

CGAP Smallholder Household Data: Analysis and Insights from the National Surveys and Financial Diaries

Submitted to:
CONSULTATIVE GROUP TO ASSIST THE POOR (CGAP)

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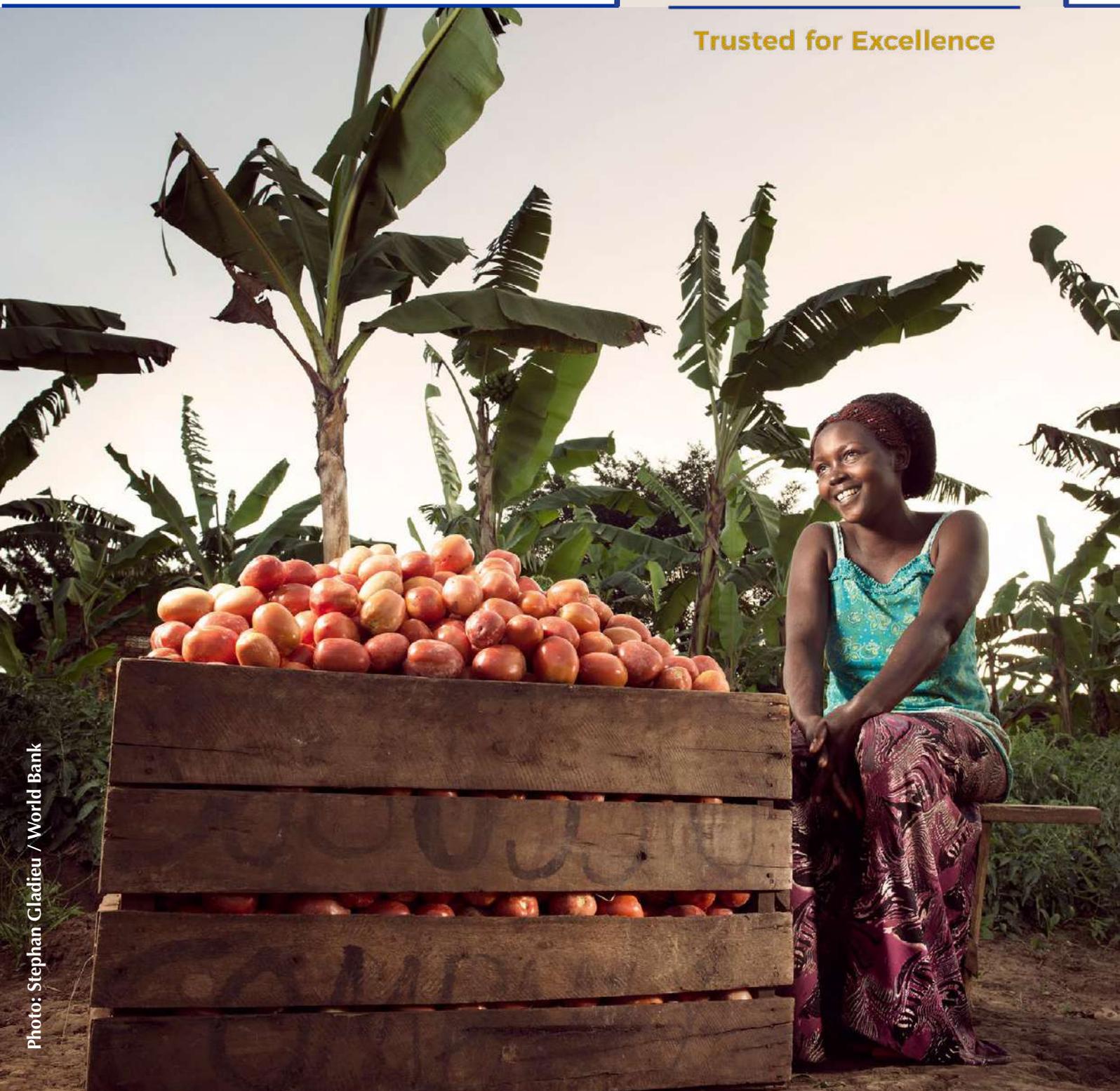


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01

Introduction

SECTION 01 :: INTRODUCTION

Nathan Associates, in cooperation with Novix, expanded on CGAP's initial findings from its smallholder data to develop a more nuanced picture of the different types of smallholder households. This analysis seeks to address knowledge gaps that remain and generate a more complete view of smallholders' day-to-day relationship with financial services.

This report represents the culmination of the team's research and presents a detailed analysis of several research questions. It also considers how to segment the smallholder population and identify opportunities for financial services providers to better serve these distinct groups. Where possible the analysis provides practical suggestions for various stakeholders and highlights opportunities for further research.

This analysis provided the foundation for the [CGAP Smallholder Families Data Hub](#), the online interactive data portal designed by Novix in conjunction with Nathan's data analysis team and CGAP technical and communications staff. The portal is designed to facilitate decision making among development organizations and financial service providers about product development and delivery mechanisms for smallholder families. The data portal will engage stakeholders who want to conduct quick data queries, and also creates opportunities for those who wish to explore the data in more detail.¹

As this analysis identifies opportunities and explores potential markets, it will raise almost as many questions as it answers. It does not claim to be a blueprint for financial service provision; there are clearly many commercial and macro-level considerations that go beyond the scope of this work. It will, however, outline the profile and needs of smallholder families and their various subgroups and provide indications as to relevant services.

Regarding the organization of this technical background paper, Section 2 gives an overview of the context of the work, why it is useful, and how its outputs can contribute to the financial inclusion of smallholder households. Section 3 outlines its methodology, highlighting key methodological issues that need to be considered when reviewing the analysis itself. Section 4 presents the research framework proposed in the inception report and refined based on discussions with key stakeholders; it also details our approach to segmentation. Section 5 presents the analyses of the research questions in detail and Section 6 proposes an approach to segmenting the smallholder population and recommends potential opportunities for financial service providers. The Annexes include important notes on the methodology and the detailed results of several analyses.

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The authors would like to acknowledge and thank the primary sponsor of this work—CGAP—for their support. The authors are indebted to the experts who provided support to the research from its outset. Specifically, the authors would like to extend their thanks to Jamie Anderson (CGAP) who provided invaluable intellectual guidance to the research, ensuring a high level of rigour and quality in the final product. The authors would also like to thank the team from Bankable Frontier Associates (BFA) and Intermedia including Laura Cojocar and Wajiha Ahmed (BFA), Dr. Samuel Schueth and Mamadou Thiam (Intermedia) for providing technical support and clarifications regarding the data on which this research is built upon.

¹ Data, user guides, and analyses from the CGAP national surveys and financial diaries with smallholder households are available for download from [CGAP's website](#), the [CGAP Smallholder Families Data Hub](#), and the [World Bank Microdata Library](#).



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02

Context

SECTION 02 :: CONTEXT

Smallholder Financial Exclusion

This research aims to complement and grow the evidence around smallholder financial exclusion. Existing literature points to the need to provide access to financial services as a key ingredient for sustainable poverty alleviation by promoting resilience, economic opportunities and overcoming social challenges. Financial services are also demanded as a means to solving a range of household and economic challenges, such as managing risk and planning for the future. However, the delivery of financial services in rural areas is complex and more so when specifically targeting smallholders as this requires navigation through not only the market failures within finance, but also those within agriculture.²

While the purpose of the research is not to explain the challenges of servicing smallholder farmers, it is instructive to set out a few stylized facts as a basis for our analysis. Some of these relate to characteristics of rural populations:

High transaction costs. Rural populations are in most cases sparsely distributed across areas with poor infrastructure. With low density and high investment needs, costs of both customer acquisition and ongoing transactions are high (particularly relative to the low value and frequency of transactions).

Smallholder families are mostly poor with low literacy levels. Despite some modest gains, illiteracy (general and financial) remains rife in the rural areas of developing countries, especially those that have experienced conflict. Incomes are small with little discretionary surplus.

Absence of financial records or suitable collateral. High informality means information can be hard to gather or verify, while poor land

titling, low asset ownership and weak property rights hamper lending decisions.

Other factors behind the financial exclusion of smallholder families relate to their agricultural activities.

Exogenous risk factors. Smallholders and other value chain participants are heavily exposed to weather, pest and disease risks. Supply/demand imbalances in price-taking markets mean that they are also vulnerable to price volatility.

Risk covariance. Many of the risks facing smallholder families also face their neighbors. This makes it difficult to hedge risk and insure against vulnerabilities.

Demand rationing. The risk adjusted rate of return for smallholder activities is often considerably lower than the price of commercial credit, therefore even where financial services are available, farmers may choose not to use them.

Seasonality. Liquidity is required at discrete points in the agricultural cycle, while harvest incomes need to be managed across hungry periods. Spikes in demand for credit and savings, and the covariance of this demand, pose an additional challenge to financial institutions.

Long lead times. Agricultural investments often have long gestation periods, which increases repayment risk and long-term credit needs can be hard to finance from short term deposits.

However, it should be recognized that a lack of access to formal financial services is not the same as a lack of financial activity. We know that poor populations, including smallholder families, have sophisticated needs and wants for agricultural, household and other services as exposed in the first generation of financial diaries

² For an exploration of this evidence see: <https://www.nathaninc.com/wp-content/uploads/2015/06/Intersection-of-agricultural-and-financial-markets-June-2015.pdf>.

by Rutherford et al.³ This study highlighted the complexity of financial lives of the poor and the informal coping mechanisms that have emerged which enable even very poor populations to conduct a range of financial and quasi-financial transactions.

However, information asymmetries, and a lack of information of smallholder livelihoods and their financial behavior in particular, makes it challenging for financial institutions to effectively design appropriate products specific to the needs of these customers. This can lead to moral hazard (customers taking risks without the knowledge of the lender), diversion of funds (using funds for purposes other than those stated) and adverse selection (higher cost of finance attracting higher risk customers). Understanding the needs and risks among different segments of rural smallholder populations, especially the most marginalized such as women, youth and the very poor, is vital for pricing by financial institutions and to close the gap between the range of financial needs against the basic and low provision of services.

Additionally, the ability to differentiate between these different customer groups will not only help to avoid a “one size fits all approach” for the provision of financial services but could also help to minimize account dormancy among smallholder families.

At the same time, even with the desire and capital by some FSPs to serve smallholders there are very few successful delivery models that reach these communities effectively. Therefore, the sector is locked in a low-supply equilibrium but has enormous potential, to quickly unlock a large supply of smallholder finance if more information is available.

So, despite some advances, we still know only a little about the needs and even less about the wants of smallholder families. Beyond some rough segmentations, we lack an effective framework for understanding how demand for financial services varies between different types of smallholder families. The purpose of this analysis is to use the data on smallholder families

that has already been generated by CGAP and others to further deepen the understanding of financial demand from smallholder families, and to generate insights and intelligence that can feed the design of new approaches to financial service delivery for smallholder families.

Engaging key stakeholders

In order to find solutions to the complex challenges of smallholder financial inclusion, the private sector, namely financial service providers, the public sector and the development community need to work together better.

Financial service providers (FSPs) should be aware of the potential opportunities in building a customer base of smallholder families and have access to data that could determine how they work with them. Therefore, this research will be of value to those FSPs, including large and small banks, banks focused on agricultural lending, commercial MFIs, NGOs, MNOs, insurance companies, leasing companies, payment service providers and other fintech companies, looking to or already working in the developing countries covered by the smallholder diaries and surveys, namely Mozambique, Tanzania, Pakistan, Bangladesh, Côte d'Ivoire, Nigeria and Uganda.

With regards to those FSPs who are already working in this space and seek to scale up their operations, this data and analysis will provide valuable insights into how smallholder families manage money, save, invest, borrow, manage risks and transact, to inform the design of more effective solutions. The analysis aims to highlight the characteristics and behaviors that are common to large groups of smallholders, and how the overall market can be segmented most effectively. By sharing a much more detailed picture of the financial lives of the poor, FSPs can start to build more user-centric solutions for smallholder populations. On the other hand, for those FSPs who need convincing of the opportunities in serving smallholders, our research provides some of those arguments for the business case.

³ For background on financial diaries research, see Collins, Morduch, Rutherford, and Ruthven (2009), Rutherford (2001), the FinMark Financial Diaries, and the results from financial diaries exercises in India, Kenya, Mexico, Rwanda, South Africa, and Uganda (Financial Sector Deepening Kenya 2014, Bankable Frontier Associates 2013).

