8 that shows that only a third of those with no education own a mobile phone compared to half of those with primary education, 75 percent of those with secondary education, and 85 percent of those having post-secondary education. This underscores the importance of education for technology adoption among adults in the region. Mobile money ownership, however, does not exhibit a similar trend. It is low among those with secondary education and higher among those with primary and post-secondary education.

Figure 8: Mobile phone, mobile money accounts across levels of education
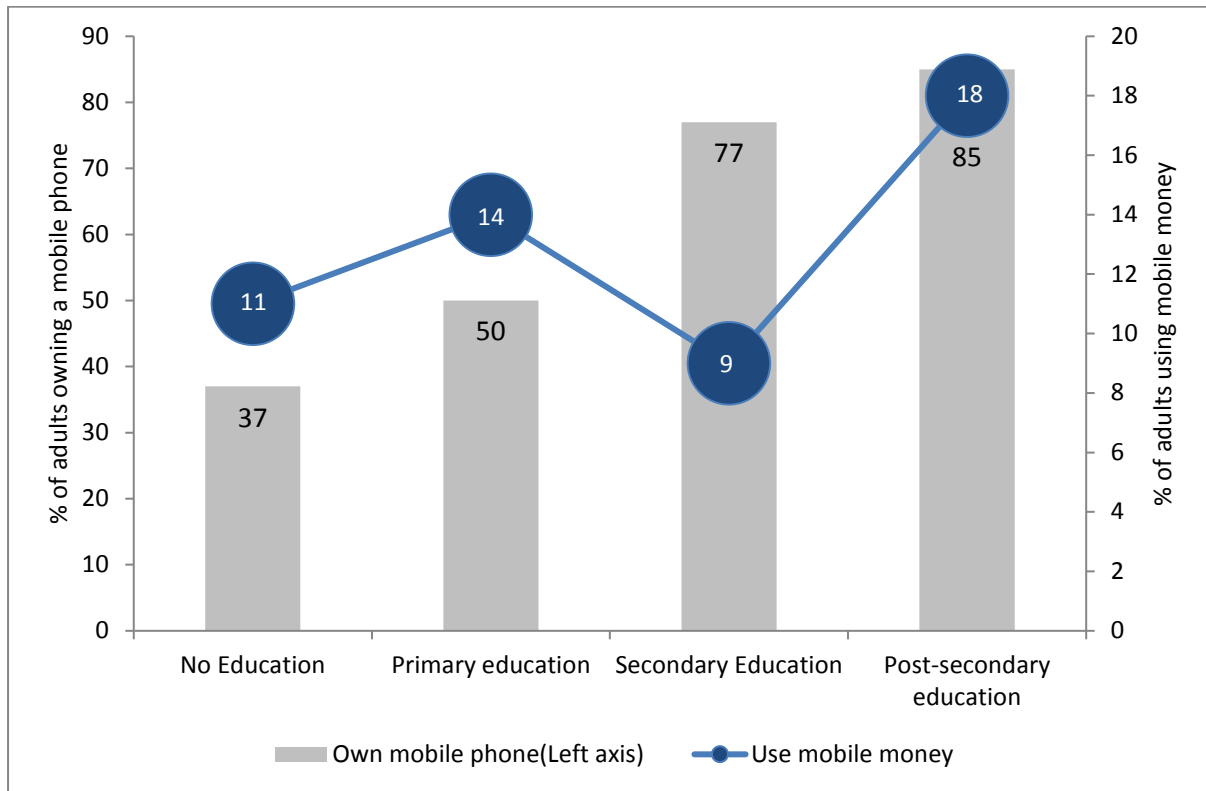
Source: FinScope Surveys

Mobile money is believed to be an important tool in expanding access to financial services for the excluded group, often including most of the unemployed. The effectiveness of mobile money in fact depends on wider access to mobile phones by this group of adults in the region. As shown in Figure 9, with only half the unemployed people owning mobile phones compared to 78 percent of the employed and 90 percent of the retired, there is a marked difference especially between the unemployed and employed. In contrast, mobile money accounts are relatively more popular among the unemployed compared to the employed and the retired. This shows the potential of mobile money to expand financial services to the unemployed who are mostly unbanked.

