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Digital Financial Services & Gender:
An Analysis of Correlates of Awareness, Adoption, and Use

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Executive Summary

Access to financial services can enhance low-income households' ability to invest in their livelihoods, safeguard their assets, manage risks, smooth income, and escape poverty (Cull, Ehrbeck & Holle, 2014; Dupas & Robinson, 2013). Yet worldwide 35% of men and 42% of women remain unbanked (Demirgüç-Kunt et al., 2015).

Approximately half of the financially excluded population has access to a mobile phone, which may facilitate access to new digital financial services (DFS) such as mobile money (GSMA, 2015). Increasing access to and adoption of DFS-based technologies such as mobile money may therefore represent a significant opportunity for increasing financial inclusion. This potential may be especially great among the poor, and among rural, low-income women in particular, who in the past have been under-served by conventional bank-based financial services.

In this report we analyze three waves of the Intermedia Financial Inclusion Insights (FII) Survey, a nationally-representative household survey conducted in 2013/14, 2014, and 2015 in Kenya, Uganda, Tanzania, Nigeria, Pakistan, Bangladesh, India, and Indonesia. We examine trends in mobile money awareness (defined as knowing the name of any mobile money provider), adoption (defined as having ever used mobile money), and use (defined as use in the last 90 days). We run multiple logistic regressions using pooled survey data and country and wave fixed-effects to explore sociodemographic and economic factors associated with mobile money adoption, awareness, and use across countries and over time. Finding significant cross-country differences, we run country-specific regressions to examine potential variation in factors associated with mobile money awareness, adoption, and use in different country contexts. Finally, we also run logistic regressions separately for women in the sample using pooled cross-wave data and country-specific data to analyze factors associated with mobile money awareness, adoption, and use specific to women respondents.

We find that sociodemographic factors possibly influencing awareness and adoption of mobile money vary between countries in Africa and countries in Asia, with less drastic within-region differences. Kenya has the greatest proportion of overall mobile money awareness, adoption, and use while Nigeria, India, and Indonesia have the lowest. Rural respondents and respondents below the Progress out of Poverty Index (PPI) score have statistically significant negative associations with awareness and adoption for each survey wave and for most countries, consistent with less reach of mobile money in these populations. Indicators of education, including level of education acquired and literacy, have a positive association with awareness and adoption across countries and across survey waves. Phone ownership and having a bank account are consistently strongly associated with awareness, adoption, and use of mobile money; and the effects of these factors are the largest in terms of magnitude for mobile money adoption and use.

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Women have consistently lower levels of awareness, adoption, and use than men across countries. Even controlling for other sociodemographic and economic factors, we find that being female is associated with an overall lower likelihood of awareness of mobile money, though the association is not significant in countries with very high overall awareness levels (Kenya, Tanzania, Uganda) and very low awareness levels (Indonesia). Across all countries, women who are aware of mobile money are also less likely to adopt mobile money than are aware men, with the negative effect of gender increasing in each wave. Gender does not have a significant association with the use of mobile money among those that have adopted it, however, which suggests that barriers to first-time use may be the most important for women's access to mobile money. One exception is Pakistan, where women who have adopted mobile money are 10 percentage points less likely to have used mobile money in the last 90 days compared to men.

The factors associated with mobile money awareness, adoption, and use, are broadly similar between women and men. The magnitude of the associations with demographic characteristics and economic factors are generally smaller for women than for men, especially in their association with awareness. While having a bank account is similarly associated in separate men's and women's regressions and phone ownership has a greater magnitude association with adoption among women, women in all FII survey countries are less likely than men to own mobile phones, own mobile phones with accompanying SIM cards, or have bank accounts.

These findings indicate that to realize the potential of DFS to reach currently unbanked populations and increase financial inclusion, particular attention needs to be paid to barriers faced by women in accessing mobile money. While policies and interventions to promote education, employment, phone ownership, and having a bank account may broadly help to increase mobile money adoption and use, potentially bringing in currently unbanked populations, specific policies targeting women may be needed to close current gender gaps.

Introduction

Access to financial services can enhance low-income households' ability to invest in their livelihoods, safeguard their assets, manage risks, smooth income, and escape poverty (Cull, Ehrbeck & Holle, 2014; Dupas & Robinson, 2013). Broad financial inclusion is also associated with positive systemic effects on economic growth and employment (Dupas & Robinson, 2013). However, it is estimated that over two billion adults in low- and middle-income countries (LMICs) have no access to a formal bank account (Demirgüç-Kunt et al., 2015). A large proportion of this financially excluded population resides in sub-Saharan Africa and South Asia (*ibid.*). Women are disproportionately represented among the financially excluded: the World Bank's 2014 Global Findex Database reports that 42% of women are unbanked compared to 35% of men (Demirgüç-Kunt et al., 2015).

Approximately half of the financially excluded population worldwide has access to a mobile phone, which may facilitate accessing digital financial services such as mobile money (GSMA, 2015). Increasing access to and adoption of digital financial services in LMICs countries may therefore represent a significant opportunity for policymakers to increase financial inclusion among the poor, and among low-income women in particular (Aron, 2017; Villasenor, West, & Lewis, 2015).

Digital financial services (DFS) systems require relatively modest resources to build out, as compared to traditional financial services that require large banking networks of formal brick and mortar buildings to act as points of service. This allows financial systems to develop more cheaply in countries with limited physical infrastructure or large rural areas (World Bank, 2016). Furthermore, compared to traditional financial services, DFS allow for greater financial flexibility and control for low-resource individuals by facilitating less burdensome person-to-person transactions, allowing users to transact more easily within existing social networks as well as with the formal financial system (*ibid.*). Due to this expanded reach, Manyika et al. (2016) estimate that DFS has the potential to reach 1.2 billion unbanked people, with over half being women.

Continuing gender disparities in DFS use suggest many women face barriers to realizing the purported benefits of expanding DFS availability. The primary aim of this analysis is to empirically investigate the relationship between gender and mobile money awareness, adoption, and use, as well as to identify other key demographic and contextual characteristics associated with expanding DFS uptake in low-income countries.[1] We use data from three nationally-representative waves of the Financial Inclusion Insights (FII) survey (2013, 2014, and 2015) for four sub-Saharan African countries (Kenya, Nigeria, Tanzania, and Uganda) and four South Asian countries (Bangladesh, India, Indonesia, and Pakistan) to explore trends in awareness, adoption, and use among different sub-populations over time, and to identify demographic correlates of these outcomes.

The paper is structured as follows. We first present additional background on DFS and mobile money, and review adoption models and specific studies that explore the relationship between gender and DFS. We then describe the data, provide descriptive statistics, and outline the analytical methods including theoretical justifications for the model variables and a summary of statistical methods. Next, we present the results, looking separately at awareness, adoption, and use of mobile money for both the pooled sample of countries

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[1] Awareness is defined as knowing the name of any mobile money provider. Adoption is defined as having used mobile money at least once. Use is defined as having used mobile money in the last 90 days.

and for each country individually. We conclude by summarizing the implications of study findings for policy aiming to increase financial inclusion through MM, particularly for women.

Background

The high upfront cost of landline phone installation and relatively minimal public regulation of mobile cellular services has prompted many developing countries to rely on cellular networks (Must & Ludewig, 2010). As a result, in some countries such as Bangladesh, Nigeria, and Uganda less than 1% of the population has a working landline connection, whereas mobile phone ownership rates are approximately 50%, 89%, and 65%, respectively (GSMA, 2014; Pew Research Center, 2015a; Pew Research Center, 2015b). Across emerging and developing economies, the median mobile phone penetration rate is 84% (Pew Research Center, 2015a). But the high penetration of mobile coverage and phone ownership rates in developing countries is not matched by access to formal financial services (GSMA, 2015). Services offered by formal financial institutions, often with high transaction costs, rarely accommodate low-income customers who are more likely to transact frequently and in small amounts (Mas, 2011).[2] Digital financial services, offering relatively lower costs and accessibility, have recently begun to fill this financial access gap in developing countries (Villasenor, West, & Lewis, 2016).

DFS use mobile devices as the point-of-service for financial transactions that would usually occur through a bank. DFS systems range in complexity from Short Message Services (SMS) that store money on an individual's phone account to robust services that offer advanced interfaces via smart phones and financial options such as loans and credit systems (Perlman, 2017). In 2007, Kenyan cell phone company Safaricom launched an SMS-based money transfer system, M-PESA. Within four years of its launch, three-quarters of households had at least one user (Jack & Suri, 2014). Consumers in low- and middle-income countries are increasingly accessing DFS offerings beyond mobile money, as in Kenya where—as of 2015—one in five Kenyans (4.5 million people) were using Safaricom's M-Shwari digital credit product (Cook & McKay, 2015). Following the success of M-PESA, digital financial services have spread to many countries in both sub-Saharan Africa and South Asia.

Mobile money, the most widely known digital financial service and the focus of this paper, enables mobile phone users to perform financial and banking functions related to money storage and transfer such as peer-to-peer transfers, long-distance remittances, and bill payments (Donovan, 2012). The Groupe Speciale Mobile Association (GSMA), an international industry group for mobile operators, estimates that in December 2016 there were 556 million registered mobile money accounts (79.4% of which were in Sub-Saharan Africa or South Asia) and 174.1 million active accounts[3] (80.7% of which were in Sub-Saharan Africa or South Asia) (GSMA, 2017). In 2016, the total value of transactions was $22.4 billion and the total volume of transactions was 1.31 billion (*ibid.*). Mobile money accounts reportedly outnumber traditional bank accounts in markets such as Kenya, Tanzania, and Uganda (Mirani, 2014).

An emerging and growing body of literature analyzes the effects of DFS on household welfare in developing countries (Kikulwe et al., 2014; Munyegera & Matsumoto, 2014). Most studies highlight the potential for DFS to reduce transaction costs for services such as savings, debt repayment, and remittances. For instance, Morawczynski (2009) finds that M-PESA customers who send money domestically spend up to 20% less than physically sending money via an intermediary using bus services and up to 40% less than sending money via the post office. Aker et al. (2013) also find travel time and cost savings for households, calculating that administering social transfers via mobile phones saves recipients significant time and money spent travelling to receive a manual cash transfer. Further, DFS allows users to store money digitally rather than in illiquid assets

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[2] Transaction costs refer to the cost, in time and money, for a consumer to use a service or per form an action.
[3] "Active" defined as using money mobile within a 90-day period.

such as livestock or insecure cash hidden in the home. Greater liquidity of wealth may enable households both to respond more quickly to crises that require cash and to smooth their consumption during unforeseeable shocks, including drought, unemployment, or illness (Aron, 2017). Suri & Jack (2014) find that Kenyan mobile money users are better able to cope with negative shocks than those without digital financial services, attributing these effects to lower remittance transfer costs that enable households to maintain consumption levels in times of need. Providers also reduce their costs through DFS, making it more profitable to offer financial services in previously unprofitable areas: using agents and digital channels is estimated to reduce costs by up to 90 percent compared to conducting transactions in physical branches of financial service providers (Voorhies, Lamb, & Oxman, 2013).

Some authors argue that lower financial service costs associated with mobile money have increased the number of people with access to financial services across sub-Saharan Africa and South Asia (Alampay & Bala, 2010; Duncombe & Boateng, 2009). Several studies suggest that benefits of access to credit, savings and loans are amplified for previously unbanked individuals and households, as these financial services can help low-income households fund income-generating activities and build assets, for example, education or training to improve employment prospects, improved housing, or investing in new enterprises (Alampay & Bala, 2010; Duncombe & Boateng, 2009; Jenkins, 2008). Researchers also report that mobile payment systems are linked to improved access and lower transaction costs for poor, rural, less-educated, and unbanked customers and may serve as a stepping stone to formal financial services (IBRD, 2012; Must & Ludewig,, 2010; Pickens, Porteous, & Rotman, 2009; Scott et al., 2004). In many cases, the poor are able to use mobile money to improve their livelihoods (IBRD 2012; Must & Ludewig 2010), through increased access to financial services as well as increased and more efficient flows of remittances and government transfers (Pickens, 2009). Hanouch & Parker (2013) find that DFS can increase the reach and affordability of microloans by reducing labor-intensive loan disbursement and debt collection costs for lenders. Ledgerwood, Earne, & Nelson (2013) report that the reduced transaction costs owing to digital financial services could enable micro financial institutions to reach more low-income rural markets and women.

Women in particular may benefit from DFS since they are less likely to have a formal bank account or borrow money (Demirgüç-Kunt et al., 2015). Digital services are less visible than cash, possibly enabling some women to discretely shield funds from the community and other household members (Jack & Suri, 2011). In Uganda, Davidsson & Anderson (2015) observe that mobile money helps women combat patriarchal societal norms and male-dominated marriages in which they have less autonomy, bargaining power, and control over household financial resources. A recent study by Suri and Jack (2016) estimates that mobile money adoption has enabled 194,000 Kenyan households to escape poverty, with poor women and members of female-headed households benefitting disproportionately. The authors report that access to mobile money has been associated with a shift in women's labor out of agriculture and into business or sales.