Aside from FSPs, this research will also be of interest to the broader development sector, working to support poverty reduction through financial inclusion and rural development. And beyond the context of financial inclusion, the unique insights into the lives of smallholder families generated here will also serve to broaden the understanding of the livelihood strategies and behaviors of marginalized and poorly understood populations.

For example, with the evolution of technology for development, there is ever-growing demand to look deeper into how mobile services are used (or not used) in rural communities, the various ways that they might be used by different members of smallholder households and for clues as to the kind of services that might be demanded. Both the smallholder surveys and the diaries provide new data as to how the rural poor are using mobile phones and other technology in their everyday lives.

With regards to agricultural development specifically, the insights help to understand how smallholder families interact with value chains and the markets in which they operate. The data gives a sense of the interconnectedness of activities in different value chains. It also provides valuable information on how subsistence farmers manage in less formal environments, when they do not have access to value chains.

The analysis also goes some way towards meeting the demand for new approaches to market segmentation, to understand how different sub-groups of smallholder families exhibit various behaviors. For the rural development community more broadly, this data can be used to better understand the different characteristics and behaviors of women, youth, the very poor, subsistence farmers and other marginalized groups.



Photo: Esther Ruth Mbabazi/Farm Africa



Photo: Allison Shelley / World Bank

03

Methodology

3.1 Analysis using CGAP Smallholder Diaries

What the data looks like

Cash flow information of 275 households across three countries – Pakistan, Tanzania and Mozambique - was collected every fortnight for about a year from June 2014 to July 2015. The datasets contain information about (1) flows related to income, (2) flows related to operational expenses (purchasing goods and services), (3) flows related to expenditures on physical assets (durable goods), (4) flows related to financial instruments (such as savings or credit), and (5) cash on hand. In total, there are 15 columns in the raw datasets that define detailed individual transactions (Annex 2 shows a full variable list). Table 1 shows the number of households interviewed and number of transactions recorded in each country.⁴

TABLE 1: SMALLHOLDER DIARIES DATASET INFORMATION

Country	Number of Households Interviewed	Number of transaction records
Mozambique	93	21,163
Tanzania	88	71,016
Pakistan	94	136,826
Total	275	229,005

In addition to the cash flow information for each household, demographic information of members of the 275 households have also been collected. This dataset provides basic demographic information including, gender, age, marital status, education, language, illiteracy, etc. In total, the demographic raw dataset has 12 variables.⁵ Table 2 shows number of household members in each country.

TABLE 2: SMALLHOLDER DIARIES DEMOGRAPHIC DATASET INFORMATION

Country	Number of Households Interviewed	Total Household Members/Records	Average Household Size
Mozambique	93	508	5.46
Tanzania	94	602	6.40
Pakistan	88	420	4.77
Total	275	1,530	5.56

The smallholder diaries dataset and the smallholder demographic dataset can be merged using household IDs and household member IDs. We also observe that some of the transactions in the diaries dataset are not assigned to any member of the household as these types of records represent

⁴ During our data review, we have observed duplicate records as well as inconsistent information on cash flow date information.

⁵ Furthermore, we have learned from Bankable Frontier Associates (BFA) that additional data has been administered but not been made publicly available. These data include an event questionnaire and a crop tracker which were administered alongside the diaries. Half-way through the year, BFA had also administered a one-off risk mitigation and coping strategies questionnaire.

the entire household. These records will not have demographic details when the two datasets are merged.

Dataset Conversion

During the inception phase, we carried out an in-depth review of the data and prepared a master dataset that facilitates the analysis of smallholder diaries. As part of our review, we created new variables to classify transactions further under the existing categories. As a result, we created the following three datasets which build the foundation of our analysis of the diaries data:

Annualized household-level data: This dataset aggregates transactions as annual averages per household and has more than 400 variables. Using this dataset, statistical and regression analysis was conducted to segment and compare households in different ways. We have classified transactions according to different categories. Please see Annex 2 for a detailed list of all variables that we have created for our analysis.

Semi-monthly data for each household: This dataset includes the same variables included in the annualized household-level data set but present transactions over time (semi-monthly) to allow for time-series analysis. This dataset helps us to understand seasonal patterns in household's income, expenditures, savings, borrowing, asset purchases and sales.

Semi-monthly data for each household member: This dataset will have the same variables as under 2) but the information has been disaggregated by individual household members at semi-monthly level. We have also merged variables from the demographic dataset for each transaction that can be attributed to a specific household member. This facilitates segmentation and analysis by household member's demographics (gender, age, education, marital status) in relation to different types of transactions over time.

Crops tracker data set: The crops tracker is a separate dataset which was administered alongside the financial diaries. The crop tracker tracks each crop grown by the household, records specifically the amounts of crops harvested, consumed, sold, lost, and given away by each household over time. A corresponding self-reported value of each transaction is noted in local currency which allows to quantify and compare harvesting behavior. The dataset did not record each transaction that occurred; instead it recorded changes in quantity levels every two weeks on the days families were visited by researchers.



Variable Classifications

For our analysis, we have aggregated socio-economic as well as financial variables in different ways. Table 3 provides a more detailed summary of how we have defined the main demographic and socio-economic variables. Table 4 shows how we have categorized financial variables. Annex 2 offers detailed descriptions of variable classifications for financial transactions, physical asset sales, and purchases, as well as expenditures.

TABLE 3: SMALLHOLDER DIARIES AGGREGATION OF DEMOGRAPHIC AND SOCIO-ECONOMIC VARIABLES

Categories	Comment on aggregation
Age	Depending on the analysis, either the average age of the household or the age of an individual is used. When segmenting the sample, age groups in 5-year intervals were created to compare different age clusters.
Gender	It is important to note that we do not use the household-head to represent the gender of an entire household. Instead data at the individual-level is used to compare income, expenditures, and financial transactions of male and female members of any given household. This allows for a much more granular gender analysis.
Education	We classified the respondent's education as primary education or above primary education. The first group includes smallholders whose highest education level is primary schooling. This category includes individuals who have never attended school. The above primary group includes individuals who have at least attended some secondary school or higher forms of education.
Net total income and other income sources	We have defined net total income as the sum of all net income sources, including net income from agriculture, self-employment, regular or casual employment, and other sources such as government grants or support from family and friends. We also look at the composition of different income sources and segment by these sources in research Question 3.2.
Expenditures	These transactions mainly relate to household expenditures and we have aggregated these in several categories as shown in Annex 2 Table A2.3.
Physical assets	These are usually aggregated by asset sales and asset purchases. For research Questions 2.9 and 3.8, assets are grouped further by income-generating assets, investment assets, and household assets. Asset variable classifications can be found in Annex 2 Table A2.2 or in the respective section of the research question.

Table 4 below shows a summary of how formal and informal financial transactions are aggregated, while Annex 2 Table A2.1 shows the aggregation of transactions in greater detail including transaction frequencies. Note that for each type of financial service, there are transactions that are defined as in-flows, such as savings withdrawals, and transactions that are defined as out-flows, such as savings deposits. We have then categorized financial transactions as either 'formal' or 'informal' as

per Table 4. We have not included 'keeping money at home' under the informal category. Households that are only engaging in this type of financial transactions are defined as un-banked due to both the highly informal nature of the transaction as well as the high frequency, which waters down other transactions. A more detailed explanation is given in the following section. In general, it is important to note that there were not a lot of formal transactions in any of the three country samples.

TABLE 4: SMALLHOLDER DIARIES AGGREGATION OF FINANCIAL VARIABLES

	INFORMAL FINANCIAL TRANSACTIONS		FORMAL FINANCIAL TRANSACTIONS	
	Out-flows	In-flows	Out-flows	In-flows
Savings	Deposits	Withdrawals	Deposits	Withdrawals
	Saving in an ASCA		Mobile Money	
	Use money guard		Checking or Savings Account	
	Saving in a Rotating Savings Group		Formal insurance	
	Private investment in someone else's business			
Borrowing	Repayment	New borrowing	Repayment	New borrowing
	Friends and family		Individual Loan from Institution	
	Agent credit		Joint Liability Loan	
	Informal Credit at a Store/Supplier credit		Airtime credit	
	Pawning			
	Moneylender Borrowing			
	Wage Advance from Employer			
	Loan from Employer			
	Borrowing from an Informal Group			
	Layaway			
Lending	New lending	Repayment		
	Act as money guard			
	Friends and Family: Lending			
	Credit Given to Clients			
Un-banked	<i>Keeping money at home</i> has been excluded from the analysis. See explanation in text.			

Notes regarding variable definitions and limitations

Below we summarize some general points regarding how we aggregated transactions into new variables as well as some limitations regarding the data. These are important to note and to keep in mind when reviewing the analysis presented in this paper.

In-flows, out-flows, and net values. Most transactions in the diaries data are categorized to be either cash in-flows or cash out-flows.⁶ For income transactions, this implies that there are cash in-flows associated with different income-generating activities which are the household's revenues from, for example, selling agricultural produce, selling goods at a small shop or receiving wages. There are also cash out-flows associated with income-generating activities, which can be interpreted as expenses such as paying for fertilizers and seeds, paying the rent for a small shop or paying taxes when earning a wage. Often in our analysis we will refer to net income, which can be interpreted as the gross profit from an income-generating activity (revenues minus the costs).

For instance, to arrive at net agricultural income, costs for fertilizers, seeds or other inputs are deducted from the revenues from selling crops. For other transactions such as asset purchases or financial transactions, the analysis shows the plain out-flows or in-flows. For example, we have created a new variable which aggregates all cash out-flows of informal savings products under informal savings deposits. Conversely, we have aggregated all cash in-flows of informal savings products under informal savings withdrawals. We also show asset purchases and sales in separate variables.

In-kind and cash transactions. We have combined in-kind and cash transactions for our analysis. This is possible because the diaries data quantifies the value of an in-kind transaction in local currency. All transactions, including income, expenditures, asset purchases and sales, therefore include both in-kind and cash transactions. The entire value of any household's transactions is therefore covered in our analysis.

Average annual transaction values and total transaction values. Throughout our analysis, average annual transaction values are used to compare groups of different smallholder households. The average annual transaction values are arrived at by summing transactions of a certain type across a group of households and dividing this sum by the number of transacting households. It is important to note that the number of households in the denominator can vary because not all households engage in every type of transaction.

For example, when we calculate the average transaction value of formal savings deposits, we find that only a small sub-set of households actually engaged in these transactions – the denominator for the average will therefore be the number of these households. Conversely every household receives income. The denominator for calculating the average income will therefore be larger by definition. For some analysis, we present total transaction values which are the simple sum of a certain type of transaction as opposed to taking the average across households. In research question 2.1, for example, we use total transaction values to compare how income, expenses, savings and borrowings vary over time.

Calculating loan repayment. In the diaries data, financial transactions are assigned to accounts. Each account has a unique ID and corresponds to an individual. Individuals can have multiple accounts of the same type; for example, an individual could have a loan account with a formal bank as well as an account with a money lender. Each account then has a starting balance, repayments, in some cases new borrowings, and a closing balance. This allows us to track the repayment status of each loan account over time. At the household-level, some individuals might therefore have fully repaid the outstanding loan that was taken at a store while another loan account (e.g. loan from a friend or family) has only been partly repaid. A limitation here is that the data does not indicate any due dates for loan accounts while new borrowings can be taken out throughout the year from any given loan account. The total value of the loan that is associated with a certain account can

⁶ Not all data points are transaction flows but can be account balances as well. Under financial transactions these could be, for example, either the starting balance or closing balance of any given account.

therefore vary, which makes it difficult to analyze repayment behavior over time in terms of percentage of loans repaid. Repayment behavior over time and how this relates to other variables such as agricultural income or household expenses can, however, still be analyzed in a straightforward way.

Interest rates. The diaries data only include very few data points on interest rates. An analysis using these data is therefore not feasible across the three country data sets – specifically since Pakistan and Mozambique do not have any such data. An alternative approach could be to use the surplus of loan repayments over the initial loan amount as a measure of interest on the loan. However, since only a subset of loan accounts has been closed, a surplus cannot be identified across the board in a straightforward way. Our analysis of cost of borrowing is therefore very limited.

Keeping cash at home. Please note that transactions which are categorized as ‘keeping money at home’ have not been included under savings transactions. There is a very high turnover of this category of transactions with frequent same-day deposits and withdrawals, indicating that it is short-term storage of cash. Consequently, the sum of these transactions is a multiple of the sum of all remaining savings transactions. This makes it difficult to analyze and present the difference between other types of savings transactions when including keeping money at home.