Figure 9: Mobile phone, mobile money accounts across employment status
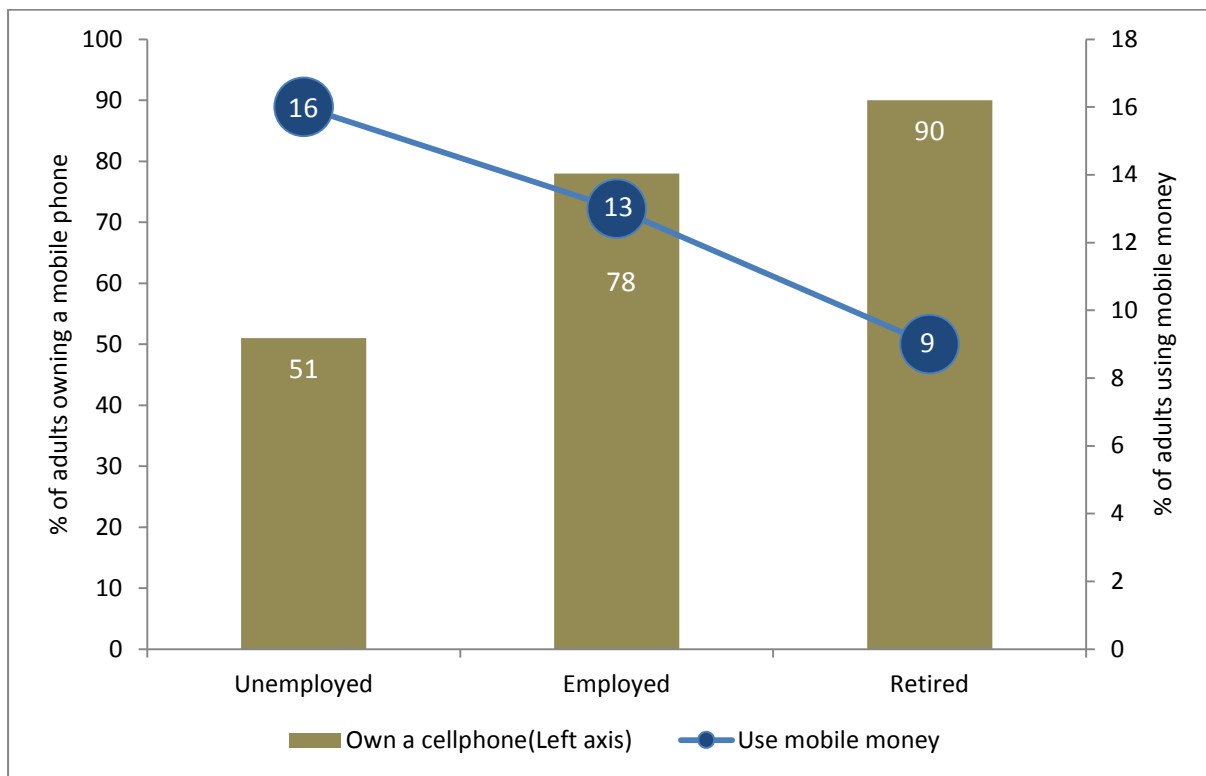
Earlier studies on financial inclusion and income levels revealed that while people with relatively higher personal monthly income tend to have better access to formal financial inclusion, low income groups have less access to formal financial services and hence they resort to the informal providers. We therefore analysed mobile phone ownership and access to mobile money accounts across income groups. As shown in Figure 10, mobile phone ownership increases with increased income. Similarly, mobile money account ownership also increases with increase in income, which implies that low income groups are still likely to be excluded.

Figure 10: Mobile phone, mobile money accounts across income groups
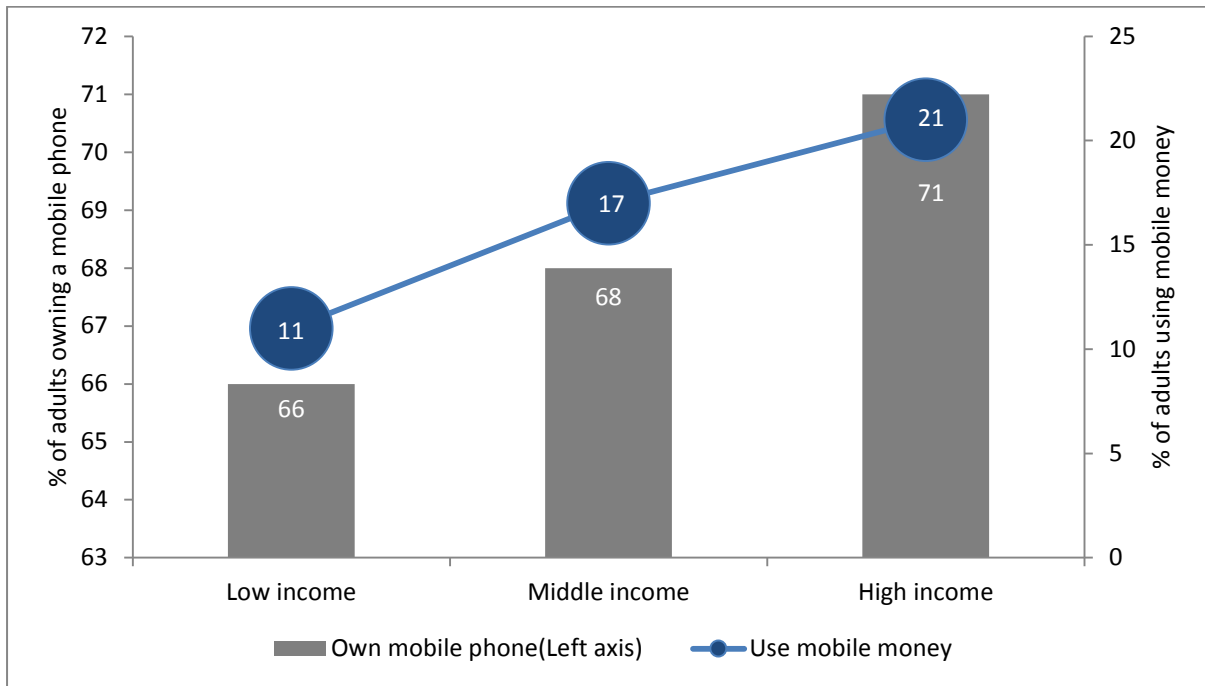
Source: FinScope Surveys