Despite the benefits of digital financial services, the number of mobile money users remains low in many developing countries, particularly among women. Intermedia's Financial Inclusion Insights (FII) surveys, the source of the data for this paper, collect information on mobile money and digital financial services in eight sub-Saharan and South Asian countries. They highlight substantial gender disparities in mobile money adoption across six of these eight countries (Intermedia, 2016). The largest country-level disparity was observed in Uganda, where 47% of men were financially included compared to 32% of women. Wide financial inclusion disparities are also observed between men and women in Nigeria (a 14 percentage point gap), Bangladesh (a 10 percentage point gap), and Tanzania (a nine percentage point gap). Earlier adoption data from the same countries suggests these gender-based digital financial service disparities have tapered but still persist (Intermedia, 2016).

Technology Adoption Models

To inform our analysis, we reviewed the technology adoption models applied in the DFS literature to date. In a recent review, Shaikh & Karjaluoto (2015) find 11 different technological and socio-psychological adoption theories. Among these, they find eight drivers commonly evidenced in mobile banking research: perceived ease of use, perceived usefulness, trust, social influence, perceived risk, perceived behavioral control and self-efficacy, compatibility with lifestyle and device, and facilitating conditions (including perceived cost and relative advantage). While most studies opt for a single adoption model, a large number extend, combine, or adapt existing models. The three most commonly utilized models identified by Shaikh & Karjaluoto (2015) are the Technology Acceptance Model (TAM), the Diffusion of Innovation (DOI) theory, and the Unified Theory of Acceptance and Use of Technology (UTAUT). In a review of mobile payment adoption research, Slade, Williams, & Dwivedi (2013) find that studies utilizing the TAM, which emphasizes perceived usefulness and ease-of-use as adoption drivers, or an adaptation of this model explain from between 50% (Riquelme & Rios, 2010) to 84% of variance in behavioral intention to adopt (Schierz et al., 2010). In a study of mobile money adoption in Ghana, Tobbin & Kuwornu (2011) use constructs from both the TAM and DOI theory, which empathizes human and social capital as key elements in adoption and use. The authors find that perceptions of mobile money's relative advantage over cash or traditional money transfer methods, perceived ease of use, perceived usefulness, and trialability are significant predictors of adoption.

Venkatesh et al. (2003) propose the UTAUT that integrates elements of eight prominent technology adoption models. Tested separately, they find that these eight models explain 53% of the variance in intent to use information technology, whereas their unified model explains 70% of the variation when applied to the same database. Unlike prior models, the UTAUT meaningfully incorporates demographic variables (e.g., gender and age), but only as factors that moderate the impact of the primary drivers of user behavior rather than as determinants of behavior. Other factors such as socio-cultural variables may also be a key determinant of adoption and use behavior. Bankole, Bankole, & Brown (2011) find that culture is the most important factor influencing the adoption behavior of mobile banking users in Nigeria. In Ghana, Crabbe et al. (2009) find that socio-cultural factors such as perceived credibility of banking agents and perceived elicitation of technology significantly influence mobile banking adoption decisions.

Dahlberg, Guo, & Ondrus (2015) find that "demographics" is the only adoption factor considered largely unimportant by researchers before 2007 that is now considered among the top 10 explanatory factors for mobile payment adoption, reporting that demographic factors drive and moderate behavioral adoption decisions. Teo et al. (2012) add age, education, gender, income, and subjective norms to the TAM to assess intentions to adopt mobile banking in Malaysia, finding that income is positively correlated with perceived usefulness while being male (gender) and higher levels of education are positively associated with perceived ease of use. Similarly, in a study conducted in Kenya on M-PESA, Mbiti & Weil (2011) identified age, level of education, standard of living, and where people lived as associated with m-banking adoption. Porteous (2007) finds that both early adopters and continued users of mobile banking in South Africa tend to have higher levels of education and wealth than the average South African with a bank account.

Many empirical studies include gender as a factor predicted to be associated with DFS adoption and use, though few of these studies explore this relationship in detail. Country-level evidence offers insight into the relevant factors that may create or remove barriers to women's adoption and use of mobile money. For instance, Jack & Suri (2011) find that use of M-PESA in Kenya for savings is increasing, but much more slowly for late adopters. The authors characterize these late adopters as having lower consumption levels and less education, and as being predominantly women.

In many low-income countries, women on average have lower literacy rates than men, meaning they are less likely to be able to read educational or marketing materials promoting awareness of digital financial services (Gigler, 2015; Scharwatt & Minischetti, 2014; GSMA, 2013). Mobile money interfaces are also often written in English or in the formal style of a local language that may challenge low-literacy consumers, creating an additional barrier to adoption (McKee, Kaffenberger, & Zimmerman, 2015; Medhi et al., 2011). Lower educational attainment levels may also affect women's confidence in their ability to use technology. GSMA (2015) finds that women have greater insecurity and self-doubt in their technological knowledge and ability to use technology, potentially contributing to lower mobile money adoption and use rates.

Financial Inclusion Insights data (2014) also show large disparities between men and women in mobile phone and sim card ownership, likely representing an important barrier to mobile money adoption. For example, in Pakistan, twice as many men own mobile phones as women. These trends may be the product of the high costs of mobile phones, which are less affordable for women, or social norms such as segregation (Scharwatt & Minischetti, 2014). Higher household work burdens and childcare duties for women may leave them with less time with which to access mobile money agents to set up an account or to perform transactions (*ibid.*). Further, women who own or have access to a mobile phone may require permission from men to use the device or face negative social stigma for use, reinforced by women's negative perceptions of their own technological literacy (Siegmann, 2009).

The Grameen Foundation (2013) finds that women in India are more likely than men to be confined to their homes and rely on others for information, thereby reducing their likelihood of DFS awareness. Onyia & Tagg (2012) claim that employment is a factor in women's lower digital financial services adoption rates. The authors argue that women have less need for digital financial services as they are less likely to have a regular income from employment. In many countries, women are also less likely than men to have official identification documents needed to access digital financial services under Know your Customer (GSMA, 2013; Scharwatt & Minischetti, 2014).

We contribute to the literature on DFS adoption by building on existing theories of technology adoption to analyze the association between gender and mobile money awareness, adoption, and technology. We explore both whether gender is a significant predictor of these mobile money outcomes while controlling for a variety of additional individual and contextual factors, and whether the factors associated with mobile money outcomes differ for women than for men.

Methods

This report uses data from the first three waves of the Intermedia Financial Inclusion Insights (FII) Survey, a nationally-representative household survey conducted in 2013/14, 2014, and 2015 in Kenya, Tanzania, Nigeria, Uganda, Bangladesh, India, Indonesia, and Pakistan. The survey included 72,023 respondents in Wave 1, 78,083 respondents in Wave 2, and 78,092 respondents in Wave 3 (Table 1). Indonesia was not included in Wave 1 but was included in subsequent surveys.

Table 1. Sample sizes by survey wave and country

	Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Pakistan	Indonesia	Total
Wave 1	3,000	6,002	2,997	3,000	6,000	45,024	6,000	N/A	**72,023**
Wave 2	2,995	6,000	3,000	3,001	6,000	45,087	6,000	6,000	**78,083**
Wave 3	2,994	6,001	3,001	3,000	6,000	45,036	6,000	6,060	**78,092**
Cross-Wave	8,989	18,003	8,998	9,001	18,000	135,147	18,000	12,060	**228,198**

Note: Sample sizes vary by country, with larger samples in countries with larger populations to support the goal of including a nationally-representative cross-section. The respondents are not tracked from wave to wave; rather, a new cross-section

of respondents is surveyed in each wave.

The FII Survey is a cross-sectional, multi-stage stratified, clustered and randomized household survey of adults aged fifteen and over based on regional proportional distributions as determined by the most recently available national census data in each country. Samples were selected independently for each survey wave in each country, with no attempt to survey respondents from previous waves, and sample weights were assigned to proportionate census-based urban-rural and demographic breakdowns (Intermedia, 2016).

Interviewers used paper questionnaires to collect data that were entered into a central database by Intermedia staff. For each wave, data were collected on the sociodemographic characteristics of both individuals and households, including age, sex, income, literacy and numeracy, marital status, highest level of education, employment status, and other factors hypothesized to be associated with access to mobile money (MM), including mobile phone ownership, having a bank account, and having an official form of identification (ID). Weighted descriptive statistics for these variables are presented in frequency and percentages in Table 2.

All three waves contain questions on awareness, adoption, and use of MM. To measure awareness, all respondents were asked, "*Have you heard of something called MM?*" Respondents who answered in the affirmative were asked to spontaneously recall the name of a MM provider ("*Please tell me the names of any MM services you are aware of*"). Respondents who answered negatively were then asked, "*Have you ever heard about the following MM services?*" and were "prompted" with the names of regional MM providers. We therefore measure MM awareness using two dichotomous variables: general awareness of the concept of MM and recognition of the names of specific service providers.

We measure adoption of MM using the survey question "*Have you ever used MM for any financial activity?*" Respondents were asked this question if they were able to identify the name of at least one MM provider, either spontaneously or when prompted with the name of a regional provider. As a result, this variable represents the number of people who used MM at least once among respondents who were aware of any MM provider and represents any adoption of the technology, as opposed to sustained use.

Finally, respondents who had ever used MM for any financial activity were asked, "*Apart from today, when was the last time you conducted any financial activity using this MM service*?" We defined current users of MM as respondents who had used MM at least once in the previous 90 days regardless of frequency of use.

We first tested for statistical differences in sociodemographic characteristics of respondents among countries in Wave 3 (2015), before presenting weighted descriptive statistics on awareness, adoption, and use within sub-populations within countries in Wave 3. We then ran logistic regressions using pooled data to examine the associations between social and economic factors and awareness, adoption, and use of MM. To account for between-country heterogeneity in sample sizes, sub-population sizes, and other contextual factors, we controlled for survey country in the regression models. We also conducted multiple logistic regression analyses individually for each country, controlling for wave. The estimated regression model was:

$$Y_{dfs} = \beta_0 + \text{female}\beta_1 + \text{age}\beta_2 + \text{married}\beta_3 + \text{literate}\beta_4 + \text{numerate}\beta_5 + \text{education\_level}\beta_6 + \text{employment}\beta_7 + \text{ppi\_cutoff}\beta_8 + \text{phone\_own}\beta_9 + \text{bank\_account}\beta_{10} + \text{official\_id }\beta_{11} + \text{rural}\beta_{12} + \text{country}\beta_{13} + \text{wave}\beta_{14} + \varepsilon$$

Y_{dfs} is a binary variable taking the value of 1 if respondents answered "Yes" to being aware of mobile money, ever using mobile money, or using MM in the last 90 days and 0 otherwise. The coefficient β_1 is the main coefficient of interest, as it represents the mean marginal effect of gender on the outcome of interest, controlling for the other specified factors. The remaining variables include other sociodemographic characteristics, economic factors, and country and wave dummy variables. The majority of these variables are

binary except for age and education level, which are continuous and categorical, respectively. Education level is based on the respondent's highest level of education. The levels of education were country specific and re-categorized as no formal education, some primary education, some secondary education, or any higher education. The *employment* dummy variable takes a value of 1 if the respondent is employed part-time, occasionally, seasonally, full-time or self-employed. The *ppi_cutoff* variable is a poverty dummy variable based on the Progess out of Poverty Index (PPI) cutoff point of living below $2.50 per day (in purchasing power party terms). A codebook with descriptions of all variables used in the analysis is included in Appendix A.

Results

Table 2 presents weighted sociodemographic statistics for Wave 3 (2015) by country. Women composed approximately 50% of the population in all countries, with the lowest percentage of female respondents in Pakistan (46.8%) and the highest in Uganda (54.2%). There were statistically significant differences (p<0.001) in proportion by country for all of the categorical variables included in the regression model, as well as a difference by ten-year age group. The mean age of respondents in Asian countries was 36.4, while the mean age in African countries was 34. In Africa, the proportion of respondents living under the poverty line of $2.50 per day was much lower in Kenya (48.8%) than in Nigeria (88.2%), Tanzania (83.4%), and Uganda (73.3%). In Asia, India had the highest percentage of respondents living under the poverty line (77.5%), followed closely by Bangladesh (76.7%).