3.2 Analysis using CGAP National Surveys of Smallholder Households

The National Surveys of Smallholder Households contain data for 6 countries - Mozambique, Uganda, Tanzania, Cote d’Ivoire, Bangladesh and Nigeria. As such, we have not performed any data conversions since the variables are already aggregated and in a format that we can use for our analysis. For each country, there are three types of surveys that have been conducted:

- 1. Household Survey:** Either head of the household, or their spouse, or a knowledgeable adult from the household responded to this survey. This survey contains basic information on all household members, for example age, gender, education attainment, schooling status as well as on household income, minimum amount that household requires for survival and information about household assets and dwelling characteristics.
- 2. Multiple-Respondent Survey:** All household members over 15 years old who contributed to the household income and/ or participated in its agricultural activities were asked to respond to this survey. It contains information about demographics and household economics.

- 3. Single-Respondent Survey:** One randomly selected adult in each household was interviewed for this survey. This dataset contains information on agricultural activities (market relationships, storage, risk mitigation), household economics (expense prioritization, insurance, financial outlook), mobile phones (usage, access, ownership, desire and importance), and formal and informal financial tools (ownership, usage, access, importance, attitudes toward financial service providers).

Please see Table 5 for number of records in each dataset and each country. Using household ID and household member ID, we merge the three datasets for our analysis.

TABLE 5: TOTAL NUMBER OF RECORDS IN EACH COUNTRY

COUNTRY	NUMBER OF RECORDS		
	Household Dataset	Single Dataset	Multiple Dataset
Mozambique	2,574	2,574	4,456
Uganda	2,870	2,771	5,517
Tanzania	2,993	2,795	5,034
Côte d'Ivoire	3,019	2,949	5,706
Nigeria	3,026	2,858	6,643
Bangladesh	3,154	3,095	5,214
Total	17,636	17,042	32,570

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Table 6 summarizes how demographic and socio-economic variables were approached for the analysis.

TABLE 6: SMALLHOLDER HOUSEHOLD SURVEYS AGGREGATION OF DEMOGRAPHIC AND SOCIO-ECONOMIC VARIABLES

CATEGORIES	COMMENT ON AGGREGATION
Age	Depending on the analysis, either the average age of the household or the age of an individual is used. When segmenting the sample, we defined 4 age groups: Less than 30, 31-45, 46-60, and more than 61. Additionally, two types of classification are also created to compare different age clusters – 1) age groups in 5-year intervals, 2) youth (15 to 30 years old), and old (above 30 years old)
Household size	The household size is the sum of all household members, including children of all ages. We have calculated the average household size of different segments of smallholder farmers.
Gender	We have individual-level data on the respondents of the questionnaire and are therefore able to relate variables of interest, such as financial usage or agricultural activity, to the gender of the individual respondent.
Education	When segmenting the sample, we defined the following 4 levels of education: 1) No schooling or never attended school 2) Attended primary school (this includes individuals who might have graduated from primary school but did not continue education in secondary school) 3) Attended secondary (this includes individuals who might have graduated from secondary school but did not continue education) 4) Post Secondary and Graduates (this includes individuals who continued education after secondary school)
Location (rural/urban)	Rural and urban areas were defined by national population censuses. The definition of rural and urban areas will therefore vary slightly between countries depending on national definitions. Unfortunately, GPS data on the location of respondents was not available.
Household Monthly Income	The monthly income is a self-reported estimate from the household head. Here it is important to note that this is not the net income (as defined for the diaries data) but the gross income as estimated by the head of household. Any expenses relating to agriculture or other income generating activities are therefore not deducted from this figure.
Occupation (Largest source of Income)	There is no straightforward measure for occupation. We use a question that relates to the largest source of income of the household as a proxy. When segmenting the sample, we defined 5 income sources: "Agricultural income", "Grants, subsidies, or non-refundables from family/friends", "Self-employment", "Earning Wages", and "Others". We have then analyzed financial usages of the respondents by the classified largest income sources.

As for the smallholder household surveys, we have defined financial services as either ‘formal’ or ‘informal’. Table 7 outlines how we have categorized formal financial services. Here a household would be counted to engage in formal financial services if any of the following three questions have a positive response:

- Do you personally have a (bank) account that is registered in your name? (F4)
- Following are financial service providers that are less formal than banks. Have you ever used any of the following... (F17)
- Do you have a registered account with any of the following mobile money providers? (F33)

TABLE 7: FORMAL ACCOUNT CLASSIFICATION

NOTE: IF A RESPONDENT SAYS “YES” TO ANY OF THE QUESTIONS IN F4, F17 AND F33, WE HAVE CONSIDERED THAT THE RESPONDENT HAS A FORMAL ACCOUNT.

Country	F4. Do you personally have an account that is registered in your name (If yes)		(F17) Following are financial service providers that are less formal than banks. Have an account / membership in your name with the following? (If yes)		F33. Do you have registered account in the following mobile money providers? (If yes)		Overall
	Yes						
Mozambique	Yes	9.9%	Microfinance institution (Yes)	3.1%	Mcel (Yes)	0.3%	12.5%
			Cooperative (Yes)	1.1%	Vodacom (Yes)	0.0%	
			Credit union (Yes)	0.3%	Other provider (Yes)	0.1%	
Tanzania	Yes	9.7%	Microfinance institution (Yes)	3.3%	Vodacom (Yes)	30.3%	51.6%
			SACCO (Yes)	1.8%	Tigo Pe (Yes)	19.5%	
			Cooperative (Yes)	1.0%	Airtel (Yes)	16.9%	
			VSLAs (Yes)	2.4%	Zantel (Yes)	0.1%	
			Post office bank (Yes)	0.7%	SMART (Yes)	0.0%	
					Halotel (Yes)	0.6%	
					Other provider 1 (Yes)	0.0%	
		Other provider 2 (Yes)	0.0%				
Uganda	Yes	9.6%	Microfinance institution (Yes)	1.8%	MTN Mob (Yes)	18.2%	27.3%
			SACCO (Yes)	5.7%	Airtel (Yes)	7.4%	
			Cooperative (Yes)	1.0%	M-Sente (Yes)	0.2%	
					Ezee Mo (Yes)	0.0%	
					Vodafone (Yes)	0.0%	
					Africel (Yes)	0.0%	
					Mcash (Yes)	0.0%	
					Micropa (Yes)	0.0%	
					Smart M (Yes)	0.2%	
					Orange (Yes)	0.1%	
		Other provider (Yes)	0.1%				
Bangladesh	Yes	21.9%	Microfinance institution (Yes)	27.5%	bKash	17.5%	51.8%
			Cooperative (Yes)	1.7%	DBBL Mobile Banking	2.1%	
			Village level semi-formal savings (Yes)	2.4%	M Cash	0.0%	
			Post office bank (Yes)	0.2%	M Pay	0.0%	
					U Cash	0.0%	
					Mobi Cash	0.0%	
					Sure Cash	0.0%	
					MyCash	0.0%	
		Other	0.0%				

Country	F4. Do you personally have an account that is registered in your name (If yes)	(F17) Following are financial service providers that are less formal than banks. Have an account / membership in your name with the following? (If yes)	F33. Do you have registered account in the following mobile money providers? (If yes)	Overall			
Côte d'Ivoire	Yes	5.3%	Microfinance institution / Cooperative (Yes)	3.8%	Orange M (Yes)	20.3%	29.0%
			Post office (Yes)	0.8%	MTN Mobi (Yes)	10.4%	
					Flooz (Yes)	1.2%	
					CelPaid (Yes)	0.0%	
					Mobile B (Yes)	0.0%	
					Other provider 1 (Yes)	0.0%	
Nigeria	Yes	20.6%			Other provider 2 (Yes)	0.0%	25.2%
			Microfinance institution (Yes)	0.7%	Access Bank (Access mobile) (Yes)	0.1%	
			SACCO (Yes)	1.1%	Airtel Money (Yes)	0.0%	
			Cooperative (Yes)	3.5%	Cellulant Nigeria (Cellulant) (Yes)	0.0%	
			VSLAs (Yes)	3.8%	Chams Mobile (Yes)	0.0%	
			Post office bank (Yes)	0.1%	Diamond/MTN Y'ello (Yes)	0.0%	
					Eartholeum Networks (QikQik) (Yes)	0.0%	
					Ecobank (Ecobank Mobile Money) (Yes)	0.2%	
					Etisalat Easywallet, etc. (Yes)	0.0%	
					ETranzact (Pocket moni)	0.0%	
					FETS Solution (Mywallet)	0.0%	
					Fidelity Bank (Quick-Pay)	0.0%	
					Fortis Microfinance bank (Fortis Mobile Money)		
					FCMB Flash Me Cash	0.1%	
					Glo Mobile Money	0.1%	
					GT Bank (GT Mobile Money)	0.1%	
					Hedonmark Management Services (Click n Pay)	0.00%	
					MKudi (Mimo)	0.00%	
					Pagatech (Paga)	0.00%	
					Parkway Projects (ReadyCash)	0.00%	
		Pay Com	0.00%				
		Pridar System (FirstMonie/ First Bank)	0.00%				
		Stanbic IBTC (Stanbic #909 Mobile Money)	0.00%				
		Teasy International (Teasy Mobile Money)	0.00%				
		Virtual Terminal Network (Vcash)	0.00%				
		Zenith Bank (Eazymoney)	0.00%				
		Zinternet	0.00%				
		Other (Specify)	0.00%				

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Table 8 shows how we define informal financial services. A household would be defined to use these if any household member would have responded positively to the following question:

Note that formal and informal accounts have been defined slightly different for each country survey.

- The next few questions are about informal financial services and service providers. Have you ever used any of the following... (F46)

TABLE 8: INFORMAL ACCOUNT CLASSIFICATION

NOTE: IF A RESPONDENT SAYS “YES” TO ANY OF THE QUESTIONS IN F46, WE HAVE CONSIDERED THAT THE RESPONDENT HAS AN INFORMAL ACCOUNT.

Country	F46. The next few questions are about informal financial services and service providers. Have you ever used any of the following?	Overall	
Mozambique	Xitique or saving and credit group	17.2%	25.8%
	Money guard/ someone in workplace or neighborhood	6.4%	
	Savings collectors	2.4%	
	Digital card / Recharge card	1.0%	
	Money lenders	11.6%	
	Other group	0.4%	
Tanzania	Merry go round / informal savings network	11.2%	19.8%
	Money guard/ someone in workplace or neighborhood	3.6%	
	Savings collectors	1.6%	
	Shop keepers	4.4%	
	Digital card / Recharge card	0.5%	
	Other group	1.7%	
Uganda	VSLAs (Village Saving and Lending Associations)	25.9%	46.2%
	ROSCA (nigiina) / Chama	11.2%	
	Other informal saving and credit group	0.0%	
	Money guard/ someone in workplace or neighborhood	5.4%	
	Savings collectors	1.5%	
	Shop keepers	1.9%	
	Digital card / Recharge card	12.0%	
	Money lenders	0.4%	
Côte d'Ivoire	Other group	3.4%	22.5%
	Village-level savings and loans group	9.5%	
	Other informal saving network or ROSCA	15.4%	
	Money guard/ someone in workplace or neighborhood	2.9%	
	Savings collectors	0.7%	
	Digital card / Recharge card	0.4%	
Nigeria	Other group	0.5%	26.8%
	Merry go round / informal savings network	22.8%	
	Money guard/ someone in workplace or neighborhood	3.2%	
	Savings collectors	6.6%	
	Shop keepers	2.3%	
	Digital card / Recharge card	0.2%	
Bangladesh	Other group	0.2%	14.6%
	Village-level savings group	10.8%	
	Other informal saving network	1.1%	
	Money guard/ someone in workplace or neighborhood	1.2%	
	Savings collectors	0.8%	
	Hawla / Hundi network	1.2%	
Digital card / Recharge card	0.4%		
Other group	0.9%		

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

3.3 Analytical approaches

Throughout the analysis we use a varied tool kit of analytical techniques, including multiple regression analysis, probit regressions, mean comparison tests, indices (that we developed), and segmentation using clustering methods. The following section explains each approach and technique in detail and indicates the research questions for which they were used.