Financial inclusion is higher among urbanites while rural people have limited access to bank and insurance products. The ubiquitous nature of mobile phone and affordability of mobile money by most rural people that are often excluded from the formal financial sector makes mobile money ideal to meet the needs of rural people. However, as shown in Figure 11, there are marked differences between the urban and rural people both in mobile phone ownership and mobile money ownership. Mobile phone ownership is 80 percent among urbanites compared to 52 percent among the rural people in the region. Similarly, mobile money ownership is higher among urbanites with 19 percent of them having a mobile money account compared to only 12 percent in rural areas. This might be due to lower coverage of mobile networks in rural areas suggesting that using mobile money for expanding financial inclusion to people in the rural areas requires development of mobile telephone infrastructure.

Figure 11: Mobile phone, mobile money accounts by place of location
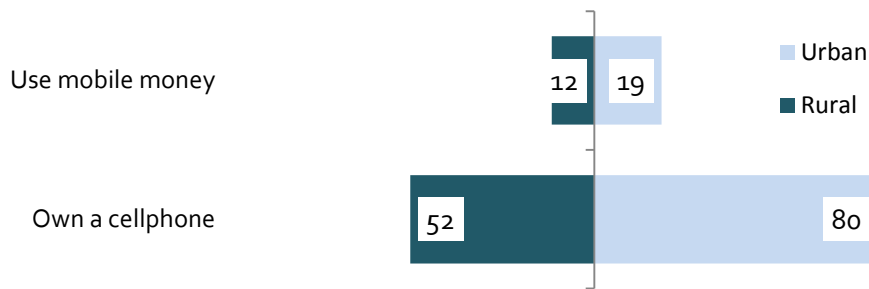
Source: FinScope Surveys

Drivers of mobile money usage

Studies report that mobile money adoption is driven by perceived usefulness, perceived ease of use, and cost (Tobbin, 2012; Upadhyay and Jahanyan, 2016; Nyirenda and Chikumba, 2013), among other factors. To identify the most important drivers of mobile money account ownership, we ranked the reasons cited based on the number of countries where the reasons are cited with those cited in most countries ranked first. As shown in Figure 12, convenience and cost are ranked first with mobile money users in eight countries citing this as a reason for owning a mobile money account. Mobile money is the only accessible way of obtaining financial services in six countries. Suitability of mobile money to the needs of individuals' needs is also part of the drivers with adults in five countries citing this as a reason. The least important factors are avoiding paying for transport and keeping money private as these are cited as reasons for using mobile money only in two countries. In general, people use mobile money for its convenience, cost and suitability, and in fact, for some it is the only way available to conduct financial transactions.

Figure 12: Reasons for using mobile money
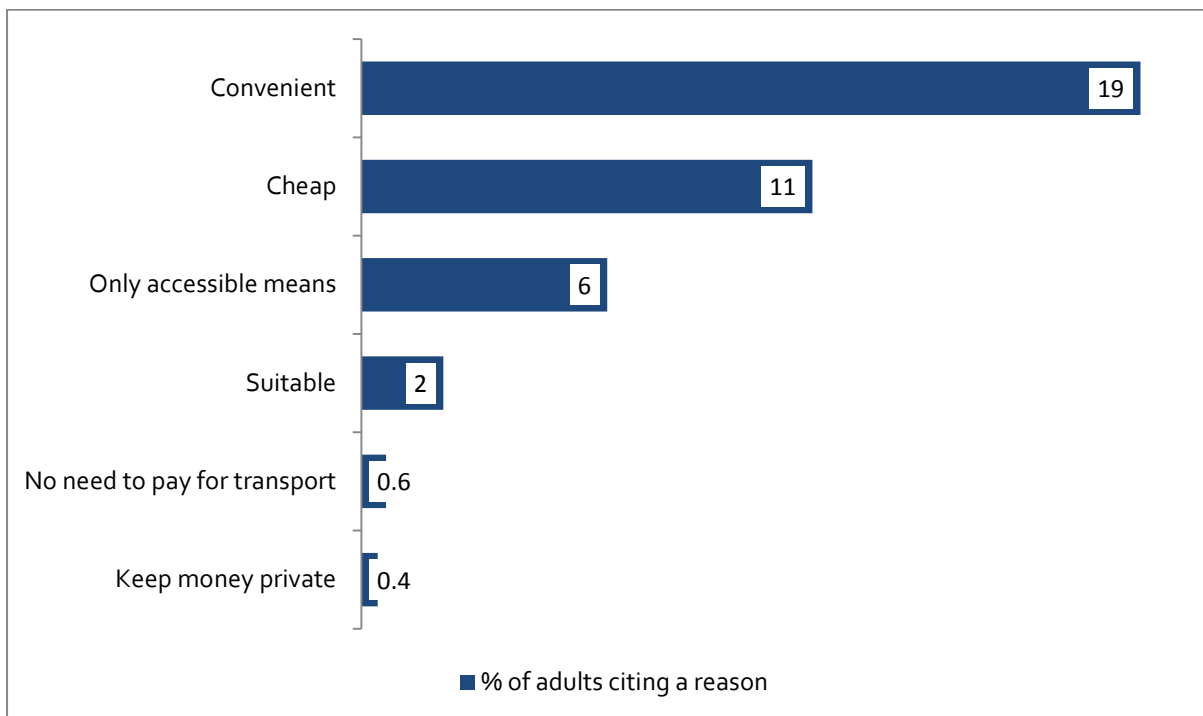
Source: FinScope Surveys