Table 2. Wave 3 (2015) weighted sociodemographic characteristics by country, percent of the total

		Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Pakistan	Indonesia
Weighted sample (n)		2,994	6,001	3,001	3,000	6,000	45,036	6,000	6,060
Demographics									
Female*		51.02	49.96	50.63	54.23	48.96	48.90	46.78	51.12
Mean age (frequency)		33.43	33.29	35.78	34.53	34.57	36.65	34.46	38.54
Age	15 – 24	36.05	34.93	24.31	34.61	30.49	27.88	27.93	22.53
	25 – 34	25.96	26.74	29.01	23.42	26.09	22.76	29.18	22.09
	35 – 44	15.81	16.98	21.99	17.75	18.94	18.88	17.02	21.06
	45 – 54	9.84	10.84	13.33	11.93	11.10	13.33	15.05	16.14
	55+	12.34	10.51	11.37	12.29	13.38	17.16	10.82	18.19
Married*		55.82	49.60	62.34	53.39	76.32	69.66	70.77	62.39
Literacy*		82.67	78.42	84.05	56.67	59.65	66.17	64.61	95.12
Numeracy*		97.68	95.62	95.93	79.73	97.69	95.47	94.57	97.90
Education*	No formal ed.	8.57	9.68	9.53	13.63	25.98	29.09	31.55	3.50
	Primary ed.	43.46	14.23	66.09	47.83	25.57	30.23	21.82	58.49
	Secondary ed.	37.85	56.11	21.23	32.80	34.54	30.38	34.22	31.11
	Higher ed.	10.12	19.98	3.15	5.73	13.92	10.30	12.42	6.90
Economic Factors Influencing Access									
Employed*		60.50	59.59	79.37	70.23	43.02	49.50	39.00	55.60
Below PPI Cutoff*		49.84	88.21	83.38	73.26	76.68	77.51	50.36	60.34
Owns a phone*		75.84	85.47	76.67	55.21	64.00	59.65	58.65	62.06
Owns a SIM card*		79.11	85.84	79.21	58.16	39.93	41.45	55.89	62.15
Owns a phone & SIM*		75.12	84.60	75.79	54.54	39.79	40.32	55.53	61.90
Owns phone & no SIM*		0.96	1.02	1.14	1.21	37.83	32.40	5.31	0.25
Has a bank account*		27.85	37.25	9.41	11.62	19.04	66.14	8.72	24.10
Has an official ID*		93.09	88.81	94.29	82.55	99.03	98.36	94.61	99.77
Other Contextual Factors									
Rural residence*		63.92	57.0	70.90	74.85	67.56	67.47	66.25	48.02

*Statistically significant differences across countries at a level of p<0.001 by Pearson's Chi2 test for equal proportions.

Literacy (56.7%) and numeracy (79.7%) were lower in Uganda than in other African countries, as was the percentage of respondents with no formal education (13.6%). With the exception of Uganda and Indonesia,

literacy rates were lower in Asia than in sub-Saharan Africa, ranging from 59.7% in Bangladesh to 66.2% in India. Indonesia had the highest literacy rate (95.1%) and the lowest percentage of respondents with no formal education (3.5%). Bangladesh (26.0%), India (29.0%), and Pakistan (31.6%) had higher percentages of respondents with no formal education (Figure 1), accompanied by low literacy rates in all three countries.

Figure 1. Wave 3 educational attainment by country, weighted percentage of the total
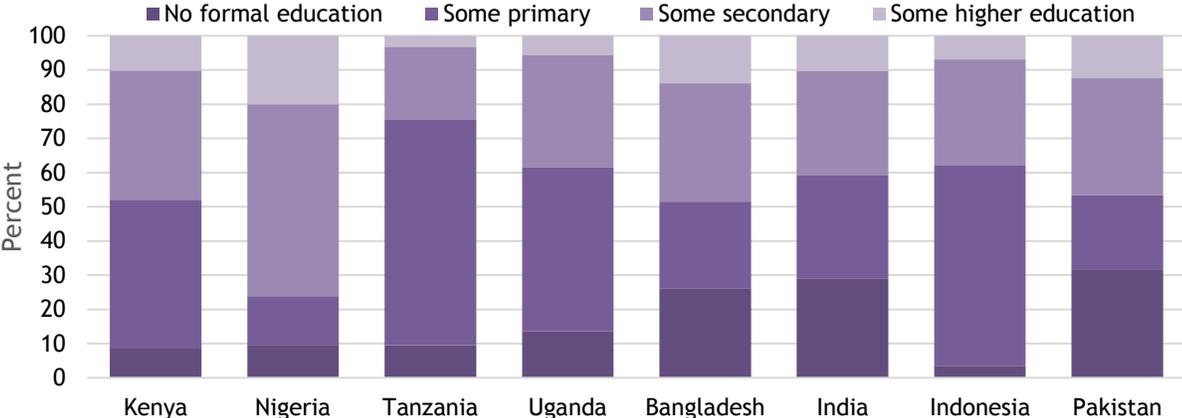
The majority of respondents in all countries had an official form of ID (Figure 2), ranging in Africa from 82.6% in Uganda to a high of 94.3% in Tanzania. The percentage of respondents with official ID was higher in Asian countries than in African countries, ranging from 98.4% in India to 99.8% in Indonesia, indicating that access to an official form of ID may not be a primary barrier to MM access in these Asian countries.

Figure 2. Wave 3 weighted descriptive statistics for access variables by country, percent of the total
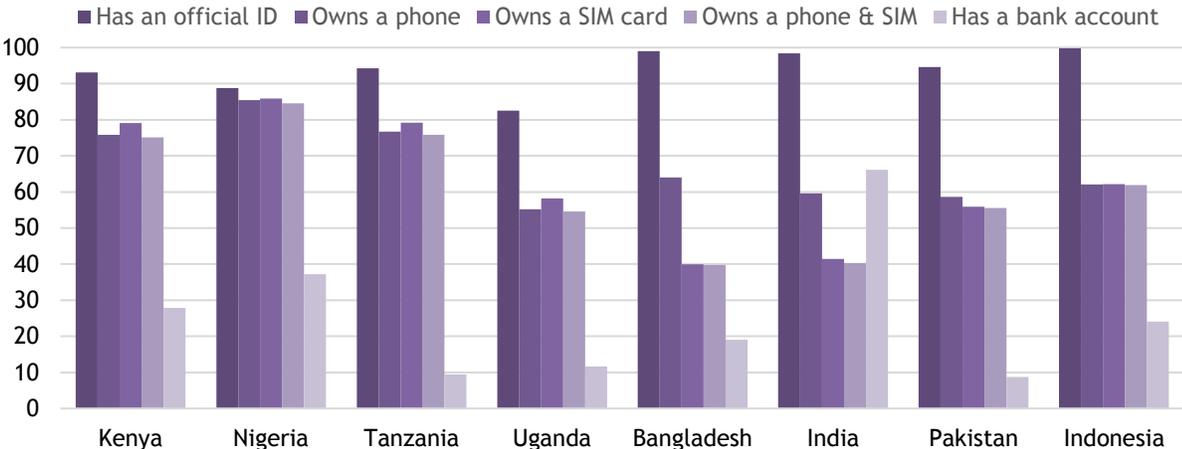
Levels of mobile phone and SIM card ownership were high in all African countries except Uganda, with phone ownership ranging from 75.8% of respondents in Kenya to 85.5% in Nigeria (Figure 2). In Uganda, however, only 55.2% of respondents owned a mobile phone. In comparison to Kenya, Nigeria, and Tanzania, percentages of phone and SIM card ownership in Asia were low. At 64%, Bangladesh had the highest percentage of phone owners in Asia and, at 62%, Indonesia had the highest percentage of SIM card owners.

In all African countries, over 98% of respondents who owned mobile phones also owned active or working SIM cards. However, large percentages of phone owners in India (37.8%) and Bangladesh (32.4%) did not own

accompanying SIM cards. In India, 91.6% percent of mobile phone owners without SIM cards stated that they had access to an active or working SIM, either by borrowing or paying to use one, but in Bangladesh, only 63.6% of respondents who owned phones but not SIM cards stated that they had access to a SIM (results not shown). Because of the collinearity between phone and SIM card ownership in the majority of countries, we excluded SIM card ownership from the regression analyses.

The percentage of respondents with bank accounts was low in all African countries but varied, from only 9.4% of respondents with a bank account in Tanzania to 37.2% in Nigeria. At 66.1%, India had the highest percentage of respondents with a bank account of all countries, and Pakistan, at 8.7%, had the lowest. Because of these differences in respondent characteristics across countries, we conduct our analysis both for the pooled sample of FII respondents, controlling for country, and for each country separately.

Table 3. Wave 3 (2015) weighted sociodemographic characteristics for women by country, percent of total

		Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Pakistan	Indonesia
Total sample size (n)		1528	2998	1519	1627	2937	22024	2807	3098
Mean age (frequency)		31.73	31.78	33.68	34.77	33.55	36.70	34.40	38.00
Age	15 – 24	37.48	38.87	27.88	33.23	31.87	27.20	24.30	21.45
	25 – 34	28.47	26.64	30.32	24.09	28.15	23.05	32.94	22.46
	35 – 44	16.06	16.46	22.69	18.25	17.75	18.90	17.41	20.83
	45 – 54	9.74	9.03	11.12	12.08	10.83	13.07	15.37	16.25
	55+	8.24	9.00	7.98	12.36	11.41	17.78	9.99	19.01
Married*		57.72	52.60	60.30	53.17	82.63	72.35	74.44	64.55
Literacy*		80.66	73.65	80.72	47.32	57.10	57.25	55.04	93.8
Numeracy*		96.86	94.41	95.40	73.58	96.55	92.68	92.04	97.35
Education*	No formal ed.	10.15	12.38	12.31	18.52	27.72	38.79	39.25	4.48
	Primary ed.	46.31	15.71	65.61	49.79	25.66	28.92	22.71	62.22
	Secondary ed.	35.49	55.29	20.42	28.32	37.22	25.09	28.44	26.38
	Higher ed.	8.05	16.62	1.66	3.37	9.39	7.20	9.60	6.92
Economic Factors Influencing Access									
Employed*		53.72	48.08	71.95	64.17	8.49	22.32	5.44	35.09
Below PPI Cutoff*		51.77	90.74	85.47	71.67	79.85	79.61	49.10	59.59
Owns a phone*		70.76	80.07	69.76	46.43	47.89	43.92	36.07	55.44
Owns a SIM card*		75.61	80.53	73.22	49.06	24.60	22.18	33.36	55.44
Owns a phone & SIM*		70.42	79.04	68.77	45.88	24.45	21.19	32.77	55.27
Owns a phone & no SIM*		0.47	1.29	1.42	1.18	48.96	51.75	9.15	0.32
Has a bank account*		20.06	29.91	7.48	6.98	14.42	60.99	6.03	20.86
Has an official ID*		91.57	84.84	92.92	79.44	98.76	97.70	91.07	99.72
Other Contextual Factors									
Rural residence*		62.96	51.95	64.53	74.15	67.58	67.76	61.44	46.95

*Statistically significant differences across countries at a level of p<0.001 by Pearson's Chi2 test for equal proportions.

Table 3 presents weighted sociodemographic statistics among female respondents for Wave 3 (2015) by country. Comparing these summary statistics to those for sample of male respondents (not presented), we observe that women were slightly poorer on average, with higher percentages of women living below the poverty line in Kenya, Nigeria, Tanzania, India, and Bangladesh. In all countries, the employment rate was lower among women than men—only 8.5% of women in Bangladesh and 5.4% of women in Pakistan reported paid employment, compared to 76.1% and 68.5%, respectively, of men. More women than men were married in

all Asian countries. Levels of literacy and numeracy were lower among women, with especially large literacy gaps in Uganda, India, and Pakistan. Women more frequently had no formal education than men, and in all countries women were less likely to have an official form of ID, own a mobile phone, own a mobile phone with an accompanying SIM card, or have a bank account. As a result of these differences, we conduct separate analyses of the correlates of mobile money outcomes for the sample of female respondents only following our main analyses of the full sample.

Awareness of Mobile Money

Table 4 presents weighted descriptive statistics representing the percentage of respondents within sub-populations who were aware of MM in 2015. Levels of awareness were consistently high in East Africa, ranging from 97.0% in Kenya to 90.4% in Uganda. Nigeria, India, and Indonesia had the lowest levels of awareness overall, and we observe lower levels of awareness among women than men in all countries. The largest disparity between men and women was in Pakistan, where the percentage of women aware of MM was 14.0 percentage points lower than the percentage among men, and the smallest disparity was in Tanzania, where the difference in awareness between men and women was only 3.4 percentage points.