Index development using national surveys

We have used the national surveys to develop indices which facilitate the segmentation of smallholder households. For research question 1.9, we have developed an index that rates smallholder households according to their linkages to value chains. To quantify the linkage strength to value chains, we developed a scoring system across 5 selected questions. The answers to each of these 5 questions are scored, where a household gets more points if responses to the selected questions indicate a strong linkage to value chains. Here responses that associate with a strong linkage to value chains, such as selling produce to a wholesaler or trading company, score high, while responses that associate with weaker linkages, such as selling produce at the local village, score low. For each household an overall score is calculated, which will be higher for households with stronger value chain linkages. Households are then subsequently ranked according to this index and then segmented into groups using a clustering approach as described in the next section.

It is worth mentioning here that we have further developed the index used for question 1.9 and have developed a new way of segmenting smallholder farmers. This segmentation is based on the level of commercialization using the national surveys and builds on the work that we have done over the past months.

Similar to our approach for research question 1.9, which is described in section 5 of this paper, we have built this index using questions from the national survey data multiple respondent questionnaire. Table 9 shows which questions were used, how we have scored the responses

to these questions to develop a scoring for each household. The results of this new segmentation model are discussed in the conclusion section below. We conclude that this is our preferred segmentation model and look forward to further discussing this.



Photo: Geeska Afrika

TABLE 9: VARIABLES INCLUDED IN NEW COMMERCIALIZATION INDEX AND SCORING TABLE

Questions from national survey's multiple respondent survey	STRONG	MEDIUM	WEAK
	Responses that count 3 points	Responses that count 2 points	Responses that count 1 point
A27: Who do you sell your crops and livestock to?	<ul style="list-style-type: none"> Wholesaler Processor 	<ul style="list-style-type: none"> Co-operative Retailer Direct to a government agency Middleman / trading company 	<ul style="list-style-type: none"> Don't know Other Directly to the public
A32: Do you have a contract to sell any of your crops?	Yes	-	No; Don't know
Sum: A2+A3: How many hectares do you own, rent, borrow or have the right to use?	High ⁷	Medium	Low
A4: Do you consider your farm to be a business?	Yes		No; Don't know
A23: For managing the land and livestock, what types of labor do you use?	<ul style="list-style-type: none"> Hired labor for extended period Daily rate for agricultural labor 	<ul style="list-style-type: none"> Friends or neighbors' labor, on a reciprocity basis 	<ul style="list-style-type: none"> Family labor Other None
A25/A5: Crops sold over crops grown	High ⁸	Medium	Low
H2B: What is your main source of income?	<ul style="list-style-type: none"> Growing something and selling it; Rearing livestock and selling it or its byproducts 	-	Other

Determining segments using wards linkage clustering method

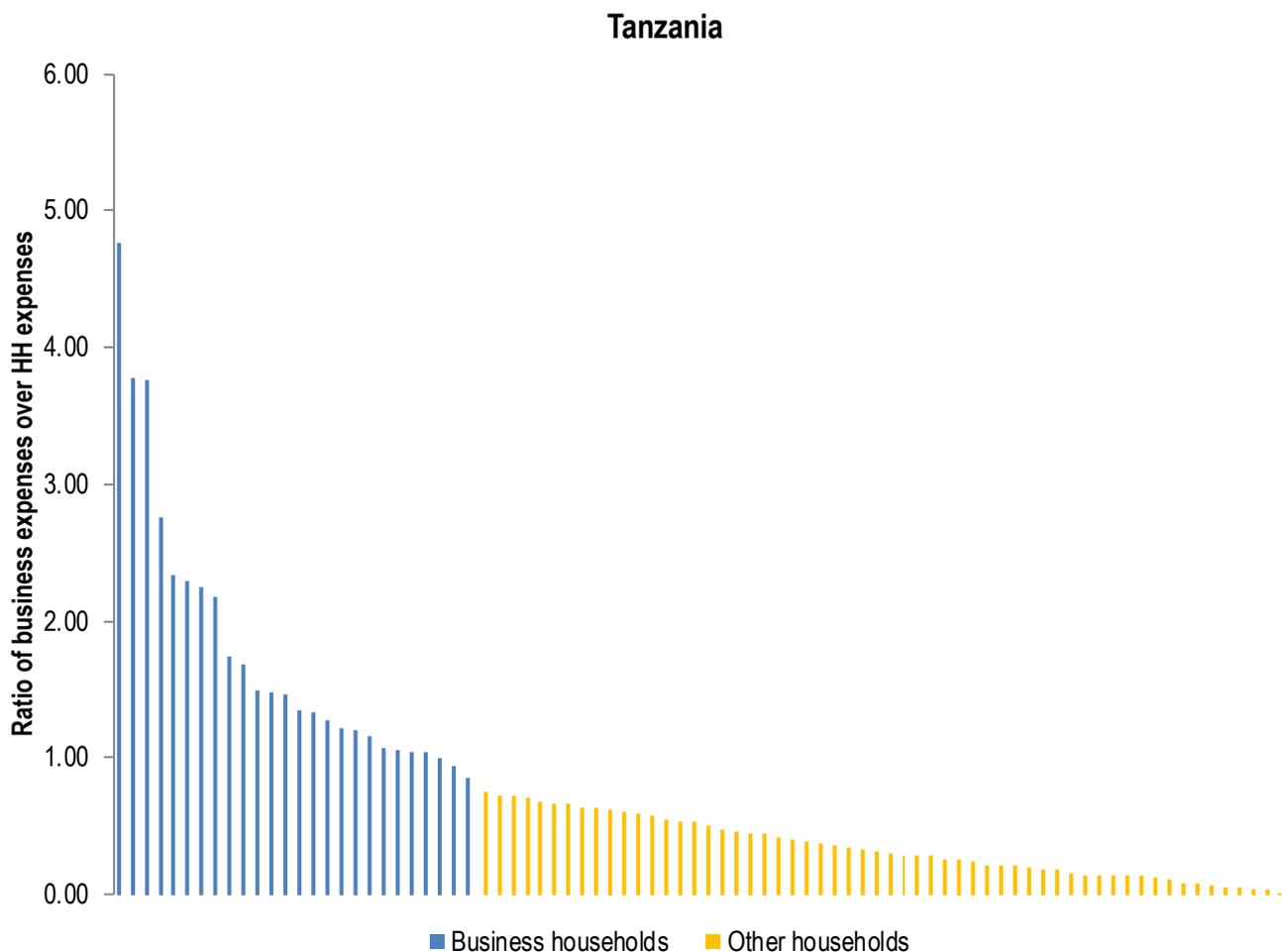
To segment smallholder farmers according to different characteristics, we make use of different transaction ratios or indices. For example, for research question 3.4, we define commercialization as the share of net agricultural income out of net total income. For research

question 3.8, we divide all business-related expenses over all household-related expenses for each household. This ratio is then used to rank and classify households as 'business household' or 'other household'. Figure 1 shows an example of such a rating for the business-expense ratio in Tanzania (see research question 3.8 in this paper for more detail).

⁷ Note that we have applied the wards linkage clustering method to segment households by size of farming land.

⁸ Note that we have applied the wards linkage clustering method to segment households by the ratio of crops sold over crops grown as a proxy for commercialisation.

FIGURE 1: RATIO OF BUSINESS EXPENSES OVER HOUSEHOLD EXPENSES FOR HOUSEHOLDS IN TANZANIA (SMALLHOLDER DIARIES)



To segment the distribution of households into different groups, the Ward's linkage clustering method is applied. Ward's method is commonly used to define clusters and is appropriate for quantitative variables. For each cluster, the sum of squares is calculated. The two clusters with the smallest increase in the overall sum of squares within cluster distances are combined.⁹ In Figure 1, we color-coded households that behave more like a small business in navy and other households which spend relatively fewer resources on income-related activities are marked in yellow. As a next step, we compare average transaction values of income, expenses or financial transactions between the two groups. This type of analysis has been applied wherever we want to segment a sample into different

groups according to a common ratio. Research questions where this method was applied are 1.9, 2.7, 3.3, 3.4, 3.8, and 3.10. Also note that in some cases, the clusters were defined based on the within country distribution of the ratio, while in others the distributions across countries were merged and a common segmentation cut-off point was determined for all country data sets.¹⁰

Statistical methods

To analyze both the smallholder diaries and the surveys, we have applied different statistical methods. Table 10 summarizes each method and gives some examples of where we have applied these in the analysis.

⁹ The book "Marketing Research: An Applied Orientation, 6/E By Malhotra Naresh K." Page number - 620; see https://mdozmorov.github.io/BIOS567/assets/presentation_Clustering/Clustering.pdf

¹⁰ In Section 4, we have described in detail our approach and methodology under a three-layered research framework comprising of specific research questions.

TABLE 10: SMALLHOLDER DIARIES AGGREGATION OF FINANCIAL VARIABLES

EXPLANATION	EXAMPLES
Mean Comparison Test	
<p>Mean Comparison Test is used to test whether the difference in the average between two groups is statistically significant or not.</p>	<p>We have used this test in various analyses to:</p> <ol style="list-style-type: none"> 1. Compare the average transaction sizes of males and females. 2. Compare educated and uneducated respondent's financial behaviours. 3. Compare users of formal financial services with users of informal financial services. 4. Compare mobile money users with respondents who do not use mobile money. 5. Compare commercialized farmers with non-commercialized farmers. 6. Compare business households with non-business households. 7. Compare smallholders with strong value-chain linkages with smallholder with weak value chain linkages.
Correlation Analysis	
<p>Correlation analysis is a statistical technique used to estimate the extent to which two variables move together over time.</p> <p>If the value of the correlation is +1, then it implies that the two variables move lock-step in the same direction, i.e., an increase in the value of one variable is matched by a similar increase in the value of the other variable, and a decrease in the value of one variable is matched by a similar decrease in the value of the other variable.</p> <p>A correlation of -1 indicates that the two variables move in a symmetric manner but in opposite directions, i.e., they diverge from each other.</p> <p>A correlation value of 0 implies that there is no relationship in the movement of the variables</p>	<p>We have used correlation analysis in research question 2.4 "how does income relate to behaviour around expenditure, savings and borrowing?" to understand how lag, current and lead income affects the behaviour around expenditure, savings and borrowing. We have also used correlation analysis in research questions 2.1, 2.7, and 3.4.</p>
Multiple Regression analysis	
<p>Regression analysis is a commonly used statistical technique to quantify the relationship between one variable and factors (variables) that one would theorize to affect this variable. For example, this analysis allows us to quantify the change in income for a change in one of the factors that influences income.</p> <p>For instance, we can say what the change in average monthly income of a smallholder farmer in Mozambique is when the farmer possesses a high school education as opposed to no education, while taking into account other factors that influence income such as household size, location, or age.</p>	<p>Regression analysis has been used throughout our analysis for both national surveys and smallholder diaries data. Examples of questions where we have used multiple regression analysis in research questions 1.1, 1.3, 1.11, 3.4.</p>

Probit regression	
<p>Probit regression is used to model dichotomous or binary outcome variables. In the probit model, the inverse standard normal distribution of the probability is modelled as a linear combination of the predictors. The dependent variable of the model will take a value of 1 if the instance occurs and 0 if the instance not occurred.</p> <p>A probit regression allows us to, for example, identify factors that increase or decrease the probability of a households using informal financial tools or not. As opposed to the multiple regression analysis, the probit model uses a binary dependent variable. In other words, the variable of interest only takes two values: 'Yes' for those households that do use informal financial services and 'No' for those that do not. This dependent variable will then be modelled as a function of various socioeconomic, demographic and behavioral variables.</p>	<p>Probit regression analysis is used in various research questions:</p> <ol style="list-style-type: none"> 1. Research question 1.7 - What are the important factors in determining propensity to use digital financial services? How important is age in this? Here the dependent variable of the model takes a value of 1 if the respondent has mobile money account and 0 if the respondent does not have mobile money account. 2. Research question 1.2 - What are the factors affecting the households to have formal bank accounts? Here the dependent variable of the model takes a value of 1 if the respondent has formal financial account and 0 if the respondent does not have formal financial account. 3. Research question 1.10 - What are the factors affecting the households to have informal account? Here the dependent variable of the model takes a value of 1 if the respondent has informal financial account and 0 if the respondent does not have informal financial account.
Coefficient of variation	
<p>In order to measure the income volatility, the coefficient of variation is used. The coefficient of variation measures the variability of a series of numbers independently of the unit of measurement used for these numbers. In order to do so, the coefficient of variation eliminates the unit of measurement of the standard deviation of a series of numbers by dividing it by the mean of these numbers." Coefficient of Variation=$SD / Mean * 100$.</p>	<p>In order to measure the income volatility, the coefficient of variation is used in research question 2.7. Households have higher income volatility when the coefficient takes on higher values. For lower values, households have lower income volatility.</p>