Financial transactions carried out through mobile money

Mobile money may be used for various purposes such as paying bills, paying insurance premiums, sending money, receiving money, buying airtime, cash out, storing money, transferring money from a bank account. Our analysis of financial transaction via mobile money revealed that there are four important purposes for which people use mobile money, namely, paying bills, buying airtime, sending money and receiving money. As shown in Figure 13, there are cross-country variations in the most important purposes for using mobile money. Paying bills through mobile money is less common among mobile money users, and most use their mobile money for buying airtime, sending and receiving money. Buying airtime via mobile money is a common place among mobile money users in South Africa, Botswana, Malawi, Mauritius, and Mozambique. Sending money is important in South Africa, Botswana, Malawi, Tanzania, Zimbabwe, and Madagascar while receiving money through mobile money is common in Tanzania, Zimbabwe, and South Africa. In general, mobile money is used in the region mostly for transactional and remittance purposes and less for saving, credit and insurance purposes. This suggests that further

innovations in financial services are needed to enable mobile money users to access wide ranging financial products including saving, credit and insurance.

Figure 13: Top four types of mobile money transactions across countries
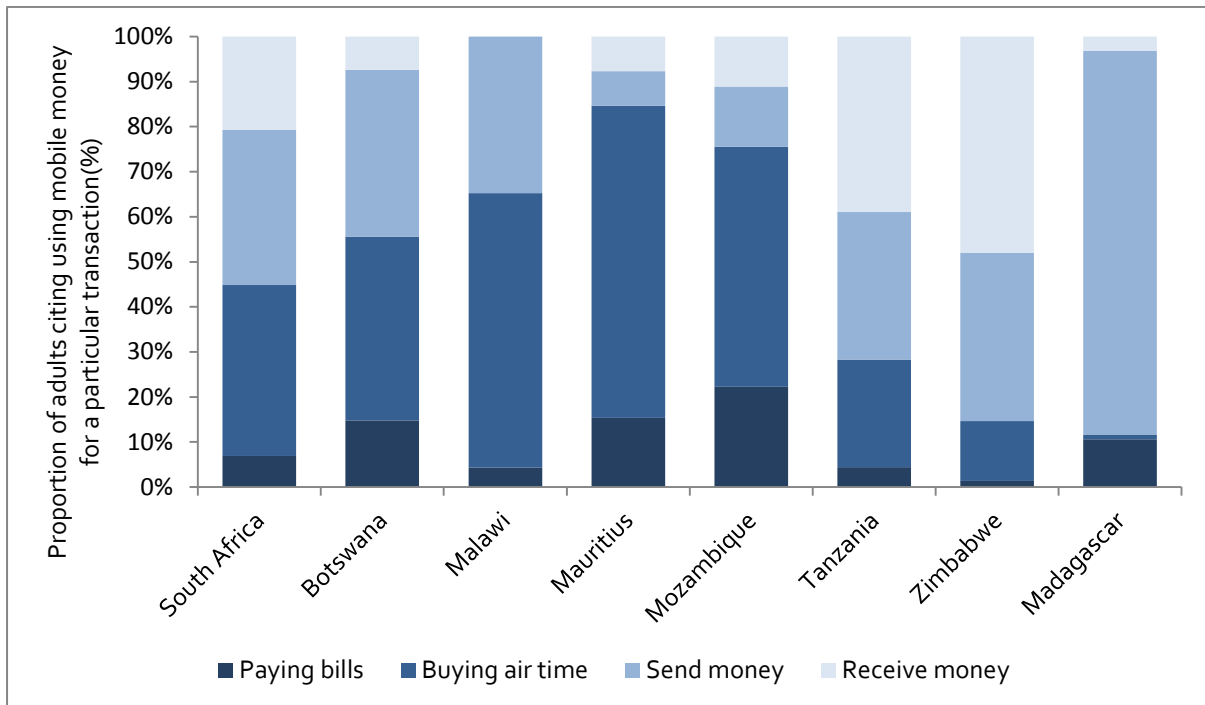
Source: FinScope Surveys