Table 4. Wave 3 (2015) weighted descriptive statistics, percent aware of MM among sub-populations by country

		Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Pakistan	Indonesia
Total aware (n)		2,905	682	2,757	2,713	5,529	4,599	4,331	490
Total aware (%)		97.02	11.37	91.88	90.44	92.15	10.21	72.18	8.09
Demographics									
Female		96.64	9.07	90.22	87.72	88.40	5.89	64.73	7.56
Male		97.41	13.67	93.58	93.67	95.74	14.35	78.73	8.64
Age	15 - 24	97.17	11.55	92.99	93.58	96.20	16.30	80.48	13.64
	25 - 34	97.80	14.75	93.72	94.49	95.49	12.52	74.25	10.58
	35 - 44	96.42	11.36	92.31	89.44	93.07	8.29	70.24	7.46
	45 - 54	97.63	8.19	91.17	90.40	88.77	5.61	64.84	4.26
	55+	95.21	5.23	86.16	75.37	77.90	2.95	58.44	1.91
Married		97.33	8.25	90.72	89.76	91.74	7.29	69.59	5.60
Single		96.62	14.45	93.79	91.22	93.47	16.93	78.45	12.21
Illiterate		92.61	1.03	80.32	82.14	84.51	1.12	52.72	1.44
Literate		97.94	14.22	94.07	96.79	97.32	14.86	82.84	8.43
Innumerate		88.42	4.70	77.52	82.49	54.26	0.05	50.95	-
Numerate		97.22	11.68	92.49	92.46	93.05	10.69	73.40	8.26
Education	No formal ed.	92.97	0.13	76.56	70.61	81.19	0.36	50.76	0.87
	Primary ed.	96.82	2.46	91.97	89.88	93.11	4.51	70.01	2.25
	Secondary ed.	97.79	10.15	97.50	97.80	96.80	16.47	85.37	13.62
	Higher ed.	99.34	28.42	98.56	100.00	99.38	36.21	93.64	36.21
Economic Factors Influencing Access									
Unemployed		96.12	11.17	93.26	88.68	90.00	10.31	68.55	7.73
Employed		97.60	11.51	91.52	91.19	94.99	10.11	77.85	8.37
Below PPI Cutoff		95.30	10.07	90.93	88.00	90.93	6.25	62.82	3.98
Above PPI Cutoff		98.73	21.11	96.64	97.15	96.17	23.86	81.67	14.34
Does not own phone		93.70	2.11	79.94	82.57	83.82	2.70	53.06	1.20
Owns a phone		98.07	12.95	95.51	96.83	96.84	15.29	85.66	12.30
No bank account		96.22	4.27	91.19	89.47	90.78	5.51		4.13
Has a bank account		99.07	23.33	98.51	97.81	97.96	12.62		20.56
No official ID		95.14	3.36	82.05	85.55	88.88	2.15	57.06	-
Has official ID		97.15	12.38	92.47	91.48	92.18	10.35	73.04	8.11
Other Contextual Factors									
Rural		96.04	7.16	90.20	88.10	91.18	5.87	68.77	2.88
Urban		98.74	16.96	95.95	97.41	94.16	19.22	78.86	12.90

In all countries, illiterate and innumerate respondents had lower levels of awareness than literate and numerate respondents. The largest difference between literate and illiterate respondents was in Pakistan, in which the percentage of illiterate respondents aware of MM was 30.1 percentage points lower than among literate respondents. In all countries, respondents with no formal education had the lowest levels of awareness, while respondents with any higher education had the highest.

In all countries, greater percentages of mobile phone owners were aware of MM than among those who did not own phones, and a greater percentage of respondents with bank accounts were aware of MM than respondents without bank accounts. The greatest disparity was in Pakistan, in which 85.7% of respondents who owned a mobile phone were aware of MM, compared to only 53.1% of respondents who did not own a mobile phone.

Rural residents had lower levels of awareness than urban residents in all countries, as did respondents earning income below the poverty line of $2.50 per day. These disparities tended to be greater in Asia, with the lowest levels of awareness observed among rural residents in Indonesia (2.9%) and India (5.9%). The greatest disparities in awareness of MM between urban and rural residents were in India (13.3 percentage points difference), followed by Pakistan (10.1), Indonesia (10.0), and Nigeria (9.8). By income group, the largest difference in MM awareness was in Pakistan, in which 81.7% of respondents earning greater than $2.50 per day were aware of MM compared to 62.8% of respondents living below the $2.50 per day poverty line.

Table 5 presents logistic regression analyses of awareness of MM by survey wave controlling for sociodemographic characteristics, economic factors, and country. Women have a lower probability than men of being aware of MM in all waves, as do those living below the poverty line and residents of rural areas, and the effects of poverty and rural residence are greater in Waves 2 and 3 than in Wave 1.

Educational attainment, literacy, and numeracy are consistently positively associated with awareness of MM in all survey waves. Across all waves, respondents with any secondary education—including any post-primary vocational training—have a 7.1 percentage point higher likelihood of MM awareness compared to respondents with no formal education. The effect of education is especially strong in Wave 3.

Owning a mobile phone and having a bank account also show strong, positive associations with awareness in all waves, as does having an official ID in all wave despite less variation among respondents.

Awareness of MM also differs by country and by wave. In comparison to Wave 1 (2013), respondents in Wave 2 (2014) have a 4.5 percentage point higher likelihood of being aware of MM, versus a 2.5 percentage point higher likelihood in Wave 3 (2015), indicating greater changes in awareness between Waves 1 and 2 than between Waves 2 and 3. Levels of awareness are lower in all seven countries compared to Kenya, with the greatest differences observed in Indonesia (89.0 percentage points lower), Nigeria (-86.0), and India (-84.8). Bangladesh (-3.1) and Tanzania (-3.4), however, show only small differences in the likelihood of being aware of MM after controlling for respondent characteristics.

Table 5. Awareness of MM in all countries pooled by wave, mean marginal effects of logit models

		Wave 1	Wave 2	Wave 3	Cross-Wave
Demographics	Female	-0.034***	-0.029***	-0.036***	-0.033***
		(0.003)	(0.003)	(0.003)	(0.002)
	Age	-0.002***	-0.002***	-0.002***	-0.002***
		(0.000)	(0.000)	(0.000)	(0.000)
	Married	-0.011***	-0.020***	-0.018***	-0.017***
		(0.003)	(0.003)	(0.003)	(0.002)
	Literate	0.031***	0.062***	0.037***	0.043***
		(0.004)	(0.004)	(0.004)	(0.002)
	Numerate	0.038***	0.032***	0.019***	0.028***
		(0.004)	(0.004)	(0.006)	(0.003)
	No formal ed.	0.000	0.000	0.000	0.000
		(.)	(.)	(.)	(.)
	Primary ed.	0.004	0.014***	0.020***	0.012***
		(0.004)	(0.004)	(0.003)	(0.002)
	Secondary ed. and above	0.040***	0.079***	0.090***	0.071***
		(0.004)	(0.004)	(0.004)	(0.002)
Economic Factors	Employed	-0.005*	-0.001	-0.008***	-0.005***
		(0.003)	(0.003)	(0.003)	(0.002)
	Income below PPI cutoff	-0.038***	-0.053***	-0.048***	-0.047***
		(0.003)	(0.003)	(0.003)	(0.002)
	Owns a phone	0.045***	0.093***	0.077***	0.070***
		(0.003)	(0.003)	(0.003)	(0.002)
	Has a bank account	0.047***	0.050***	0.054***	0.051***
		(0.003)	(0.003)	(0.003)	(0.002)
	Has an official ID	0.030***	0.060***	0.048***	0.045***
		(0.005)	(0.007)	(0.007)	(0.004)
Other Context	Rural residence	-0.038***	-0.060***	-0.056***	-0.052***
		(0.003)	(0.003)	(0.003)	(0.002)
	Kenya	0.000	0.000	0.000	0.000
		(.)	(.)	(.)	(.)
	Nigeria	-0.862***	-0.852***	-0.869***	-0.860***
		(0.007)	(0.008)	(0.006)	(0.004)
	Tanzania	-0.001	-0.083***	-0.037***	-0.034***
		(0.008)	(0.010)	(0.007)	(0.005)
	Uganda	-0.030***	0.010	-0.018***	-0.012***
		(0.008)	(0.009)	(0.006)	(0.005)
	Bangladesh	-0.065***	-0.008	-0.024***	-0.031***
		(0.008)	(0.008)	(0.006)	(0.004)
	India	-0.889***	-0.804***	-0.855***	-0.848***
		(0.007)	(0.008)	(0.005)	(0.004)
	Pakistan	-0.352***	-0.154***	-0.212***	-0.234***
		(0.010)	(0.009)	(0.008)	(0.005)
	Indonesia		-0.881***	-0.882***	-0.890***
			(0.008)	(0.006)	(0.004)
Time	Wave 1				0.000
					(.)
	Wave 2				0.045***
					(0.002)
	Wave 3				0.025***
					(0.002)
	Observations	69,892	77,627	77,595	22,5114

Robust standard errors in parentheses; *p<0.05, **p<0.01, ***p<0.001
No formal education, Kenya and Wave 1 are the (omitted variable) reference categories

Table 6 presents cross-wave regressions stratified by country. Women have lower levels of awareness than men in all countries except Indonesia and Kenya, though the effect of gender on awareness is not significant in

Kenya, Tanzania, or Uganda (all countries with overall levels of awareness above 90%). The greatest differences between women and men are in Pakistan and Bangladesh. Declines in awareness by additional year of age at the mean are small but statistically significant in all countries except for Kenya, where fewer results are significant, potentially because of very high overall levels of awareness (97% in wave 3).

Rural residence is associated with lower levels of awareness in all countries except Kenya, in which the decline is not statistically significant. As in the pooled regression analysis, the majority of countries show a negative association between MM awareness and living below the poverty line, ranging from a 2.8 percentage points lower likelihood of awareness of MM in India to an 8.5 percentage points lower likelihood in Pakistan.

Table 6. Awareness of MM by country and survey wave, mean marginal effects of logit models

		Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Pakistan	Indonesia
Demographics	Female	0.004	-0.022***	-0.009	-0.004	-0.061***	-0.037***	-0.083***	0.009*
		(0.005)	(0.005)	(0.007)	(0.007)	(0.006)	(0.002)	(0.011)	(0.005)
	Age	-0.000	-0.001***	-0.001***	-0.001***	-0.002***	-0.002***	-0.003***	-0.002***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	Married	0.004	-0.014**	-0.010	-0.007	-0.004	-0.017***	-0.003	-0.019***
		(0.005)	(0.006)	(0.007)	(0.006)	(0.007)	(0.002)	(0.009)	(0.005)
	Literate	0.015**	0.063***	0.040***	0.050***	0.028***	0.055***	0.101***	-0.018
		(0.008)	(0.016)	(0.009)	(0.008)	(0.006)	(0.004)	(0.010)	(0.020)
	Numerate	0.001	0.041***	0.029***	0.014**	0.052***	0.046***	0.018*	0.051
		(0.005)	(0.012)	(0.011)	(0.007)	(0.005)	(0.006)	(0.010)	(0.033)
	No formal ed.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
	Primary ed.	0.072***	0.037***	0.032**	0.064***	0.029***	0.026***	-0.019*	-0.007
		(0.012)	(0.014)	(0.014)	(0.010)	(0.006)	(0.003)	(0.011)	(0.027)
	Secondary ed. and above	0.084***	0.093***	0.037**	0.097***	0.057***	0.087***	0.053***	0.042
		(0.013)	(0.011)	(0.016)	(0.012)	(0.008)	(0.003)	(0.012)	(0.028)
Economic Factors	Employed	0.016***	-0.013**	-0.002	0.041***	-0.007	-0.009***	-0.029***	0.002
		(0.004)	(0.006)	(0.009)	(0.007)	(0.006)	(0.002)	(0.011)	(0.005)
	Below PPI cutoff	-0.010	-0.006	-0.074***	-0.036***	-0.013**	-0.048***	-0.085***	-0.028***
		(0.009)	(0.007)	(0.016)	(0.011)	(0.005)	(0.002)	(0.007)	(0.006)
	Owns a phone	0.047***	0.014	0.081***	0.085***	0.052***	0.070***	0.139***	0.062***
		(0.006)	(0.015)	(0.007)	(0.009)	(0.005)	(0.002)	(0.008)	(0.010)
	Has a bank acct.	0.023**	0.124***	-0.058***	0.014	0.044***	0.039***	0.075***	0.059***
		(0.010)	(0.006)	(0.009)	(0.021)	(0.008)	(0.002)	(0.015)	(0.005)
	Has an official ID	-0.002	0.018	0.040***	0.034***	0.019*	0.043***	0.086***	0.000
		(0.009)	(0.011)	(0.009)	(0.007)	(0.011)	(0.009)	(0.013)	(.)
	Rural	-0.011	-0.073***	-0.021**	-0.052***	-0.017***	-0.055***	-0.045***	-0.034***
		(0.008)	(0.005)	(0.008)	(0.014)	(0.005)	(0.002)	(0.007)	(0.006)
Time	Wave 1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
		(.)	(.)	(.)	(.)	(.)	(.)	(.)	
	Wave 2	-0.008	-0.011	-0.080***	0.026***	0.016**	0.059***	0.167***	0.000
		(0.007)	(0.006)	(0.007)	(0.008)	(0.008)	(0.002)	(0.009)	(.)
	Wave 3	-0.003	-0.004	-0.052***	0.008	0.013*	0.029***	0.113***	0.018***
		(0.006)	(0.006)	(0.008)	(0.008)	(0.008)	(0.002)	(0.009)	(0.005)
	Observations	8924	17244	8893	8443	17768	135037	16775	11993

Robust standard errors in parentheses; *p<0.05, **p<0.01, ***p<0.001
No formal education and Wave 1 are the (omitted variable) reference categories

The association between awareness of MM and level of education is greater in Africa than in Asia. Uganda and Nigeria show the greatest differences in MM awareness between those without any formal education and those

with at least some secondary education. Literacy also has a positive association with awareness of MM in all countries except Indonesia (where 95% of respondents were literate in wave 3). The largest differences between literate and illiterate respondents are in Pakistan and Nigeria, and strong, positive associations between awareness and owning a mobile phone are observed in all countries except Indonesia.