Photo: Allison Shelley / World Bank

04

Research Framework and Questions

SECTION 04 :: RESEARCH FRAMEWORK AND QUESTIONS

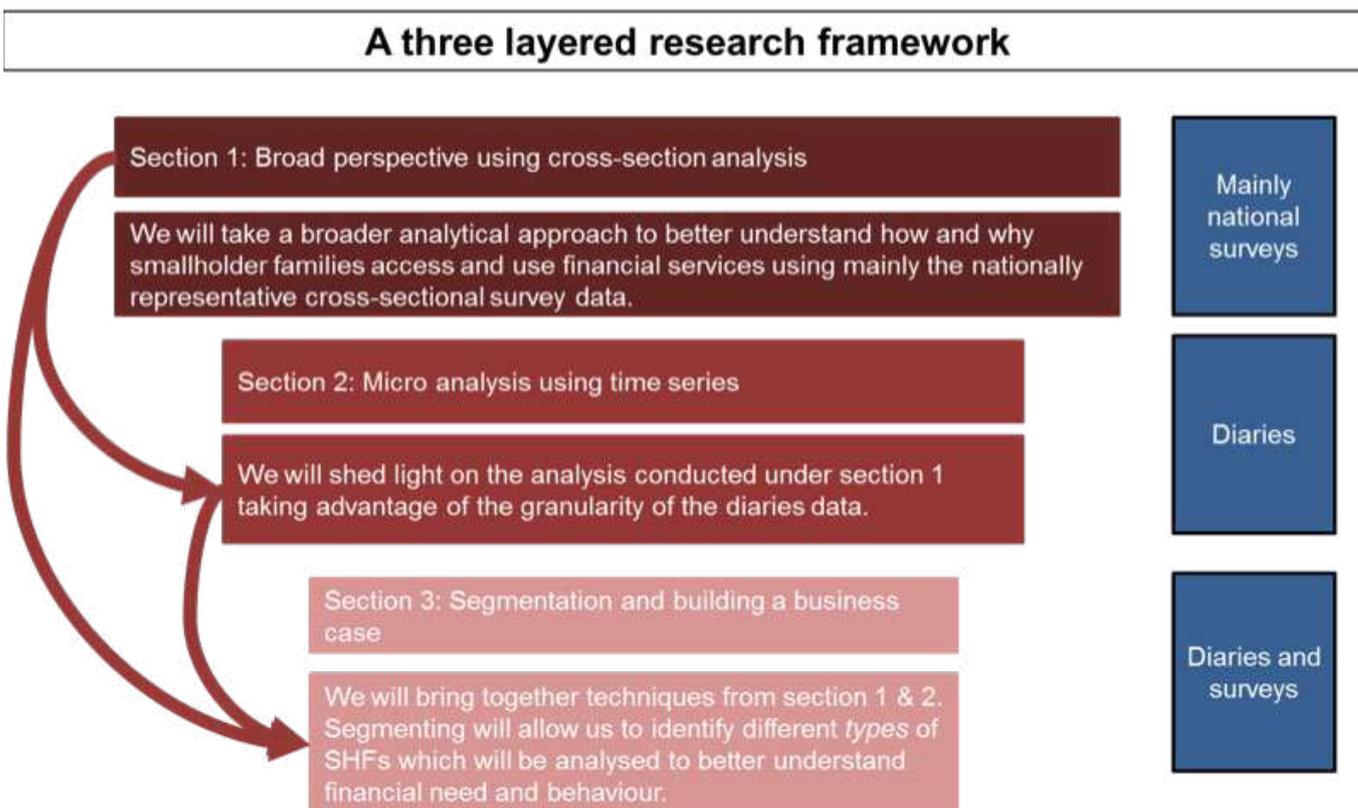
Our research framework has been carefully designed to map the richness of the available data on to the requirements of stakeholders in the smallholder finance space. A few key themes have guided its design:

- 1. Specificity:** This is not generic smallholder finance research but an attempt to draw as many new insights as possible from the smallholder diaries and surveys data (using complementary sources where required).
- 2. Practicality:** This is not academic research, and we are not investigating research hypotheses out of pure interest. Our findings therefore have practical implications for stakeholders.

- 3. Narrative:** The value of much of these data (particularly the diaries) is not in its statistical significance but in its depth. It was important for our analysis to identify interesting stories that help to illustrate the smallholder family experience.
- 4. Relevance:** These data could tell a million stories. We have isolated and focused on those that are most interesting to financial service providers, donors, and other key stakeholders.

With this in mind, we have designed a three-layered research framework which is detailed in Figure 2. In the process of developing this research framework, we have considered CGAP's suggested research questions carefully and have selected a sub-set of these to include in our research framework below.

FIGURE 2: DIAGRAM OF RESEARCH FRAMEWORK



Research Tracker

We have carefully documented the process of developing our framework by categorizing a long list of potential questions in a *research tracker*, which includes both CGAP's questions as well as our additional research questions. Our *research tracker* includes variables that link the research questions detailed in the sections below to the list of research questions.

As we developed our research framework, we used this tracker to note detailed descriptions of planned research approaches for each research question and clearly document every step in our research.

In the following sections, we describe our three-layered research framework. Please note that in each section we have included a table with research questions. The questions are numbered and refer to data source and a type of analysis.

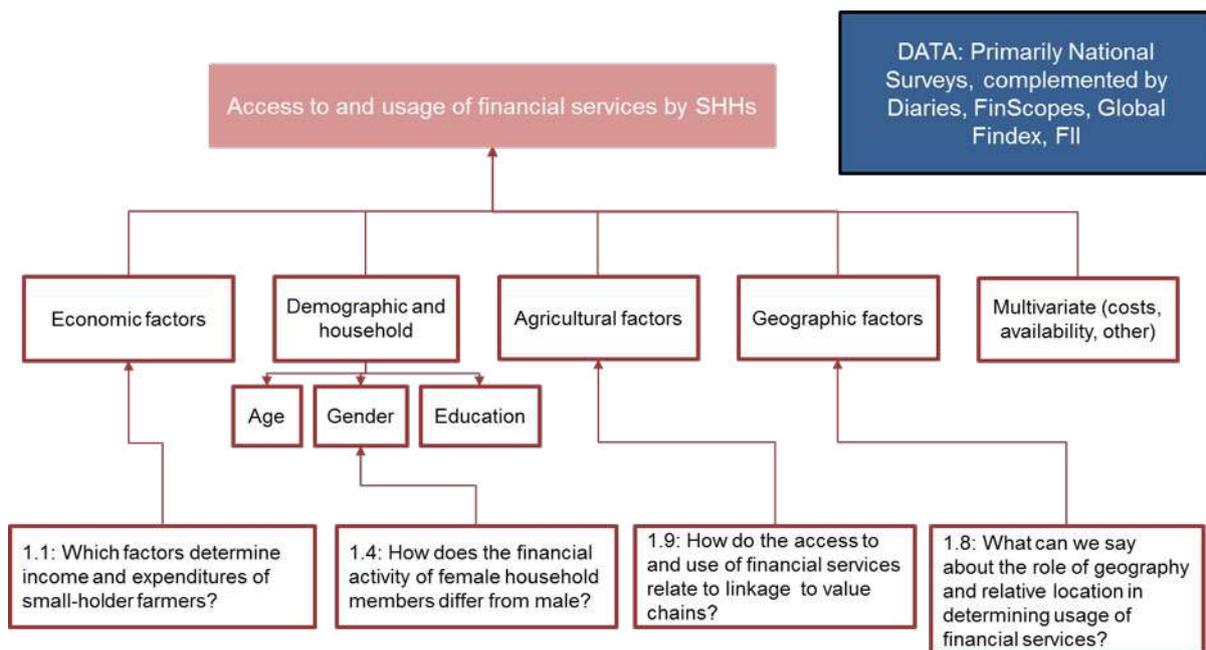
4.1 How and why do smallholder families access and use financial services?

As a starting point for our analysis, we explored some high-level questions around the access to and usage of financial services by smallholder families.

Taking the six survey datasets as the basis for our analysis, we looked to isolate the key determinants of financial decision making in smallholder households, with an emphasis on those in Mozambique, Uganda, Bangladesh, Tanzania, Côte d'Ivoire and Nigeria. Where possible, we also brought in relevant data from Finscopes, FSP maps and FII here.

The analysis used a range of econometric techniques based around regression analysis. Essentially, we were hypothesizing that access to or usage of a particular financial service, or type of financial services (e.g. digital), is a function of a wide range of variables. These included data points around personal, social, economic, household, environmental, agricultural and other characteristics (Figure 3).

FIGURE 3: ACCESS AND USE OF FINANCIAL SERVICES RESEARCH TREE



Please see below the research questions for Section 1 of our research that we have addressed with our analysis.

TABLE 11: RESEARCH QUESTIONS: SECTION 1¹¹

Thematic Area	RQ#	Research Questions	Data
Economic factors	1.1	Which factors determine income and expenditures of small-holder farmers?	Surveys
	1.2	How do more formally banked households compare to informally banked households with respect to commercialization, total income, physical asset portfolio, expenditure?	Surveys and Diaries
	1.3	How is access to and use of financial solutions associated with the most positive livelihood outcomes (i.e. low poverty, high income, low income volatility) for smallholder households?	Surveys and Diaries
Demographic and household factors	1.4	How does the financial activity of female household members differ from male, and how do the gender roles tend to vary between countries?	Diaries
	1.5	How does the behavior of older family members compare to younger family members (e.g. in terms of financial activities, diversity of incomes, risk appetite, overall livelihood strategies)	Surveys and Diaries
	1.6	How do educated household members compare to less educated household members in terms of income generating activities, making household expenditures, asset purchases/sales, and savings/borrowing behavior?	Surveys and Diaries
	1.7	What are the important factors in determining propensity to use digital financial services? How important is age in this?	Surveys
Agricultural factors	1.9	How do the access to and use of financial services relate to linkage strength with value chains? What other features of agricultural activity are related to usage of formal and informal tools? Can we explore the importance of connections to markets as a determinant of income, poverty, assets, livelihood strategies, digitization, etc.	Surveys and Diaries
Other variables	1.10	How are the outcomes of access to and use of finance associated with the development stage of the financial industry in the country?	Surveys and Diaries
	1.11	What are the key drivers behind the usage of informal financial tools? What can the data tell us about the relative role of cost, flexibility, availability and other factors in making these decisions?	Surveys and Diaries