Barriers to mobile money usage

Studies show that perceived usefulness, ease of use, cost and convenience are among the most important factors that drive mobile money usage. The studies also show that educational attainment and trust on the mobile money service provider and mobile money agent are important for mobile money adoption (see Morawczynski, 2009; Osei-Assibey, 2015). Education is an important enabler for mobile money usage and lack of it may inhibit usage. Similarly, the trust in the mobile money service provider and mobile money agent are important drivers of mobile money usage and the lack of which can discourage people from taking up mobile money accounts. As shown on Figure 14, lack of information, money, and education are among the top four reasons for not using mobile money. This implies that more people can be encouraged to adopt mobile money through mobile money awareness campaigns. Cost, trust and inability to produce the required documentation are the least cited barriers against mobile money adoption.

Figure 14: Reasons cited as barriers of mobile money adoption
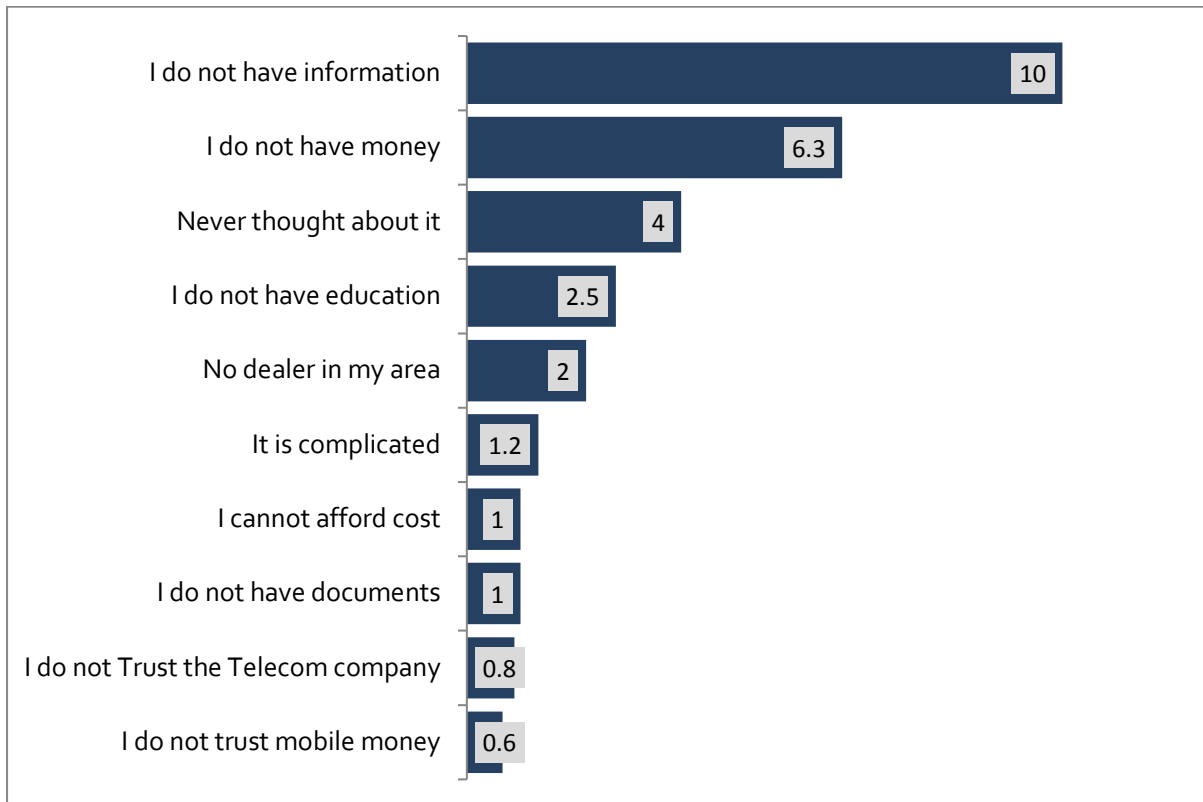
Source: FinScope Surveys

3.1.2. Descriptive statistics

The descriptive statistics reported in Table 2 (appendix B) show that two third of adults in the region own mobile phones. Given that 47 percent of adults have no access to formal financial products, wider accessibility of mobile phones provides an opportunity for expansion of mobile money to expand financial inclusion. At 15 percent, mobile money penetration is higher than the SSA average of 12 percent. Although ATMs, mobile and internet banking facilitate access to a bank account, only 20 percent of adults own ATM cards, 10 percent use mobile banking and 4 percent use internet banking.

Mobile money usage is driven by cost and convenience as evidenced by 8 percent of adults considering mobile money to be cheap and 8 percent considering it to be convenient. Remittances are among important factors that drive demand for mobile money. One in five adults in the region sends and receives money. In fact, there are slightly more receiving than sending adults. An analysis of the frequency of remittances shows that sending frequency is higher than receiving frequency.