In all countries except Kenya and Nigeria, there is a greater difference in awareness of MM between Waves 1 and 2 than between Waves 1 and 3. The largest increase occurs in Pakistan, in which there was a 16.7 percentage point higher likelihood of awareness among respondents in Wave 2 than in Wave 1, indicating substantial increases in awareness of the technology in recent years.

Adoption of Mobile Money

Table 7 presents weighted descriptive statistics representing the percentage of respondents within sub-populations who adopted MM, defined as ever having used MM. The sample of respondents for this table is the number of respondents who were aware of mobile money, as respondents who were not aware of mobile money were not asked questions about mobile money use.

Table 7. Wave 3 (2015) weighted descriptive statistics, percent adopted MM among sub-populations by country

		Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Pakistan	Indonesia
Total adopted (n)		2,332	50	1,850	1,420	1,988	237	556	27
Total adopted (%)		80.30	7.31	67.10	52.32	35.99	5.15	12.83	5.50
Demographics									
Women		78.18	6.03	64.63	47.84	23.24	2.06	6.74	6.40
Men		82.48	8.15	69.55	57.29	47.27	6.37	17.24	4.68
Age	**15 - 24**	66.67	6.92	64.41	47.14	37.66	6.16	11.21	4.10
	25 - 34	89.51	8.20	69.88	63.15	39.14	5.34	14.62	6.48
	35 - 44	89.79	11.21	69.28	52.82	34.98	3.53	18.03	5.13
	45 - 54	85.80	2.26	64.68	52.57	33.30	3.92	10.92	4.08
	55+	84.16	0.00	63.73	43.40	27.96	1.90	5.59	5.77
Married		84.88	5.41	65.29	51.46	33.56	3.98	13.55	5.25
Single		74.46	8.37	70.01	53.29	43.65	6.31	11.29	5.70
Innumerate		61.65	0.00	37.81	40.19	14.32	0.00	2.89	-
Numerate		80.70	7.44	68.15	55.07	36.28	5.15	13.23	5.50
Illiterate		68.17	5.53	48.12	36.80	26.22	5.05	6.34	0.00
Literate		82.70	7.34	70.18	62.39	41.72	5.16	15.10	5.55
Education	No formal ed.	67.24	0.00	39.27	26.43	23.19	1.74	7.17	0.00
	Primary ed.	77.21	2.97	63.93	42.99	33.37	1.67	12.85	2.14
	Secondary ed.	82.82	4.38	82.21	64.79	36.93	4.80	13.30	3.09
	Higher ed.	97.89	10.55	92.73	96.05	57.52	7.03	19.43	11.46
Economic Factors Influencing Access									
Unemployed		66.30	7.73	71.45	49.34	27.90	4.40	8.57	4.82
Employed		89.30	7.03	65.95	53.55	46.13	5.93	18.71	6.01
Below PPI Cutoff		70.00	6.65	63.80	42.71	33.35	3.30	12.03	4.55
Above PPI Cutoff		90.17	9.66	82.70	76.15	44.17	6.82	13.46	5.91
Does not own phone		41.22	9.17	26.54	25.81	17.04	0.47	4.61	0.00
Owns a phone		92.19	7.26	77.44	70.66	45.21	5.71	16.43	5.83
No bank account		73.70	3.12	64.43	47.03	32.08	2.42	10.21	1.60
Has a bank acct.		96.88	8.60	90.94	89.15	51.36	5.76	35.09	7.97
No official ID		50.47	9.91	34.92	39.59	30.45	0.00	5.10	-
Has official ID		82.46	7.22	68.83	54.84	36.04	5.17	13.18	5.50
Other Contextual Factors									
Rural		77.10	8.54	58.94	44.95	32.58	3.72	11.33	1.46
Urban		85.80	6.62	85.81	72.14	42.85	6.06	15.41	6.34

Note: Percentages are of the sample of respondents who were aware of mobile money.

Levels of adoption were higher in East Africa, ranging from 52.3% of respondents aware of MM in Uganda to 80.3% in Kenya. Bangladesh had the highest ratio of adoption in Asia, while India, Indonesia, and Nigeria had the lowest levels of adoption overall. Fewer women than men adopted MM in all countries except Indonesia, although the sample size of respondents who had adopted MM in Indonesia was small (weighted n=27). The largest disparity between men and women was in Bangladesh, in which 47.3% of men who were aware of MM adopted MM compared to 23.2% of women, followed by Pakistan, in which there was a 10.5 percentage point difference between men and women.

In all countries except Nigeria, the percentage of respondents aware of MM who adopted MM was higher among urban residents than among rural residents. These disparities were especially large in Uganda (27.1 percentage point difference) and Tanzania (26.9 percentage point difference), with smaller differences in India (2.4 percentage points), Pakistan (4.1), and Indonesia (4.9). Respondents living below the PPI cutoff of $2.50 per day had lower levels of adoption than those living above the poverty line in all countries. The greatest

difference was in Uganda, in which 76.2% of respondents living above the poverty line had adopted MM compared to 42.7% of residents living below the poverty line, and the smallest difference was in Pakistan.

The percentage of respondents who adopted MM was positively correlated with educational attainment. In all countries, illiterate and innumerate respondents had lower levels of adoption than literate and numerate respondents. The largest difference by numeracy status was in Tanzania, in which 68.2% of literate respondents adopted MM compared to 37.8% of innumerate respondents. Differences by literacy status were higher in East Africa, ranging from a 14.5 percentage point difference in Kenya to a 25.6 percentage points difference in Uganda. Differences by literacy and numeracy status in Bangladesh were also high. In East Africa, respondents with any higher education had higher levels of adoption than all other groups, ranging from 92.7% of respondents in Tanzania to 97.9% of respondents in Kenya.

Respondents with official forms of ID, mobile phones, and bank accounts had higher levels of adoption across all countries except Nigeria. Differences between respondents who had an official form of ID and those who did not were especially large in Tanzania and Kenya. There were also large differences in Kenya between respondents who owned mobile phones and those who did not: 92.2% of mobile phone owners had adopted MM, compared to only 41.2% of respondents who did not own a phone.

Table 8 presents logistic regression analyses of adoption of MM among those who were aware of MM, controlling for sociodemographic characteristics, economic factors, and country. Across all three survey waves, being female is associated with a lower likelihood of adopting MM, with the coefficient increasing over time from -0.012 in Wave 1 to -0.034 in Wave 3.

Living in a rural area and earning income below the poverty line are also negatively associated with adoption of MM in all waves. In Wave 3, rural residents have a 5.3 percentage point lower likelihood than urban residents of having adopted MM, and respondents earning less than $2.50 per day have a 2.8 percentage point lower likelihood of adopting MM than those living above the poverty line. Respondents who are married also had a slightly lower likelihood of adopting MM, although the effect is only statistically significant in Wave 3.

Table 8. Adoption of MM in all countries pooled by wave, mean marginal effects of logit models

		Wave 1	Wave 2	Wave 3	Cross-Wave
Demographics	Female	-0.012*	-0.020***	-0.034***	-0.023***
		(0.008)	(0.006)	(0.006)	(0.004)
	Age	-0.000	-0.000	-0.000	-0.000**
		(0.000)	(0.000)	(0.000)	(0.000)
	Married	-0.005	-0.004	-0.013**	-0.007**
		(0.008)	(0.006)	(0.006)	(0.003)
	Literate	0.010	0.037***	0.026***	0.024***
		(0.009)	(0.007)	(0.008)	(0.005)
	Numerate	0.036***	-0.001	0.041***	0.021***
		(0.010)	(0.010)	(0.014)	(0.006)
	No formal education	0.000	0.000	0.000	0.000
		(.)	(.)	(.)	(.)
	Primary education	0.024**	0.020**	0.022**	0.021***
		(0.010)	(0.009)	(0.010)	(0.006)
	Secondary ed. and above	0.095***	0.061***	0.052***	0.068***
		(0.013)	(0.011)	(0.011)	(0.006)
Economic	Employed	0.072***	0.043***	0.044***	0.052***
		(0.008)	(0.006)	(0.007)	(0.004)
	Income below PPI cutoff	-0.039***	-0.035***	-0.032***	-0.036***
		(0.007)	(0.006)	(0.006)	(0.004)
	Owns a phone	0.239***	0.196***	0.198***	0.209***

		(0.009)	(0.007)	(0.007)	(0.004)
	Has a bank account	0.071***	0.027***	0.091***	0.059***
		(0.008)	(0.006)	(0.008)	(0.004)
	Has an official ID	0.009	0.056***	0.060***	0.043***
		(0.011)	(0.009)	(0.013)	(0.006)
Other Context	Rural residence	-0.037***	-0.036***	-0.053***	-0.043***
		(0.007)	(0.005)	(0.006)	(0.003)
	Kenya	0.000	0.000	0.000	0.000
		(.)	(.)	(.)	(.)
	Nigeria	-0.740***	-0.704***	-0.757***	-0.736***
		(0.011)	(0.012)	(0.009)	(0.006)
	Tanzania	-0.198***	-0.197***	-0.114***	-0.170***
		(0.014)	(0.013)	(0.011)	(0.007)
	Uganda	-0.246***	-0.199***	-0.160***	-0.199***
		(0.014)	(0.015)	(0.013)	(0.008)
	Bangladesh	-0.415***	-0.413***	-0.369***	-0.404***
		(0.017)	(0.013)	(0.011)	(0.007)
	India	-0.729***	-0.730***	-0.770***	-0.746***
		(0.011)	(0.010)	(0.008)	(0.006)
	Pakistan	-0.636***	-0.614***	-0.639***	-0.631***
		(0.012)	(0.012)	(0.010)	(0.007)
	Indonesia		-0.735***	-0.772***	-0.750***
			(0.011)	(0.010)	(0.006)
Time	Wave 1				0.000
					(.)
	Wave 2				-0.010**
					(0.004)
	Wave 3				0.047***
					(0.004)
	Observations	19062	23710	23014	65786

Robust standard errors in parentheses; * $p<0.05$, ** $p<0.01$, *** $p<0.001$
No formal education, Kenya and Wave 1 are the (omitted variable) reference categories

There is a strong, positive association between level of education and adoption of MM in all waves. Compared to respondents with no formal education, respondents with any primary education had a 2.1 percentage point higher likelihood of adopting MM, and respondents who have received at least some secondary education have a 6.8 percentage point higher likelihood of MM adoption.

Similarly to awareness of MM, economic factors like phone ownership, having a bank account, and having an official form of ID are positively associated with adoption of MM. Respondents with official forms of ID and respondents with bank accounts have greater likelihoods of MM adoption compared to those without ID or without bank accounts. The effect of owning a mobile phone on adoption of MM is especially large: a respondent who owns a mobile phone has a 20.9 percentage point higher likelihood at the mean of adopting MM across waves. The next largest effect we observe is for any secondary education.

Adoption of MM differs by country and by wave. In comparison to Wave 1, respondents in Wave 2 have a slightly lower likelihood of adopting MM, while respondents in Wave 3 have a higher likelihood (4.7 percentage points). All seven countries show lower adoption levels than Kenya, with the greatest differences observed in Indonesia (-75.0), India (-74.6), and Nigeria (-73.6). In comparison to Kenya, the smallest differences are in other East African countries.

Table 9 presents individual cross-wave regressions stratified by country. Women are significantly less likely to adopt MM in India, Pakistan, and Bangladesh, and the magnitude of the effect is particularly large in Bangladesh. On the other hand, women are significant more likely to adopt MM in Kenya and Uganda, after

controlling for other factors. There is no statistically significant association between gender and MM awareness in Nigeria, Tanzania, or Indonesia.