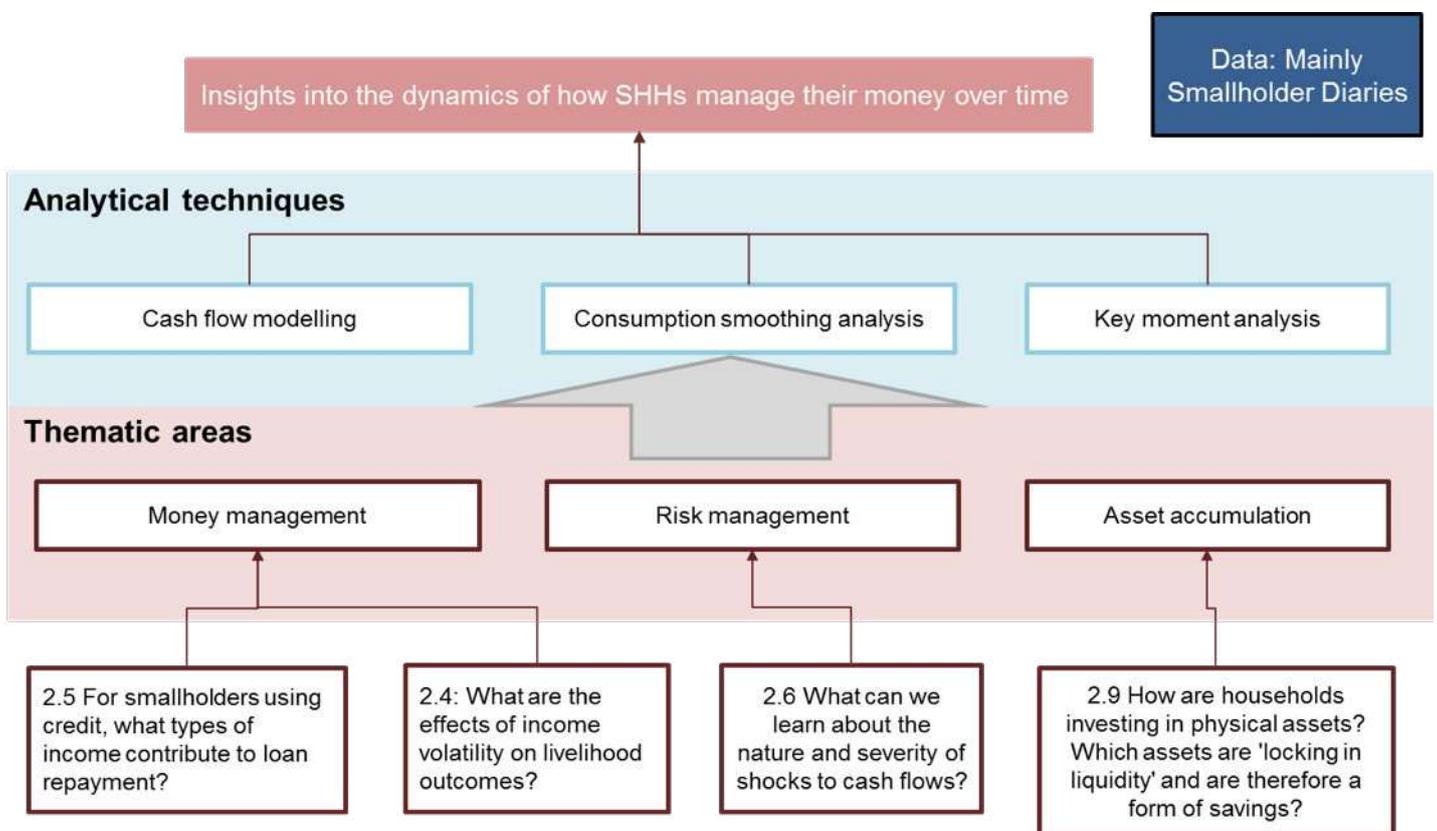
¹¹ Note that it was agreed with CGAP to exclude research question 1.8 since no consistent data across all national surveys on location (GPS) is available to conduct the analysis. (Research question 1.8: By linking the geotagged Surveys data to data from FSP maps where available, what can we say about the role of geography and relative location in determining usage of financial services?).

4.2 How do smallholders manage incomes and expenditures?

The second section of the research framework uses the diaries data to further dig onto initial findings from our analysis of national surveys (and other macro sources) in Section 1 of our research. The primary data source is the smallholder diaries data from Tanzania, Mozambique and Pakistan, which is also complemented with additional data where possible. Though the statistical significance of

these data is limited, they provided a unique opportunity to examine in more detail some of the key issues that have emerged from our initial analysis. The data helps to tell more detailed stories and add narrative to some of the trends identified in Section 1. We have used a range of additional techniques to analyze these very different data sets as per Figure 4.

FIGURE 4: HOW DO SMALLHOLDER FAMILIES MANAGE THEIR INCOMES AND EXPENDITURES FOR RESILIENCE, INVESTMENT AND OTHER NEEDS AND WANTS?



Cash flow modelling and graphical analysis. The unique time series allows us to track dynamic trends over the course of the agricultural and annual cycles. By modelling how income and borrowings map on to expenditures and savings we can track how liquidity is managed and investigate how decisions are made. By comparing within and between households this provides a simple framework for understanding how key variables such as gender, age and income affect financial behavior.

Consumption smoothing analysis. The data shows us that there is variation in how different households manage their income to finance expenditure and investment over time. Where some households manage to smooth consumption to a certain degree and save-up for larger, potentially production-related, investments, others go through 'hunger periods' and struggle to make larger investments. Patterns of how different types of households make small and regular transactions versus larger and lumpy ones can tell us a lot about variations in behavior.

Key events analysis. The data initially suggested that there are certain important transactions that occur in the financial cycle of a household. Examples might be the purchase of an asset, investing in a savings product or taking out a loan. Here we will build on Rutherford's concept of *useful lump sums*. These large lump sum financial transactions can form pivotal points in the lives of smallholder households which have tried to identify and examine in detail. Using the diaries data, we have tried to classify and rank households according to *degree of commercialization* or *financial product usage* on a monthly basis to identify households that transition in relation to other households over time. In particular we looked at the behavior around these key moments, to see what lead and lag indicators are significant in understanding these decisions, and the effects that they have.

We also analyzed the data to provide insights around how smallholder households manage money, manage risk and accumulate assets. The research questions that we studied in Section 2 of our analysis include those in Table 12.

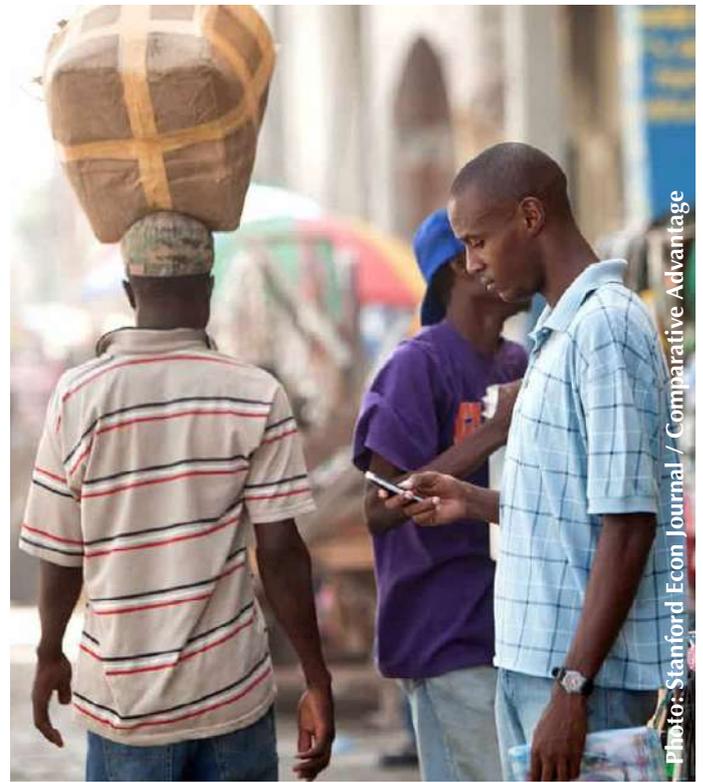


Photo: Stanford Econ Journal / Comparative Advantage

TABLE 12: RESEARCH QUESTIONS SECTION 2¹²

Thematic Area	RQ#	Research Questions	Data
Money management	2.1	How does the composition of household income and expenditures vary across time? How are different income streams (e.g. agricultural sales, labor, remittances) and expenditure streams (e.g. education, health, non-agricultural investments, agricultural investments, general consumption) related and what are the covariance patterns between them?	Diaries
	2.2	For households switching from informal to more formal financial services over the year, what are the key drivers behind these decisions?	Diaries
	2.3	What is the role of women in managing the flow of funds and how does this vary between country datasets?	Diaries
	2.4	How does income relate to behavior around expenditure, savings and borrowing? And what are the effects of income volatility on livelihood outcomes?	Diaries
	2.5	For smallholders using credit, what types of income contribute to loan repayment? What can the data tell us about the role and relative importance of agricultural cash flows and non-agricultural cash flows in loan repayment?	Diaries
Risk management	2.6	What can we learn about the nature and severity of shocks to cash flows and what is the role of risk mitigation tools?	Diaries and Surveys
	2.7	How does income volatility relate to other variables, such as poverty level, crop choices and diversification, and other aspects of livelihood strategies?	Diaries
Asset accumulation	2.9	How are households investing in physical assets? Which assets complement income generation, which assets are 'locking in liquidity' and are therefore a form of savings and which assets are for household usage?	Diaries

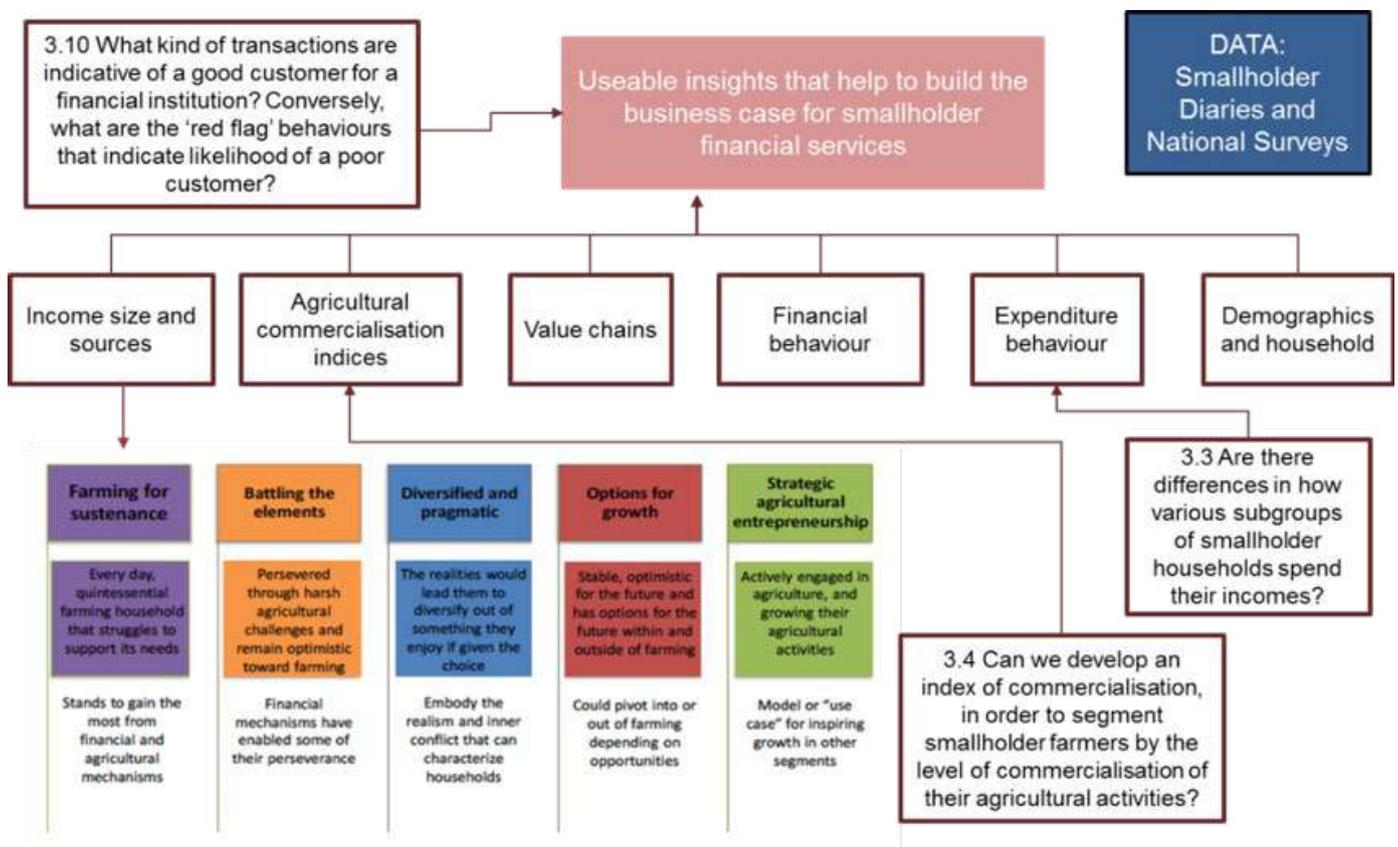
¹² Note that it was agreed with CGAP to remove research question 2.8 since a transition from lower income levels to higher incomes could not be determined with a data range that only covers 12 months – especially considering seasonal income volatility. (Research question 2.8: For households who are seen to significantly increase or decrease their incomes, switch from non-commercial to commercial activities or significantly change livelihood strategies within the annual cycle, what are the key variables that allow these transitions to take place?).

4.3 How might understanding smallholder segments build a business case to serve them?

The final section of our research brings together the macro and the micro analysis and answers some questions that are more specific to the needs of financial institutions and other key stakeholders. This aims to be a more forward-looking section, exploring the practical implications of the analysis and how it can be used to build a business case for more effectively serving smallholder households.

In building the models for segmentation, we looked to more behavioral approaches, seeking not just to look for market segments by socioeconomic characteristics and incomes but also how they use their money (expenditures) and how they interact with financial services, in order to build a framework that is more accessible to financial institutions.