3.1.3. Econometric analysis[4]

Two models are estimated where the first model identifies individual level characteristics that drive mobile money adoption while the second model examines the link between mobile money and financial inclusion (both formal and informal access).

Determinants of mobile money

We examined the determinants of mobile money adoption by using variables on financial products, channels of accessing bank accounts, and financial transactions, while controlling for demographics. Financial product related variables include ownership of a bank account, formal account, and informal account. Channel variables include the usage of ATMs, mobile and internet banking (as channels through which bank accounts are mobilized). Variables measuring financial transactions include the sending and receiving of money along with sending and receiving frequency. Demographic variables include age, gender, educational level, employment status, personal monthly income, and area of residence.

Mobile phone ownership may not necessarily be related to mobile money usage because people in developed markets who have access to bank account via ATMs, internet banking and mobile banking may not sign up for mobile money accounts. However, mobile phone ownership provides an opportunity for the unbanked to access financial services through their cellphones. As shown in Table 3 (appendix B), mobile money adoption is strongly correlated with mobile phone ownership, while bank account ownership decreases the incidence of mobile money adoption. This is consistent with previous studies that suggest that mobile money is mostly accessed by the unbanked. Age has a non-linear relationship with mobile money, increasing up to a certain age and declining afterwards. This is consistent with results of the descriptive analysis where we observe an increase in access to mobile money as we move from the youth to working adults with children and further increase to pre-retirement adults, and a lower access among the retired. As is the case with access to a bank account, mobile money ownership is skewed towards men, suggesting the

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[4] We run the econometric model on aggregated data to be able to structure the analysis along variables rather than individual countries. Heterogeneity among countries in the data is addressed using a dummy variable to control for country fixed effects. However, such an approach does not guarantee that all country characteristics are accounted for in the model, and hence running a model for each country separately may yield in a more robust result.

existence of a gender gap. However, from the descriptive analysis, we observe that the gap in mobile money account ownership is not as much as the gap in bank account ownership. Increase in personal monthly income decreases the chance of owning a mobile money account, suggesting that mobile money is mostly accessed by the low income group in society. This shows that it can be used to promote financial access among the poor. Interestingly, all levels of education are positively related to mobile money ownership which is consistent with Baguma (2013) who reported that mobile money is less likely to be accessed by the uneducated, calling for re-designing the service in a more user friendly manner.

The employed are more likely to own mobile money accounts than the retired. This might be due to the employed wanting mobile money accounts to make remittances to families, friends, and other dependents unlike the retired who themselves have to depend on others. Like access to bank accounts, mobile money accounts are also more likely to be owned by people in urban areas. This might be due to better mobile telecom infrastructure and hence better mobile phone ownership in urban areas which underlines the importance of expanding mobile telecom infrastructure in rural areas as a requisite for expanding financial services to the unbanked. All the three channels of accessing a bank account that we have introduced into our model, namely, ATMs, mobile banking and internet banking are negatively correlated to mobile money account ownership. This implies that like a bank account, ATMs, mobile and internet banking decrease the need for mobile money use.

The importance of remittances as a major driver of mobile money is evident from our results that show strong relationship between remittances (both inward and outward) with mobile money ownership. Frequency of remittances is related with mobile money ownership in such a way that while increased receiving frequency increases the chance of mobile money ownership, increased sending frequency decreases it. This might be due to senders who remit more frequently opt for informal remittance channels such as families and friends rather than having to use mobile money. However, those who receive money more frequently are more likely to have a mobile money account. In general, bank account ownership, income, access to ATM, mobile banking, internet banking, sending money more frequently are related to decreased chances of mobile money ownership. On the other hand, mobile phone ownership, gender, education, employment, living in urban areas,

sending/receiving money, and receiving money more frequently are related to increased chance of mobile money ownership.

Mobile money and financial inclusion

While the previous section focused on identifying individual-level factors affecting mobile money ownership, this section presents the relationship between mobile money and financial inclusion. Previous studies suggest that mobile money ownership increases the chance of bank account ownership (Mbiti, 2011). As shown in Table 3, mobile money account ownership decreases the incidence of bank account ownership. This reinforces our earlier claim of the importance of mobile money in the effort to expand financial inclusion to the unbanked. A look at the other variables shows that an increase in age increases the incidence of bank account ownership, as does an increase in personal monthly income. All levels of education are related to a higher chance of owning a bank account, with an increase in level of education increasing the likelihood of owning a bank account. A positive coefficient for gender suggests that bank account ownership is skewed towards males, with females more likely to be excluded. Location is an important determinant of bank account ownership with urbanites having a higher chance of being banked. Interestingly, incidence and frequency of remittances are strongly related to a higher chance of bank account ownership. Compared to receiving money, sending money is related to a higher chance of bank account ownership.