Table 9. Adoption of MM by country and survey wave, mean marginal effects of logit models

		Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Pakistan	Indonesia
Demographics	Female	0.025*	-0.015	-0.01	0.028*	-0.129***	-0.025***	-0.055***	0.014
		-0.01	-0.011	-0.011	-0.012	-0.011	-0.006	-0.01	-0.017
	Age	0.001**	0.00	0.00	0.001*	-0.002***	-0.001***	-0.001***	0.00
		0.00	-0.001	0.00	0.00	0.00	0.00	0.00	-0.001
	Married	0.047***	0.00	-0.031*	-0.009	-0.018	-0.006	0.014	-0.003
		-0.009	-0.012	-0.012	-0.012	-0.012	-0.005	-0.009	-0.016
	Literate	0.032**	0.031	0.086***	0.064***	0.017*	-0.012	0.002	0
		-0.011	-0.056	-0.018	-0.013	-0.01	-0.008	-0.012	(.)
	Numerate	0.029*	-0.006	0.045*	0.038*	0.025	-0.050***	0.005	0
		-0.014	-0.029	-0.021	-0.016	-0.018	-0.01	-0.014	(.)
	No formal education	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
	Primary education	0.066***	0.00	0.096***	0.055*	0.041***	-0.081***	0.018	0.00
		-0.016	(.)	-0.026	-0.022	-0.011	-0.022	-0.011	(.)
	Secondary ed. and above	0.119***	0.00	0.163***	0.143***	0.091***	-0.060***	0.035***	0.00
		-0.019	(.)	-0.029	-0.025	-0.015	-0.022	-0.012	(.)
Economic Factors	Employed	0.081***	-0.005	0.019	0.037*	0.034***	0.010**	0.023**	0
		-0.01	-0.011	-0.014	-0.014	-0.011	-0.005	-0.009	-0.017
	Income below PPI cutoff	-0.024*	-0.015	-0.078***	-0.121***	-0.011	-0.019***	0.002	0.002
		-0.011	-0.012	-0.016	-0.013	-0.009	-0.005	-0.006	-0.02
	Owns a phone	0.249***	-0.028	0.379***	0.279***	0.160***	0.020***	0.093***	0.00
		-0.006	-0.036	-0.011	-0.011	-0.009	-0.008	-0.011	(.)
	Has a bank account	0.125***	0.061***	0.013	0.141***	0.064***	0.028***	0.083***	0.056*
		-0.014	-0.017	-0.016	-0.019	-0.009	-0.007	-0.008	-0.03
	Has an official ID	0.018	-0.026	0.094***	0.041**	0.03	-0.007	0.01	0.00
		-0.018	-0.024	-0.015	-0.015	-0.02	-0.027	-0.017	(.)
	Rural residence	-0.037***	0.008	-0.141***	-0.110***	-0.024***	-0.004	-0.021***	-0.045
		-0.011	-0.011	-0.011	-0.014	-0.008	-0.004	-0.007	-0.039
Time	Wave 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
		(.)	(.)	(.)	(.)	(.)	(.)	(.)	-
	Wave 2	-0.017	0.029*	-0.031*	-0.011	0.003	-0.023***	-0.001	0.00
		-0.012	-0.012	-0.014	-0.014	-0.013	-0.005	-0.008	(.)
	Wave 3	0.023*	0.042***	0.093***	0.073***	0.090***	0.008	0.015*	0.037***
		-0.011	-0.012	-0.014	-0.014	-0.014	-0.006	-0.008	-0.014
	Observations	8615	2223	8126	7628	15904	10692	11862	676

Robust standard errors in parentheses; * $p<0.05$, ** $p<0.01$, *** $p<0.001$
No formal education and Wave 1 are the (omitted variable) reference categories

Declines in adoption of MM by additional year of age at the mean are observed in Bangladesh, India, and Pakistan, but slight increases by age are observed in Kenya and Uganda. Rural residence has a strong, negative association with adoption of MM in Kenya, Tanzania, Uganda, Bangladesh, and Pakistan, as does earning income below the poverty line. The largest difference by income group is in Uganda, in which respondents earning less than $2.50 per day have a 12.1 percentage point lower likelihood of adopting MM.

Education has a strong, positive association with adoption of MM in all countries except Indonesia (n=27) and Nigeria (n=50), in which the sample sizes are small. We find again that the effect of secondary education relative to no education, is larger than the effect of primary education relative to no education. In Tanzania, respondents with some secondary education have a 16.3 percentage point higher likelihood of adopting MM, followed by Uganda and Kenya, in which the likelihoods are 14.3 and 11.9 percentage point higher respectively. In India, however, education appears to have a negative effect: respondents who have some primary education have a 8.1 percentage point lower likelihood of adopting MM, and those with some secondary education have a 6.0 percentage point lower likelihood. Employment is positively associated with MM adoption in all countries except Nigeria, Tanzania, and Indonesia.

In comparison to Wave 1, all countries have higher levels of adoption of MM in Wave 3, ranging from a 1.5 percentage point higher likelihood in Pakistan to a 9.3 percentage points higher likelihood in Tanzania.

Use of Mobile Money in the Last 90 Days

Table 10 presents weighted descriptive statistics representing the percentages of respondents within sub-populations who had used MM in the past 90 days. These statistics represent the percentage of respondents who had used MM in the last 90 days among respondents who were aware of MM and who had ever used (adopted) MM. The samples are therefore very small in Nigeria (50 respondents), India (237) and Indonesia (27). Levels of use among those who had adopted MM were consistently high in East Africa, ranging from 86.7% in Uganda to 91.4% in Kenya, although slightly lower percentages of women than men had recently used MM in all East African countries. The largest disparity between men and women was in Pakistan, in which the percentage of women who had used MM in the last 90 days was 12.9 percentage points lower than the percentage of men who had used MM.

Use of MM by respondents living in rural areas and respondents living below the poverty line varied by country. Rural residents had lower levels of use than urban residents in Africa and Bangladesh, while rural residents had slightly higher percentages of use in India and Pakistan. In East Africa and Bangladesh, more respondents living above the poverty line had used MM in the last 90 days, but in the remainder of countries there was a higher percentage of users among respondents earning less than $2.50 per day.

A higher percentage of literate respondents had used MM in the last 90 days than illiterate respondents in all countries except India and Pakistan, where greater numbers of illiterate respondents had used MM. In Indonesia, no illiterate and innumerate respondents were asked about recent use since none had ever adopted the technology.

Table 10. Wave 3 (2015) weighted descriptive statistics; percent used MM in the last 90 days among sub-populations by country

		Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Pakistan	Indonesia
Total use (n)		2,131	40	1,660	1,230	1,621	174	467	18
Total use (%)		91.38	79.15	89.72	86.67	81.50	73.23	84.03	67.05
Demographics									
Women		90.41	86.84	88.98	85.30	79.52	76.18	74.01	79.63
Men		92.33	75.39	90.40	87.94	82.4	72.86	86.86	51.35
Age	15 - 24	92.18	92.73	91.45	85.38	83.28	73.30	89.09	33.30
	25 - 34	92.05	81.50	89.87	87.11	82.05	76.86	81.59	79.56
	35 - 44	91.92	56.20	89.87	87.68	79.55	63.49	83.07	60.04
	45 - 54	92.04	100.00	89.84	88.79	80.04	77.83	83.30	100.00
	55+	86.61	-	85.49	84.95	78.98	55.57	77.78	100.00
Married		90.72	61.93	88.90	86.07	80.11	76.86	82.47	82.49
Single		92.33	85.40	90.95	87.32	84.96	70.97	88.05	56.24
Illiterate		84.36	0.00	84.62	83.60	78.26	75.24	94.75	-
Literate		92.52	80.35	90.29	87.84	82.73	73.15	82.46	67.05
Innumerate		82.26	-	74.86	84.13	93.85	-	100.00	-
Numerate		91.53	79.15	90.02	87.09	81.46	73.23	83.89	67.05
Education	No formal ed.	86.77	-	84.16	88.72	78.97	100.00	90.61	-
	Primary ed.	88.17	100.00	88.47	82.87	75.09	74.68	79.50	100.00
	Secondary ed.	93.87	87.68	91.85	87.11	83.20	73.66	82.86	60.75
	Higher ed.	96.70	76.95	98.66	96.49	86.84	72.53	87.47	66.69
Economic Factors Influencing Access									
Unemployed		89.78	96.46	88.99	85.32	82.51	73.27	82.32	30.76
Employed		92.14	66.64	89.93	87.18	80.78	73.20	85.10	88.53
Below PPI Cutoff		87.16	84.47	88.49	82.61	80.40	75.83	86.95	82.42
Above PPI Cutoff		94.52	66.10	94.21	92.32	84.17	72.10	81.99	62.06
Does not own phone		75.10	100.00	73.20	71.01	78.77	100.00	82.22	-
Owns a phone		93.59	78.42	91.16	90.63	82.03	72.97	84.25	67.05
No bank account		88.60	85.22	88.48	83.91	80.51	61.38	81.70	0.00
Has a bank acct.		96.70	78.47	97.55	96.78	84.03	74.34	89.78	75.56
No official ID		85.93	75.57	90.38	83.10	92.87	-	85.41	-
Has official ID		91.62	79.32	89.70	87.18	81.43	73.23	84.00	67.05
Other Contextual Factors									
Rural		89.59	78.72	88.65	83.05	79.58	76.00	85.32	0.00
Urban		94.12	79.46	91.41	92.73	84.51	72.15	82.40	70.23

Although it was not included in the Waves 1 and 2 FII surveys, the question, *"How often do you use mobile money for this activity?"* was added to the Wave 3 survey, allowing for further analysis regarding respondent's frequency using MM. In order to examine how often respondents used MM platforms, we examined the highest frequency response (e.g. daily) for each respondent, regardless of activity (Table 11).

Table 11. Wave 3 (2015) weighted frequency of mobile money use by country, percent of adopters

	Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Pakistan	Indonesia
Total (n)	2,329	40	1,834	1,412	1,987	219	556	26
Daily	14.39	9.16	20.61	10.90	0.73	0.00	1.94	4.43
Weekly	38.11	30.46	29.67	26.64	10.33	23.80	6.42	7.13
Once every 15 days	16.64	6.32	18.07	17.47	9.45	20.48	13.56	30.96
Monthly	18.06	17.24	14.05	21.07	37.25	21.49	47.77	22.12
Once every 3 months	7.33	15.04	12.02	12.05	26.45	14.69	14.46	30.93
Once every 6 months	2.54	8.00	3.07	5.92	10.39	7.96	8.68	0.00
Once a year	1.44	7.28	2.01	4.10	2.75	9.06	7.17	4.43
Almost never	1.50	6.51	0.49	1.86	2.64	2.53	0.00	0.00

MM use among those that had ever used MM was relatively frequent in Africa with the plurality of users in each African country using mobile money weekly and at least 75% of users in Kenya, Tanzania, and Uganda using MM at least every month. Between 9 and 21% of users in Africa also reported using MM daily. Usage rates in Asian countries were lower than Africa, with very low amounts of daily usage and most respondents reporting using MM between every 15 days and every 3 months. Once a year use of mobile money was low in all countries.

Table 12 presents multiple logistic regression analyses of use of MM in the last 90 days controlling for sociodemographic characteristics, technological and institutional factors, and country, and keeping in mind that this is a sub-sample of all FII respondents. Nigeria and Indonesia are excluded from the analysis due to a small number of respondents (n<50). Unlike the relationships between gender and awareness and adoption of MM, there is no association between being female and use of MM in the last 90 days, among those that have adopted (ever used) MM.

Living in a rural area and earning income below $2.50 per day are both negatively associated with use of MM, but educational attainment, which is positively associated with awareness and adoption, does not have a clear relationship with use. In Waves 2 and 3, respondents with some primary education who have adopted MM have lower likelihoods of having used MM in the last 90 days than those with no formal education, although respondents with any secondary education have a 6.0 percentage point higher likelihood of having used MM in Wave 1. As with awareness and adoption of MM, mobile phone ownership and having a bank account are positively associated with use of MM in all waves.

Use of MM in the last 90 days differs by country and by wave. In comparison to Kenya, respondents in all five countries included in the analysis have lower likelihoods of having used MM in the last 90 days, with the greatest differences observed in India, Pakistan, and Bangladesh. Respondents surveyed in Wave 2 have a slightly lower likelihood than respondents in Wave 1 of having used MM, while respondents in Wave 3 have a 2.0 percentage point higher likelihood of having used MM.