FIGURE 5: SEGMENTATION OF SMALLHOLDER FARMERS



We aspired to add depth to the understanding of smallholder farmer's lives by making use of the granularity of the diaries to segment the sample by demographics, expenditure patterns, financial usage patterns and income patterns. By segmenting the sample in different ways, we were able to identify clusters of households with commonalities across different variables. We then conducted a deeper analysis of these commonalities. Here we compare households both in terms of the annual averages of variables of interest and behavior of both households and individual household members over time. We made use of techniques mentioned under section 2 of our research (consumption smoothing analysis, key moment analysis and cash flow modelling and graphical analysis) to look at dynamic trends. In preparation of this analysis, we produced a master data set that allowed us to conduct this type of analysis.

In Section 3, we particularly focused on investigating alternative ways of segmenting and analyzing smallholder families and their behavior. Firstly, to expand on the conventional definitions of smallholder commercialization by making use of the granularity of the diaries data. Second of all, we segmented households in new and alternative ways and see how this might be interesting for FSPs in terms of customer profiling. One example being that not all households might choose commercialization as their desired way out of poverty. While some do, others might want to focus more on waged employment or self-employment and are using agriculture only as another complementary income source. Households focusing on progressing their agri-business then might need a different financial product portfolio than households who are aiming for waged employment. As such, we not only profiled households according to income but also alternative routes to pick-up on profiles by looking at expenditure, type of income mix, borrowing behavior, saving behavior, to create profiles of households that we can compare.



Photo: CC Rachel Hinman, courtesy of Rosenfeld Media on Flickr

TABLE 13: RESEARCH QUESTIONS SECTION 3¹³

Thematic Area	RQ#	Research Questions	Data
Segmentation	3.1	Who is a smallholder farmer? What are the key criteria in defining smallholder families as a market?	Diaries and Surveys
	3.2	What different segments of smallholder households can be defined according to their household characteristics and source of income mix? (segmentation by demographics and income)	Diaries
	3.3	Are there differences in how various subgroups of smallholder households – by gender, different income levels, or education – spend their income (aggregately or proportionally)? (segmentation by expenditure)	Diaries and Surveys
	3.4	Can we develop an index of commercialization, in order to segment smallholder farmers by the level of commercialization of their agricultural activities? (segmentation by commercialization)	Diaries
	3.5	What profile of smallholders is most likely to demand and actively use certain financial products (e.g., savings, layaway, mobile money, general short- and long-term credit, input credit) and formal and informal tools? How does this differ between meeting general household needs and priorities, and those linked to agriculture? (segmentation by financial usage)	Surveys
Building a business case	3.7	What are the gaps between current smallholder demand and the financial solutions available (e.g. current terms do not meet seasonal constraints)?	Diaries and surveys
	3.8	To what extent can we view smallholder households as businesses? How are their cash flows and working capital needs similar/different to a small business?	Diaries
	3.9	What incentives, motivations or aspirations might drive uptake and usage of DFS among smallholder farmers? Do they differ according to farmer segments? (This has now been merged with 1.7)	Surveys
	3.10	What kind of transactions are indicative of a good customer for a financial institution? Conversely, what are the ‘red flag’ behaviors that indicate likelihood of a poor customer?	Diaries
	3.11	Can the data be useful in building credit reference models for smallholders? Are there elements in the data that can give smallholders a credit history or information trail FSPs can use to make lending decisions?	Diaries

¹³ Note that research question 3.6 (How can we use what we’ve learned to build on previous segmentation models (e.g. no/loose/tight value chains?)) will be answered as part of the synthesis of our research in section 6.1 – Segmentation.



Photo: Stephan Gladieu / World Bank

05

Addressing the Research Questions

SECTION 05 :: ADDRESSING THE RESEARCH QUESTIONS

Included below is the analysis of each of the agreed questions based on the research framework put forward in Section 4.

5.1 Smallholder families access to and use of financial services

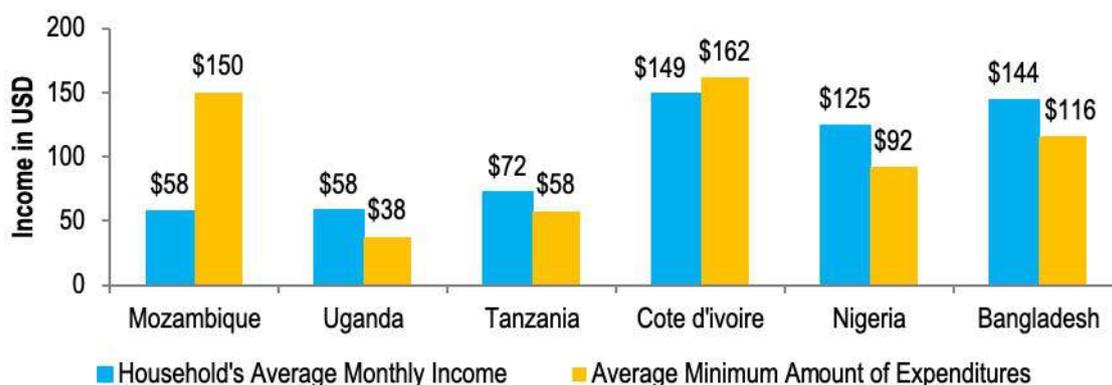
RESEARCH QUESTION 1.1

Which factors determine income and expenditures of smallholder farmers?

To get a better understanding of the income and expenditures of smallholder farmers across countries we first look at the national survey data. Figure 6 shows average monthly income¹⁴ of smallholder farmers converted into USD.¹⁵ We find that smallholders in Bangladesh, Côte d'Ivoire, and Nigeria have similar monthly incomes around \$150 while Tanzania, Mozambique and Uganda generally show lower averages.¹⁶ In terms of expenditures, the national surveys collect and report the minimum amount that a household needs to survive per month.

In Figure 6, we summarize the average minimum amount of expenditures needed to survive for each country. For most countries, we find that the average income exceeds the minimum amount needed. Data for Mozambique however suggests a shortage of income to cover basic expenses suggesting hunger periods that smallholder families have to manage by reducing consumption. For Côte d'Ivoire, income matches minimum expenses suggesting there not being a lot of spare income to invest or save. We use the smallholder diaries data to learn more about expenditure behaviors and pattern in research questions 2.1 and 2.4.

FIGURE 6: NATIONAL SURVEY DATA ON AVERAGE INCOME OF SMALLHOLDER FARMER HOUSEHOLDS ACROSS COUNTRIES (\$US)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

¹⁴ The smallholder surveys report total monthly, self-reported income from all different household sources and members. This income figure does not account for any costs or expenses associated with income-generating activities.

¹⁵ See Annex 3 Table A3.2 for exchange rates applied. We are using exchange rates that correspond to the data collection periods.

¹⁶ Annex 3 Figures A3.1-A3.7 show how income distributions vary across countries.

We use the statistical technique of multiple regression analysis on the national survey data to better understand which variables can best explain the income of smallholder farmers. The regression analysis allows us to quantify the change in income for a change in one of the factors that influences income. For instance, we can say what the change in average monthly income of a smallholder farmer in Mozambique is, when the farmer possesses high school education as opposed to no education, while taking into account other factors that influence income such as household size, location, or age.

The preferred regression model defines average monthly income of smallholder households as a function of age, household size, household head's gender, household head's marital status, household head's education level, location

(rural/urban as well as region), household's largest source of income, and, where applicable, whether the household owns a motorcycle, bicycle or other motorized vehicle. The full regression output can be found in Annex 3 Table A3.1.

We find interesting patterns specifically for the following variables:

Age categories. Across all countries, smallholder families with an older household head have higher average income levels. This trend is found to be statistically significant in Bangladesh and Nigeria specifically. Table 14 summarizes regression results. Note that we defined the household head's age as a categorical variable clustering age in four categories (below 30; 31-45; 46-60; 60 and above). These age categories have been used throughout the analysis.

TABLE 14: MULTIPLE REGRESSION OUTPUTS FOR AGE CATEGORIES

INDEPENDENT VARIABLES Age category	Mozambique	Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
Below 30	0.00	0.00	0.00	0.00	0.00	0.00
31 to 45	11.43 *	8.46 ***	4.82 *	19.12	12.01 ***	9.07 **
46 to 60	15.41	12.94 ***	3.66 **	28.57 *	31.51 ***	30.47 ***
Above 60	25.58 **	8.53 0.0	4.90	26.12	17.84 ***	17.90 ***

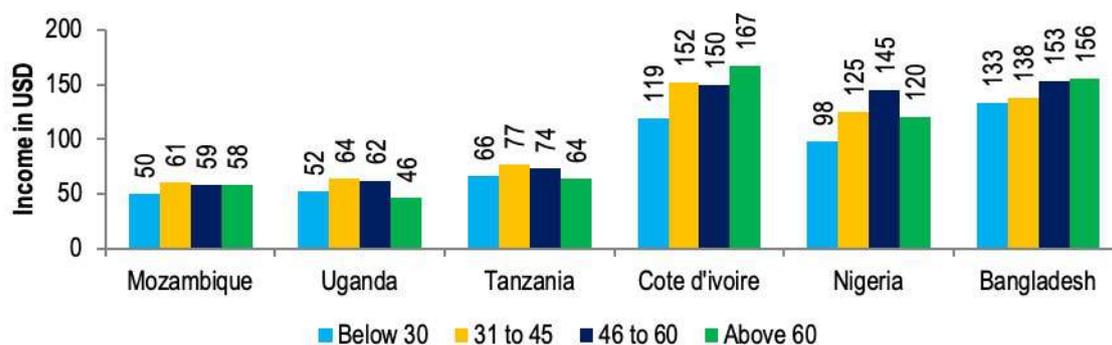
[1] *10% SIGNIFICANT, ** 5% SIGNIFICANT, *** 1% SIGNIFICANT.

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The age category 'below 30' is used as the 'base category'. This means that households with a household head between 31-45, 46-60 and above 60 are compared to households with household heads that are below 30 years of age. The results indicate that largest (statistically significant) effect is found for age category [46-60] in Nigeria, where smallholder households where the household head is between 46-60 years old have a monthly income that is on average USD 41.31 higher than that of households where the household head is below 30 years old, all else equal.

Figure 7 shows how average income varies by age categories using the same national survey data across countries. This confirms the regression results with most pronounced income differences in Côte d'Ivoire and Nigeria. Research question 1.5 will explore age differences and what these imply for financial service usage in more detail.

FIGURE 7: NATIONAL SURVEY DATA ON AVERAGE INCOME¹⁷ BY AGE CATEGORY



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

Household size. Household size is found to have a statistically significant effect on average monthly income in all countries. The most pronounced effect was observed in Bangladesh, where one additional household member explains an \$12.4 increase in monthly average incomes (Table 15). Here it is important to note

that national surveys report on gross monthly income which does not subtract household expenses or other costs to the household. Figure 7 therefore explains the change in gross income due to an additional household member. The additional costs of another household member are not taken into account.

TABLE 15: MULTIPLE REGRESSION OUTPUTS FOR HOUSEHOLD SIZE

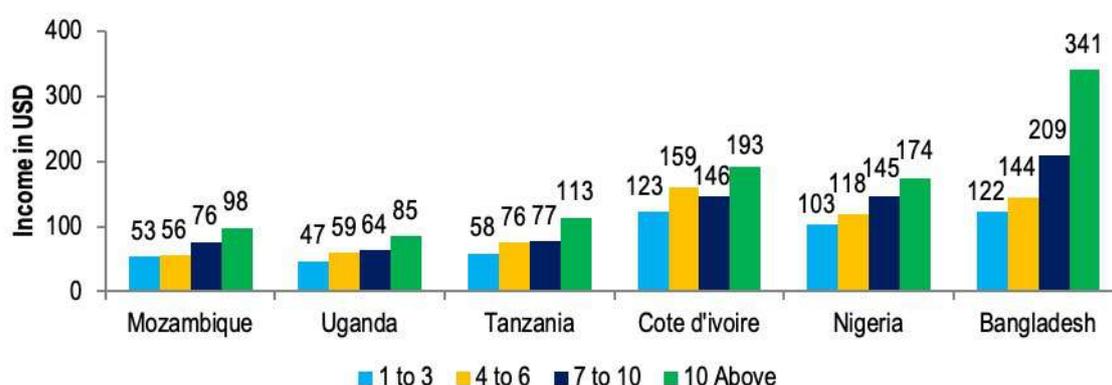
Independent Variables	Mozambique	Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
Household Size	0.95 ***	2.25 ***	4.75 ***	2.73 ***	6.85 ***	12.41 ***

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

Using the same data, Figure 8 shows this pronounced linear relationship between household size and monthly household income by four household size brackets (1-3; 4-6; 7-8; 10+). As for the regression analysis it

can be seen that the effect of household size on monthly income is largest in Bangladesh followed by Nigeria and Côte d'Ivoire, hinting at a high marginal return of additional household members in these countries.