We also analysed the relationship between mobile money ownership and informal access. Consistent with Mbiti (2011), mobile money account ownership decreases the chance of informal access. An examination of the rest of the variables shows that all of the variables, except age and retirement, are likely to decrease the chance of owning a mobile money account. A negative coefficient for gender means women are more likely to have informal access than men. An increase in personal monthly income, level of education, employment status, living in urban areas, sending/receiving money are all likely to decrease the incidence of informal account ownership. In general, mobile money ownership is negatively correlated to the incidence of both bank account ownership and informal access.

4. Conclusion

This paper examined cross-country differences in mobile money ownership and its covariates. It also assessed the determinants of mobile money adoption and the link between mobile money and financial inclusion. The following insights have been gained from the study.

Lower penetration of mobile phones in countries with large number of financially excluded population would be a serious setback to use mobile money to advance financial inclusion. Madagascar, the Democratic Republic of Congo, Malawi, and Mozambique have the lowest level of financial inclusion and mobile phone penetration, implying that expanding financial services through the use of mobile money would be challenged by lower mobile phone ownership levels.

Mobile money is also useful in markets where financial inclusion is not very low. Countries such as Botswana, Zimbabwe, and Swaziland have a relatively higher level of mobile money penetration despite the fact that they have nearly two-thirds of adults formally included.

Bank account ownership, access to ATM, mobile banking and internet banking are inversely related to mobile money ownership. Mobile money adoption is lower among those that own a bank account and also those who use ATMs, mobile banking, and internet banking to access their bank account which implies existence of substitutability.

Lower level of mobile money penetration in almost half the countries studied means there is opportunity for expanding financial access through mobile money. Malawi, Mozambique, the Democratic Republic of Congo, Zambia, and Madagascar, with high levels of financial exclusion, have a lower level of mobile money penetration implying that there is opportunity for using mobile money in expanding financial access.

Remittances are strongly related to mobile money adoption. Both the descriptive analysis and regression results show a strong link between remittances and mobile money adoption. Most countries that have a higher level of remittances exhibit higher levels of mobile money adoption except Malawi, Mozambique, the Democratic Republic of Congo, and Zambia where mobile money penetration is not matched by the demand for

remittances which makes a good case for pushing further mobile money expansion in the countries.

Mobile money ownership is low among women, the retired, low income groups, and rural people. Women, the retired, low income groups, and rural people have a lower level of access to mobile money partly driven by lower level of mobile phone ownership and partly due to lower level of financial literacy.

Popularity of mobile money accounts among the unemployed provides opportunity to expand financial services to this segment through mobile phones. Despite the unemployed having a lower level of mobile phone ownership, they have a higher level of mobile money adoption. This shows the potential of mobile money to expand financial services to the unemployed and unbanked by promoting wider access to mobile phones.

Mobile money is mostly used to buy airtime, send and receive money and to a lesser extent to pay bills, to access saving, credit, and insurance products. Most adults in the region use mobile money to buy airtime, send or receive money and relatively a few of them use it for paying bills. Accessing saving, credit and insurance products through mobile money is a rarity implying that further innovation in the sector is needed to make various financial products available to the unbanked.

Lack of information is the most cited barrier to mobile money ownership. Most adults cite lack of information, lack of education, and absence of knowledge about mobile money as major barriers to mobile money adoption. This implies that financial education programmes aimed at enhancing people's attitude and understanding of mobile money will be important in promoting increased adoption among the financially excluded segments of the population.

Mobile money adoption is mainly determined by mobile phone ownership and remittances. While adoption of mobile money is positively affected by mobile phone ownership and remittances (both incidence and frequency), it is negatively affected by ownership of a bank account, usage of ATMs, mobile and internet banking.

Mobile money substitutes both formal and informal account ownership. Mobile money adoption is negatively related to bank account ownership and informal access which implies that mobile money serves as a substitute to both.

5. Implications for policy

Based on the foregoing conclusions, the following policy recommendations are proposed:

1. **Expanding mobile telecom infrastructure and hence increasing mobile phone penetration is important in extending financial services to the financially excluded segments of the population.** Mobile money is unlikely to succeed in Madagascar, the Democratic Republic of Congo, Malawi, and Mozambique unless mobile phone infrastructure is improved. Therefore, expansion of mobile telecom infrastructure should precede any effort to expand mobile money adoption in the countries.

2. **Mobile money should be expanded to rural people to increase financial inclusion.** Given that formal financial institutions are scarce in rural areas in many countries in the region, mobile money will be critical in extending financial products to the rural people that do not have access to ATMs, mobile and internet banking. Therefore, increasing mobile money adoption among the rural people by expanding mobile telecom and mobile money agent infrastructure will help in expanding financial inclusion to rural areas.

3. **Mobile money should be user-friendly so that the illiterate are comfortable using it.** Both the descriptive and regression analysis show that mobile money adoption is low among those with no education, which calls for designing mobile money applications in a manner usable by the uneducated.

4. **Financial education that focuses on utility of mobile money is important.** Lack of knowledge or information about mobile money is among the barriers to mobile money adoption. Therefore, mobile money literacy programmes that educate people about various mobile money products, their usefulness in managing money, and their effective usage should be designed and implemented.