Table 12. Use of MM in the last 90 days all countries pooled by wave, mean marginal effects of logit models

		Wave 1	Wave 2	Wave 3	Cross-Wave
Demographics	Female	0.019	0.012	-0.011	0.006
		(0.011)	(0.013)	(0.009)	(0.006)
	Age	-0.000	0.000	-0.001***	-0.000*
		(0.000)	(0.000)	(0.000)	(0.000)
	Married	-0.000	-0.001	-0.010	-0.012**
		(0.012)	(0.011)	(0.010)	(0.006)
	Literate	-0.013	0.019	0.002	0.004
		(0.014)	(0.016)	(0.012)	(0.008)
	Numerate	-0.012	0.000	0.010	-0.004
		(0.017)	(0.020)	(0.022)	(0.011)
	No formal ed.	0.000	0.000	0.000	0.000

		(.)	(.)	(.)	(.)
	Primary ed.	0.022	-0.047***	-0.046***	-0.025***
		(0.020)	(0.017)	(0.014)	(0.010)
	Secondary ed. and above	0.060***	-0.025	-0.019	0.001
		(0.022)	(0.020)	(0.015)	(0.011)
Economic Factors	Employed	0.017	-0.022	0.003	0.001
		(0.013)	(0.013)	(0.010)	(0.007)
	Income below PPI cutoff	-0.013	-0.023*	-0.025***	-0.020***
		(0.011)	(0.012)	(0.010)	(0.006)
	Owns a phone	0.095***	0.091***	0.083***	0.089***
		(0.015)	(0.015)	(0.011)	(0.008)
	Has a bank account	0.038***	0.071***	0.065***	0.060***
		(0.013)	(0.013)	(0.012)	(0.007)
	Has an official ID	0.019	-0.004	0.003	0.009
		(0.015)	(0.019)	(0.020)	(0.010)
Other Context	Rural residence	-0.017	-0.014	-0.021**	-0.017***
		(0.011)	(0.011)	(0.009)	(0.006)
	Kenya	0.000	0.000	0.000	0.000
		(.)	(.)	(.)	(.)
	Tanzania	-0.035**	-0.009	-0.000	-0.015**
		(0.015)	(0.013)	(0.010)	(0.007)
	Uganda	-0.041***	-0.050***	-0.029**	-0.040***
		(0.013)	(0.015)	(0.013)	(0.008)
	Bangladesh	-0.051***	-0.155***	-0.098***	-0.105***
		(0.019)	(0.019)	(0.014)	(0.009)
	India	-0.300***	-0.093*	-0.356***	-0.279***
		(0.061)	(0.054)	(0.047)	(0.032)
	Pakistan	-0.096***	-0.176***	-0.091***	-0.121***
		(0.025)	(0.024)	(0.019)	(0.013)
Time	Wave 1				0.000
					(.)
	Wave 2				-0.013*
					(0.007)
	Wave 3				0.020***
					(0.007)
	Observations	6597	6617	8219	21433

Robust standard errors in parentheses; * p<0.05, ** p<0.01, *** p<0.001
No formal education, Kenya and Wave 1 are the (omitted variable) reference categories

Table 13 presents regression results for each country separately. There is no association between gender and MM use in any country except Pakistan, in which women that adopted MM have a 10.2 percentage point lower likelihood of having used MM in the last 90 days than men. Rural residents have a lower likelihood of having used MM in the last 90 days in Tanzania and Uganda, but rural residence is not associated with use of MM in any Asian country. Similarly, in Kenya, respondents earning less than $2.50 per day have a 2.5 percentage point lower likelihood of having used MM in the last 90 days, but there is no association between MM use and living below the poverty line in other African countries.

Table 13. Use of MM in the last 90 days by country and survey wave, mean marginal effects of logit models

		Kenya	Tanzania	Uganda	Bangladesh	India	Pakistan
Demographics	Female	0.006	0.014	0.002	-0.014	0.122	-0.102***
		(-0.009)	(-0.012)	(-0.014)	(-0.02)	(-0.077)	(-0.037)
	Age	-0.001*	0.00	0.00	-0.001	-0.002	0.00
		(0.00)	(0.00)	(-0.001)	(-0.001)	(-0.003)	(-0.001)
	Married	0.00	-0.023	0.008	-0.003	-0.001	-0.001
		(-0.009)	(-0.013)	(-0.013)	(-0.022)	(-0.063)	(-0.027)
	Literate	0.015	0.026	0.018	0.00	-0.074	-0.111***

		(-0.011)	(-0.021)	(-0.016)	(-0.019)	(-0.156)	(-0.041)
	Numerate	-0.01	-0.005	0.001	-0.023	2.682***	-0.062
		(-0.014)	(-0.024)	(-0.02)	(-0.035)	(-0.21)	(-0.058)
	No formal ed.	0.00	0.00	0.00	0.00	0.00	0.00
		(.)	(.)	(.)	(.)	(.)	(.)
	Primary ed.	-0.006	0.00	-0.033	-0.016	-0.216*	0.008
		(-0.014)	(-0.028)	(-0.026)	(-0.022)	(-0.126)	(-0.047)
	Secondary ed. and above	0.028	0.018	-0.015	0.022	-0.251***	0.022
		(-0.016)	(-0.03)	(-0.027)	(-0.026)	(-0.025)	(-0.047)
Economic Factors	Employed	0.020*	0.009	-0.014	-0.009	0.016	-0.083**
		(-0.01)	(-0.014)	(-0.017)	(-0.019)	(-0.058)	(-0.032)
	Income below PPI cutoff	-0.025**	-0.011	-0.007	-0.031*	0.092	-0.012
		(-0.009)	(-0.015)	(-0.014)	(-0.016)	(-0.06)	(-0.022)
	Owns a phone	0.093***	0.126***	0.106***	0.034*	-0.019	-0.003
		(-0.011)	(-0.016)	(-0.016)	(-0.018)	(-0.158)	(-0.044)
	Has a bank account	0.057***	0.126***	0.090***	0.029*	0.142*	0.013
		(-0.01)	(-0.023)	(-0.02)	(-0.017)	(-0.077)	(-0.027)
	Has an official ID	0.005	0.006	-0.003	0.042	0.00	-0.135*
		(-0.02)	(-0.017)	(-0.017)	(-0.034)	(.)	(-0.078)
	Rural residence	-0.018	-0.028*	-0.038*	-0.007	0.056	0.002
		(-0.01)	(-0.012)	(-0.016)	(-0.014)	(-0.057)	(-0.023)
Time	Wave 1	0.00	0.00	0.00	0.00	0.00	0.00
		(.)	(.)	(.)	(.)	(.)	(.)
	Wave 2	0.002	0.034*	-0.016	-0.083***	0.229***	-0.096***
		(-0.012)	(-0.015)	(-0.017)	(-0.025)	(-0.067)	(-0.03)
	Wave 3	0.015	0.054***	0.02	-0.011	0.069	0.028
		(-0.01)	(-0.015)	(-0.015)	(-0.024)	(-0.067)	(-0.027)
	Observations	7051	4467	3768	4318	356	1471

Robust standard errors in parentheses; * $p<0.05$, ** $p<0.01$, *** $p<0.001$
No formal education and Wave 1 are the (omitted variable) reference categories

Unlike awareness and adoption of MM, there is no association between educational attainment and use of MM in the last 90 days, except in India, in which the association is negative, and literacy is only associated with MM use in Pakistan, in which the relationship is also negative. In India, numerate respondents have a 268 percentage point higher likelihood of having used MM, likely resulting from few innumerate respondents adopting MM and no innumerate respondents using MM in the last 90 days. Finally, owning a phone shows a strong, positive association with use of MM in African countries, ranging from a 9.3 percentage points higher likelihood in Kenya to a 12.6 percentage points higher likelihood in Tanzania. Having a bank account is positively associated with use of MM in all countries except Pakistan, ranging from a 14.2 percentage points higher likelihood of having used MM in India to a 2.9 percentage points higher likelihood in Bangladesh.

Mobile Money Awareness, Adoption, and Use among Women

Table 14 presents multiple logistic regression analyses of awareness, adoption, and use of MM in the last 90 days, controlling for sociodemographic characteristics, technological and institutional factors, and country, for female respondents across all survey waves. Male respondents are excluded from this analysis though parallel results are available in Appendix C.

The largest effects on women's MM awareness are for secondary education and phone ownership, similar to the sample of male respondents. For adoption of MM among women, the largest effect by far is for mobile phone ownership, which is associated with a 19.5 percentage point higher likelihood of adoption, larger than the

effect among men. Again, following what we observe for the full sample and for men only, the largest effects on use of MM in the last 90 days for women are for phone ownership and having a bank account.

Table 14. Awareness, adoption, and use of MM for female respondents only in all countries pooled by wave, mean marginal effects of logit models

		Awareness	Adoption	Use in Last 90 Days
Demographics	Age	-0.002***	0.000	0.000
		(0.000)	(0.000)	(0.000)
	Married	-0.009***	-0.007	-0.017**
		(0.002)	(0.005)	(0.008)
	Literate	0.032***	0.025***	-0.002
		(0.003)	(0.006)	(0.011)
	Numerate	0.022***	0.023***	0.014
		(0.003)	(0.007)	(0.013)
	No formal ed.	0.000	0.000	0.000
		(.)	(.)	(.)
	Primary ed.	0.014***	0.014*	-0.011
		(0.002)	(0.008)	(0.014)
	Secondary ed. and above	0.068***	0.045***	0.018
		(0.003)	(0.009)	(0.015)
Economic Factors	Employed	-0.003	0.027***	0.001
		(0.002)	(0.005)	(0.009)
	Income below PPI cutoff	-0.032***	-0.031***	-0.014
		(0.002)	(0.005)	(0.009)
	Owns a phone	0.056***	0.195***	0.075***
		(0.002)	(0.005)	(0.009)
	Has a bank account	0.041***	0.058***	0.060***
		(0.002)	(0.006)	(0.011)
	Has an official ID	0.035***	0.043***	0.018
		(0.004)	(0.007)	(0.013)
Other Context	Rural residence	-0.043***	-0.045***	-0.015*
		(0.002)	(0.005)	(0.008)
	Kenya	0.000	0.000	0.000
		(.)	(.)	(.)
	Nigeria	-0.870***	-0.691***	-0.183
		(0.006)	(0.008)	(0.116)
	Tanzania	-0.045***	-0.191***	-0.010
		(0.008)	(0.010)	(0.010)
	Uganda	-0.023***	-0.197***	-0.042***
		(0.007)	(0.010)	(0.011)
	Bangladesh	-0.060***	-0.473***	-0.101***
		(0.007)	(0.010)	(0.014)
	India	-0.869***	-0.701***	-0.216***
		(0.006)	(0.008)	(0.064)
	Pakistan	-0.285***	-0.629***	-0.107***
		(0.009)	(0.009)	(0.026)
	Indonesia	-0.883***	-0.695***	-0.239*
		(0.006)	(0.009)	(0.138)
Time	Wave 1	0.000	0.000	0.000
		(.)	(.)	(.)
	Wave 2	0.032***	-0.009	-0.003
		(0.002)	(0.006)	(0.010)
	Wave 3	0.016***	0.043***	0.008
		(0.002)	(0.005)	(0.010)
	Observations	124872	31823	10277

Robust standard errors in parentheses; * $p<0.05$, ** $p<0.01$, *** $p<0.001$

No formal education, Kenya and Wave 1 are the (omitted variable) reference categories

We do observe some differences in the significance and effects of certain factors for women compared to the full sample of respondents. The negative effect of marriage on MM awareness among women is less than the effect among men (negative 0.9 percentage points compared to negative 2.3 percentage points for men). Being employed is positively associated with MM adoption but to a lesser degree for female than for male respondents (2.7 percentage points compared to 4.8 percentage points). Being below the PPI cutoff and having primary education are not associated with MM use in the last 90 days for women while for men they have negative associations (negative 2.4 and 3.6 percentage points, respectively).

Discussion

Predictors of mobile money awareness, adoption, and use vary across countries and across survey waves within countries. Individual demographic factors (including gender, age, and education) and broader factors influencing both the ability to access and potential value of mobile money services (including employment, income, mobile phone ownership, and having a bank account) are all significant predictors of MM awareness, adoption, and use in different countries and sub-populations.

This analysis supports the association of MM awareness and adoption with education-based factors hypothesized in the DFS literature. Having above a secondary education (relative to no education) has a higher positive association with both awareness and adoption than having a primary school education (relative to no education) except in India, where it had a negative association with adoption. This aligns with other research that shows households with better educated heads are more likely to use MM and that individuals with higher education levels are more likely to adopt mobile money and more likely to save and have access to financial education (Kikulwe et al., 2014; Ouma, Odongo, & Were, 2017). The exception in India may be due to respondents with higher education having higher levels of access to other financial services. For example, when examining bank account ownership among respondents aware of mobile money across waves in India, 54.4% of those with no formal education had a bank account while 88.0% of those with more than secondary education had bank accounts (Table 15). Bank account ownership is much lower in all other countries with a high of 37.25% of respondents in Nigeria in Wave 3 (2015) compared to 66.14% of respondents in India.

Table 15. Cross-Wave weighted frequency of bank account ownership rates by education level for India, percent of those aware of mobile money

	No formal education	Primary education	Secondary education	Above Secondary education
Total (n)	197	1,473	5,172	4,047
Bank account ownership	54.4	67.4	73.1	88.0

Other enabling factors hypothesized to facilitate access to MM, including employment, income, phone ownership, and having a bank account, show strong, positive associations with awareness and adoption of MM in all survey waves.