5. **Introduction of new mobile money financial products will be critical in allowing the poor to access saving, credit, and insurance products.** Most adults in the region use mobile money to buy airtime and make remittances which constitute a fraction of financial products needed by people. Therefore, additional mobile money services such

as saving, credit, insurance, and investment products should be introduced to allow people to access various alternative financial products.

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Appendix A

Binary logistic regression model was used in which the probability of the dependent variable is described by the following function:

$$\pi_i = \frac{e^{z_i}}{1+e^{z_i}} \text{ or } z_i = \log\left(\frac{\pi_i}{1-\pi_i}\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

Where

π_i is the probability the ith person has a certain characteristic (this is the probability of using mobile money in the first model and probability of owning a bank account and informal access in the second and third model respectively)

z_i is the value of the unobserved variable for the ith person.

The logistic regression model assumes that z is linearly related to the predictors

$$z_i = b_0 + b_1 x_{i1} + b_2 x_{i2} + \dots + b_p x_{ip} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$

Where

x_{ij} is the jth predictor for the ith person that include ownership of mobile phone, usage of ATM/debit card, and demographic characteristics such as gender, income, age, place of residence, level of education, marital status, and employment status.

b_j is the jth coefficient

p is the number of predictors

The dependent variable in each model is dichotomous taking the values 1 or 0 otherwise. In the first model, the dependent variable is ownership of mobile money account and the value 1 is assigned to mobile money account owners and 0 otherwise. In the second model where we determine the relationship between mobile money account ownership and bank account ownership, bank account is the dependent variable taking a value of 1 when a person has a bank account and 0 otherwise. Informal access is the dependent variable in the third model where we examine the relationship between mobile money and informal inclusion with 1 assigned to those who have informal access and 0 otherwise.

Appendix B

Table 2: Descriptive statistics

Variable Name	Description	N	Min	Max	Mean
Own a cell phone	A person owns a cell phone	113,323,640	0	1	0.64
Own mobile money account	A person has mobile money account	91,634,689	0	1	0.15
Banked	A person own a bank account	126,843,162	0	1	0.35
Formally included	A person has account at a bank or other formal financial institution	134,972,612	0	1	0.53
Informal	A person has informal access	134,972,612	0	1	0.13
Financially excluded	A person does not have access to financial services either formal or informal	126,843,162	0	1	0.34
Have ATM/Debit card	A person uses ATM/Debit card	134,960,054	0	1	0.20
Use mobile banking	A person uses mobile banking	105,016,647	0	1	0.10
Use internet banking	A person uses internet banking	88,750,088	0	1	0.04
Sent money	A person sent money	134,972,612	0	1	0.18
Received money	A person received money	134,972,612	0	1	0.21
Sending frequency	Frequency of sending money (with weekly being most frequent and once in a year being less frequent)	11,626,336	1	10	3.09
Receiving frequency	Frequency of receiving money (with weekly being most frequent and once in a year being less frequent)	17,689,625	1	10	2.88
Age	Age of respondent	133,539,565	16	98	39
Gender	Respondent gender	134,972,612	0	1	0.48
Income	Categories of monthly personal income	106,558,774	1	3	1.5
Unemployed	A person is jobless	134,118,955	0	1	0.55
Employed	A person is employed	134,306,772	0	1	0.42

Retired	A person is retired	112 ,608, 431	0	1	0.02
Urban	A person lives in urban area	134 ,966, 284	0	1	0.41
Primary	A person has primary education	124, 011, 588	0	1	0.36
Secondary	A person has secondary education	124 ,011, 588	0	1	0.45
Post-secondary	A person has post-secondary education	124, 011, 588	0	1	0.08

Table 3: Logistic regression output: Determinants of mobile money ownership and the link between mobile money and financial inclusion

	Own mobile money account	Own Bank Account	Own informal account
Own cell phone	1.739***		
Own mobile money account		-0.033***	-0.331***
Have a bank account	-0.897***		
Age	0.006***	0.006***	0.112***
Age Square	-0.001***	-	-0.001***
Gender	0.043***	0.029***	-0.261***
Personal Monthly Income	-0.098***	0.884***	-0.017**
Primary school	0.314***	1.453***	-1.202***
Secondary school	0.412***	2.558***	-2.315***
Post-secondary school	0.323***	3.558***	-5.932***
Employed	0.889***	0.563***	-0.794***
Retired	-0.716***	2.153***	0.535***
Urban	0.086***	0.091***	-1.293***
Use ATM	-0.057***		
Use mobile banking	-0.613**		
Use internet banking	-0.215***		
Sent money	0.216***	1.037***	-3.351***
Received money	0.426***	0.349***	-0.463***
Sending frequency	-0.004***	0.027***	-0.059***
Receiving frequency	0.085***	0.085***	-0.05***
Country fixed effect	YES	YES	YES
N	134,972,612	134,972,612	134,972,612
Cox & Snell R^2	0.233	0.344	0.089

Note: *** *significant at 1% level,* * *significant at 10% level. Binary logistic regression estimation coefficients are reported.*