The association of employment with MM awareness and adoption is difficult to interpret. While employment was weakly associated with awareness, it was positively associated with adoption in all waves. However, the relationship varies in significance, magnitude, and direction by country for both outcome variables. This lack of a clear relationship may be due to the different types of employment included in "employed" and "unemployed" categories. In Wave 3, survey questions distinguish between full-time, part-time, occasional, and self-employment, as well as full-time students, retirees, housewives, and respondents looking for employment. We observe that more respondents in Africa report being self-employed, while the most common employment type in South Asia is "housewife" (Appendix B). The survey also includes options regarding regular

or irregular pay, a distinction that may help to distinguish informal and formal employment. Further stratification of respondents by employment status may provide additional information on the relationship between employment and MM in future analyses.

Only Kenya and Nigeria do not have significant associations between MM awareness and being below the PPI cutoff. This may be due to the large proportion of respondents aware of MM in Kenya and the low proportion and small sample in Nigeria, reducing the variation in the sample. Being below the PPI cutoff has a less negative association with MM adoption with each successive wave when looking at pooled country analysis, which may indicate that MM is becoming more accessible for poor populations. But in Tanzania, Uganda, Kenya, and India, results indicate that poverty is still associated with lower MM use. Income below the PPI cutoff is associated with a lower likelihood of using MM in the last 90 days in Kenya and Bangladesh, but this association is not significant in other countries.

Phone ownership is consistently strongly associated with awareness, adoption, and use of MM: in the cross-wave analyses, phone owners have a 7.7 percentage point higher likelihood of being aware of MM, a 20.9 percentage point higher likelihood of MM adoption, and a 8.9 percentage point higher likelihood of having used MM in the last 90 days ($p<0.001$). In Kenya, Tanzania, Uganda, and Bangladesh, phone owners have more than a 15 percentage point higher likelihood of adopting MM (up to 38 percentage points higher in Tanzania). While a strong relationship between owning a mobile phone and accessing MM is expected, the relationship also has a gender dimension: women in all countries were less likely to own mobile phones, and women are 14% less likely to own mobile phones worldwide (Scharwatt & Minischetti, 2014). Levels of mobile phone ownership are especially low among women in South Asia (GSMA, 2015).

Similarly, having a bank account is positively associated with awareness of MM in all countries except Tanzania, in which there is a negative association, and Uganda, in which there is no association. These relationships may be explained by small comparison groups: the number of respondents who had bank accounts in Tanzania and Uganda are the lowest of all countries, and in both countries substantially more respondents were aware of MM among those who had bank accounts than among those who did not[4]. Having a bank account is also positively associated with MM adoption and MM use in the last 90 days across all countries, though the effect on use is not significant in Pakistan. A number of countries have seen a simultaneous rise in adoption of MM and bank account ownership, including Tanzania (Mirani, 2014) and Kenya, where the number of bank accounts increased from 4 million in 2007, the year M-PESA was launched, to 20 million in 2013 (Hanouch, 2013). However, while MM is sometimes referred to as a "stepping stone" to formal financial services (Economist, n.p, 2009), banks in some countries have lobbied against the proliferation of MM out of concern that it will negatively impact demand for their services (Popper, 2015; Economist, 2009).

India presents an interesting case, as only 10.21% of the population is aware of MM, despite India having the highest rate of bank account ownership of all countries (66.1%). High levels of bank account ownership are in part the result of a targeted initiative: in 2014, the Indian government launched a nationwide program to provide bank accounts and basic financial services, including debit cards and facilities for cash deposits, to 75 million households by 2018 (Rai, 2014). However, regulations in India only allow MM transactions if they are linked to a registered bank account and, as of 2014, mobile networks were not allowed to use airtime agents to facilitate MM transactions (Mirani, 2014; Tiwari, 2013). Despite the presence of fifteen MM operators in the country, a lack of bank tellers—the only agents who are allowed to process transactions under existing regulations—in rural areas remains a major barrier to MM access (Mirani, 2014).

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[4] In Uganda, of people with bank accounts, 341 were aware of MM and eight were not (n=349). In Tanzania, of people with bank accounts, four people were aware of MM and 278 were not (n=282).

Even controlling for multiple factors, we find that being female is significantly associated with an overall lower likelihood of awareness of MM, though the association is not significant in countries with very high overall awareness levels (Kenya, Tanzania, Uganda) and very low awareness levels (Indonesia). Women who are aware of MM are also less likely than men to adopt MM overall across countries. Gender does not have a significant effect on use of MM among those that have adopted it, however, which suggests that barriers to first-time use are the most important for women's access to MM. One exception is Pakistan, where women who have adopted MM are still 10 percentage points less likely to have used MM in the last 90 days compared to men.

While policies and interventions to promote education, employment, phone ownership, and having a bank account may broadly help to increase mobile money adoption and use, potentially bringing in currently unbanked populations, specific policies targeting women may be needed to close current gender gaps.

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Appendix A. Codebook

Table A1. Codebook for variables included in analyses

Variable	Definition	Type	Variable Construct	FII Survey Question
Dependent Variables				
dfs_aware_gen	Person is aware of the concept of MM	Binary	dfs_aware_gen=1 if person has heard of mobile money.	Have you heard of something called MM?
dfs_aware_name	Person is able to recall the name of at least one MM provider spontaneously or when prompted	Binary	dfs_aware_name=1 if person can spontaneously recall name of at least one provider or recognize name of DFS provider when prompted	Answered "yes" to dfs_aware_spont or dfs_aware_prompt
dfs_aware_spont*	Person is able to spontaneously recall the name of a MM provider	Binary	dfs_aware_spont=1 if person can spontaneously recall name of at least one provider.	If answer is "yes" to dfs_aware_gen: Please tell me the names of any MM services that you are aware of?
dfs_aware_prompt*	Person is able to recall the name of a MM provider when prompted	Binary	dfs_aware_prompt=1 if person can recognize name of at least one provider when prompted	Have you ever heard about the following MM services?
dfs_adopt	Person has ever used MM	Binary	dfs_adopt=1 if person has ever used any MM service for any financial activity	Have you ever used this MM service for any financial activity? (only asked of persons aware of some MM provider)
dfs_90	Person has used MM in the last 90 days	Binary	dfs_90=1 if person has used any MM service within the past 90 days	Apart from today, when was the last time you conducted any financial activity using this MM service?
Demographic Characteristics				
female	Sex	Binary	female=1 if person is female	Is the respondent a male or female?
age	Age	Continuous	-	What year were you born?
married	Monogamously or polygamously married	Binary	married=1 if person is monogamously or polygamously married	What is your marital status?
literate	Has basic literacy	Binary	Literate=1 if person has basic literacy	Literacy test questions (Section LN)
numerate	Has basic numeracy	Binary	Numerate=1 if person has basic numeracy	Numeracy test questions (Section 6.2)
ed_level	Level of education	Categorical (dummies)	1=No formal education; 2=Some primary or completed primary school; 3=Some secondary or vocational training after primary, completed secondary or vocational training; 4=Any higher education after secondary; 5=Other/missing	What is your highest level of education? Created from highest_ed; based on highest level of education received
rural	Rural residence	Binary	rural=1 if person is a rural resident (rural=0 if urban resident)	Based on geographic information
Economic Factors				

employed	Employment status	Binary	employed=1 if person is employed part-time, occasionally, seasonally, full-time or self-employed	In the past 12 months, you were mainly...? List of employment-related responses (DL1)
ppi_cutoff	Below the PPI Cutoff of $2.50/day	Binary	ppi_cutoff=1 if person's PPI score is below the PPI cutoff of $2.50 per day (earns less than $2.50/day)	Multiple questions combined
phone_own	Owns a phone	Binary	Phone_own=1 if person owns a mobile phone	Do you personally own a mobile phone?
bank_own	Has a bank account	Binary	Bank_own=1 if person owns a bank account	Do you personally have a bank account registered in your name?
official_id	Has an official ID	Binary	Official_id=1 if person has an official ID	Do you have any of the following types of identification? (responses vary by country)
Other Independent Variables				
rural	Rural residence	Binary	rural=1 if person is a rural resident (rural=0 if urban resident)	Based on geographic information
Country	Country where the survey was conducted	Categorical (dummies)	Kenya=1; Nigeria=1; Tanzania=3; Uganda=4; Bangladesh=5; India=6; Indonesia=7; Pakistan=8	
Wave	Survey Wave 1, 2, or 3	Continuous (dummies)	Wave=1 for Wave 1. Waves are annual (Waves 1, 2, 3) but are treated as dummy variables with Wave 1 as the reference group.	Wave 1: October 2013 – January 2014; Wave 2: September 2014-December 2014; Wave 3: June – October 2015

*These variables are not in the regression model. They were combined to create dfs_aware_name.

Appendix B. Descriptive Statistics for Employment Type, Wave 3 (2015)

Table B1. Descriptive Statistics for Employment Type, Wave 3 (% of respondents)

Employment Type	Kenya	Nigeria	Tanzania	Uganda	Bangladesh	India	Indonesia	Pakistan
Full-time for regular pay	12.15	13.79	19.86	8.44	8.38	18.06	17.64	11.42
Part-time for regular pay	4.34	3.57	8.61	5.17	1.26	3.80	5.21	5.38
Occasionally, irregular pay	9.51	3.96	6.45	6.47	3.90	7.79	11.72	8.18
Per season	4.98	4.04	26.41	27.32	9.10	5.97	6.55	2.56
Self-Employed	29.52	34.22	18.04	22.88	20.38	13.88	14.48	18.05
Not working, looking	3.90	6.79	3.67	5.35	1.85	2.56	5.02	1.84
Housewife	11.03	11.45	8.98	9.26	39.04	31.73	24.78	40.59
Fulltime Student	18.34	17.66	5.88	8.71	10.77	11.76	9.32	10.05
Not working retired	1.55	2.10	0.59	1.00	2.81	2.59	1.60	1.26
Not working sickness, disability	0.85	0.73	0.50	1.56	2.16	1.50	1.56	0.44
Other	3.55	0.77	0.63	3.50	0.35	0.02	2.08	0

Appendix C. Mean Marginal Effects of Logit Models for Males, Cross Wave

Table C1. Awareness, adoption, and use of MM for male respondents only in all countries pooled by wave, mean marginal effects of logit models

		Awareness	Adoption	Use in Last 90 Days
Demographics	Age	-0.002***	-0.001***	-0.001**
		(0.000)	(0.000)	(0.000)
	Married	-0.023***	0.004	-0.006
		(0.003)	(0.005)	(0.009)
	Literate	0.056***	0.024***	0.010
		(0.004)	(0.007)	(0.011)
	Numerate	0.036***	0.024**	-0.026
		(0.005)	(0.010)	(0.019)
	No formal ed.	0.000	0.000	0.000
		(.)	(.)	(.)
	Primary ed.	0.011***	0.030***	-0.036***
		(0.003)	(0.008)	(0.013)
	Secondary ed. and above	0.077***	0.089***	-0.011
		(0.004)	(0.009)	(0.014)
Economic Factors	Employed	-0.012***	0.048***	0.003
		(0.003)	(0.006)	(0.011)
	Income below PPI cutoff	-0.061***	-0.038***	-0.024***
		(0.002)	(0.005)	(0.009)
	Owns a phone	0.072***	0.155***	0.110***
		(0.005)	(0.012)	(0.020)
	Has a bank account	0.060***	0.061***	0.060***
		(0.003)	(0.005)	(0.009)
	Has an official ID	0.064***	0.045***	-0.001
		(0.008)	(0.010)	(0.016)
Other Context	Rural residence	-0.061***	-0.039***	-0.020**
		(0.002)	(0.005)	(0.008)
	Kenya	0.000	0.000	0.000
		(.)	(.)	(.)
	Nigeria	-0.855***	-0.768***	-0.309***
		(0.005)	(0.009)	(0.061)
	Tanzania	-0.025***	-0.145***	-0.020*
		(0.006)	(0.011)	(0.010)
	Uganda	-0.004	-0.202***	-0.039***
		(0.005)	(0.012)	(0.011)
	Bangladesh	-0.004	-0.345***	-0.107***
		(0.004)	(0.011)	(0.011)
	India	-0.828***	-0.779***	-0.289***
		(0.004)	(0.008)	(0.036)
	Pakistan	-0.177***	-0.641***	-0.129***
		(0.006)	(0.009)	(0.015)
	Indonesia	-0.903***	-0.793***	-0.525***
		(0.005)	(0.010)	(0.159)
Time	Wave 1	0.000	0.000	0.000
		(.)	(.)	(.)
	Wave 2	0.056***	-0.015***	-0.020**
		(0.003)	(0.006)	(0.010)
	Wave 3	0.033***	0.051***	0.027***
		(0.003)	(0.006)	(0.010)
	Observations	97737	33861	11297

Robust standard errors in parentheses; * $p<0.05$, ** $p<0.01$, *** $p<0.001$
No formal education and Wave 1 are the (omitted variable) reference categories