FIGURE 8: NATIONAL SURVEY DATA ON AVERAGE INCOME BY HOUSEHOLD SIZE BRACKETS



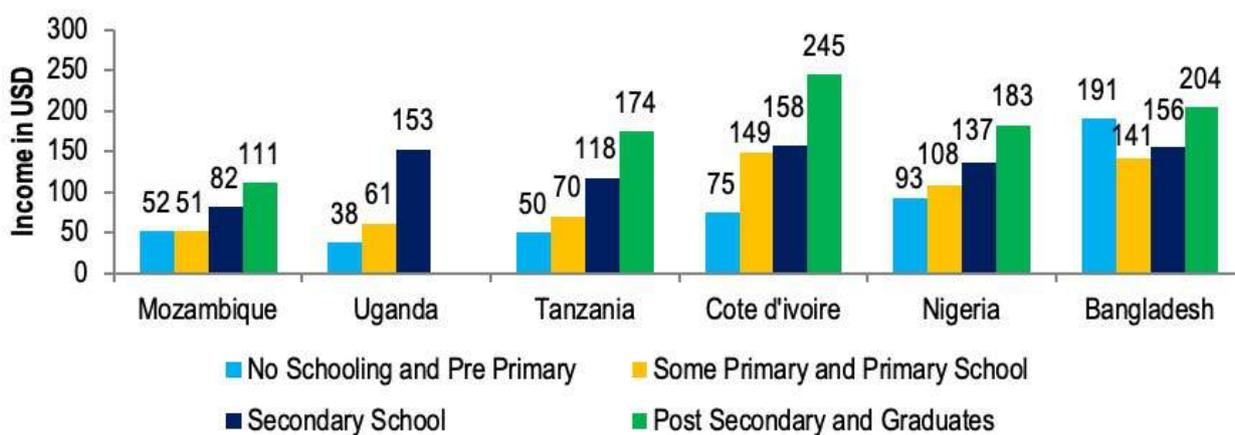
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

¹⁷ Average of “Household’s average monthly income across all sources of money that household receives”.

Household head sex. The regression results do not show a statistically different monthly income for households depending on the sex of the household head for all countries but Côte d'Ivoire, where households with male heads earn on average USD 39.83 more each month than households that have female heads. We find small differences for Mozambique, Uganda and Tanzania and the lowest difference for Bangladesh. Implications of gender will be further explored in research questions 1.4 and 2.3.

Education. The regression analysis shows a positive and statistically significant association between higher levels of education and income levels for all countries across the board. Figure 9 shows the according average monthly income of smallholder farmers across different education levels.¹⁸ While the regression suggests a strong correlation between education and income in all cases, there are differences across countries in terms of the magnitude of the effect. For instance, in Mozambique there is no significant difference in incomes between household heads who do not have any formal education and household heads who have attended some primary school – only for household head who have attended secondary school an effect on incomes can be seen. In Nigeria we see a more linear picture, where each additional level of schooling of the household head has a significant effect on income. We will further explore the effects of education on smallholder’s lives in research question 1.6.

FIGURE 9: NATIONAL SURVEY DATA ON AVERAGE INCOME BY EDUCATION LEVEL



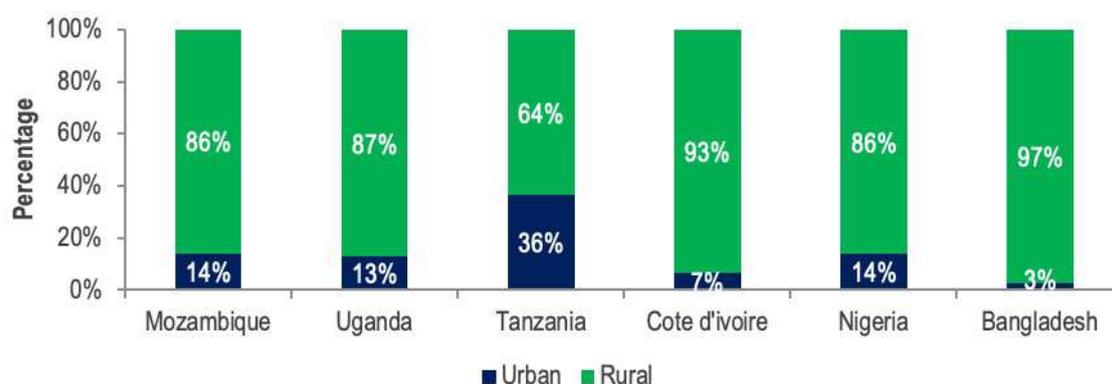
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

¹⁸ To proxy education responses to question D8 'What is the highest grade attended' from the national household survey is used.

Location (rural/urban).¹⁹ Figure 10 shows the split of smallholder farmers living in rural and urban areas by country. Here we can see that indeed the population of smallholder farmers living in urban areas is not marginal. In Tanzania, 36% of smallholder farmers live in urban areas followed by Nigeria, Mozambique and Uganda with 14%, 14% and 13% respectively. This

finding as such proves that against common beliefs smallholder farmers are not necessarily a difficult to reach group. For FSPs this might mean that there are ‘low hanging fruits’ in urban areas consisting of a customer group that will be easier to expand towards using existing, urban operations.

FIGURE 10: PERCENTAGE OF HOUSEHOLD’S LIVING IN RURAL AND URBAN AREAS BY COUNTRY (SMALLHOLDER SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

Regression results show significant and large effects of location on household income for all countries with the exception of Nigeria (Table 16). We find the largest difference in income in Côte d'Ivoire, where households in urban areas earn \$57.63 more in average monthly household

income than those in rural areas (Figure 11). In other words, a smallholder family that has the same characteristics in terms of other variables such as education, age, or household size would have a higher income merely by the difference in location.

TABLE 16: MULTIPLE REGRESSION OUTPUTS FOR URBAN/RURAL VARIABLE

INDEPENDENT VARIABLES Urban/Rural Households	Mozambique	Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
Rural	-25.85 ***	-17.06 ***	-26.33 ***	-75.61 ***	0.00	-24.05 ***
Urban	0.00	0.00	0.00	0.00	1.97	0.00

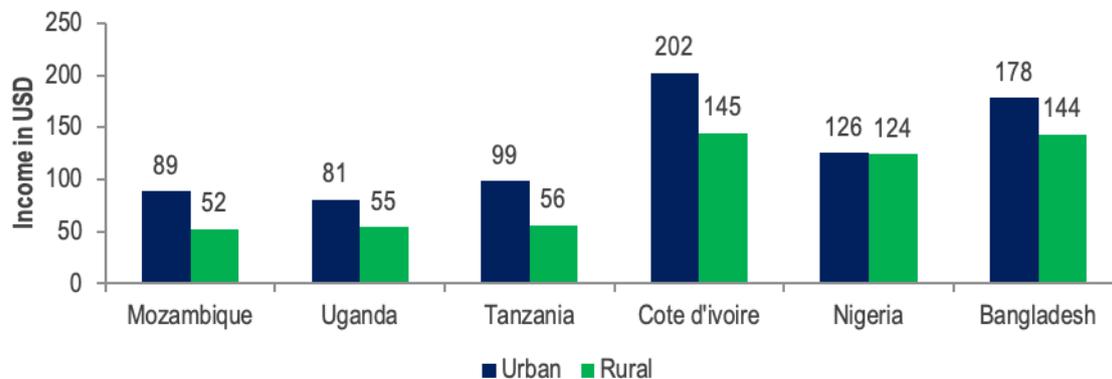
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

¹⁹ Rural and urban areas are classified based on national population censuses and can therefore vary in terms of definition and methodology.

For rural households in Côte d'Ivoire this implies that their urban peers earn an income that is 40% higher. The difference in terms of percentage increase is most pronounced for Tanzania and Mozambique where average incomes of urban

smallholders are between 71-77% higher than those of rural smallholders. Figure 11 shows the different average monthly incomes for rural and urban smallholder farmers across all countries.

FIGURE 11: NATIONAL SURVEY DATA ON AVERAGE INCOME BY LOCATION



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

This stark and significant disparity hints at disadvantages that smallholders in more rural areas suffer from, including a lack of infrastructure allowing for better education, health, and tighter value chains, and potentially access to financial products which would facilitate economic activities of smallholder farmers in urban areas. At the same time, a segment of smallholder farmers is described here that might be attractive for FSPs who do not look to expand operations beyond urban areas: wealthier and easier to reach smallholder farmers. Location as such could be treated as an explanatory variable for explaining factors such as education, effectiveness of value chains, income volatility, or types of income sources.

Largest source of income. For all countries, we find that earning a salary from a regular job provides the most profitable source of income followed by self-employment. Income from agricultural activities plays different roles in different countries as well as at different times in the annual cycle. We will further explore the importance of agricultural income and how it relates to other sources of income when discussing research questions 2.1, 2.5 and 3.4. Annex 3 provides regression results and a chart showing average monthly incomes by largest source of income.

There is a lot of information here that should be valuable to financial service providers (FSPs). The flows in and out of an account not only provide an opportunity to monetize transactions but also provide the data that can be crucial to expanding the range of services provided to customers. The challenge for FSPs, in a data-light environment, is to find proxies for higher income based on other, more easily observed data points. More education, older household head and larger household size are examples of these data points that could point towards higher income. The analysis suggests that for FSPs looking to serve smallholder communities, the lowest-hanging fruit are likely to be those closer to urban areas, due to both higher average incomes and (presumably) lower costs of serving. This is particularly true in Tanzania and Mozambique.

RESEARCH QUESTION 1.2

How do more formally banked households compare to informally banked households with respect to commercialization, total income, physical asset portfolio and expenditure?

In order to answer this question, we begin by identifying what a formally banked household is and what is not within the contexts of our data sets.

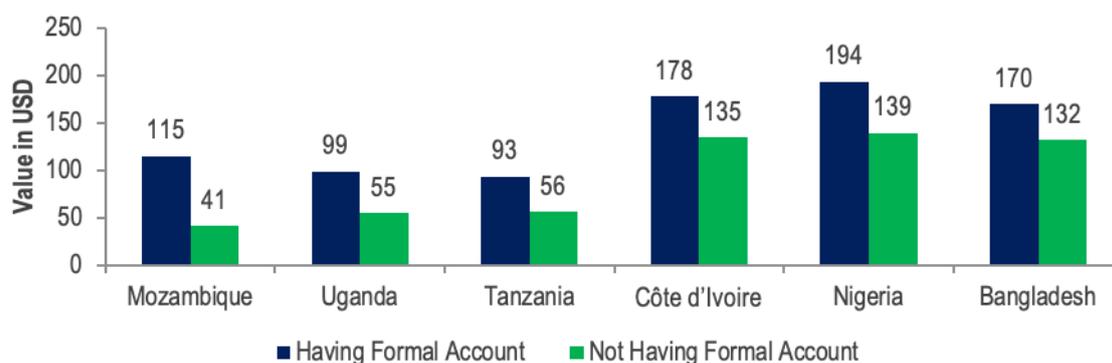
For smallholder households in the financial diaries, we identified those households who carried out any deposits, withdrawals, savings or borrowings through a mobile money provider, checking or savings account, life or health insurance provider as formally included (or formally banked). One such transaction through the year was sufficient to qualify as formally included. Those households who only used financial mechanisms like an ASCA, ROSCA, money guard, or something of a similar level of sophistication were considered to be informally banked. A third category, non-banked, comprised

(predominantly in the Mozambique sample) households who did not use any financial services, formal or informal.

For the national surveys, we used the definitions of formal and informal to be consistent with the surveys for each country. Note that this provides some variation as depending on the country, some financial services are defined as either formal or informal. For example, VSLAs are defined as borderline formal in Tanzania, Bangladesh and Nigeria, while they are defined as informal in Uganda, Mozambique and Côte d'Ivoire. Tables 7 and 8 outline in detail which services are defined as formal or informal in which country.

Analysis of the survey data shows that households with access to formal financial services also have higher incomes (Figure 12). This is true for all the countries for which we have national survey data. On average across the six countries, a smallholder with a formal account earns an income 52% higher than one without a formal account.

FIGURE 12: AVERAGE INCOME BY USAGE OF FORMAL BANKING VS NOT USING FORMAL BANKING BY COUNTRY

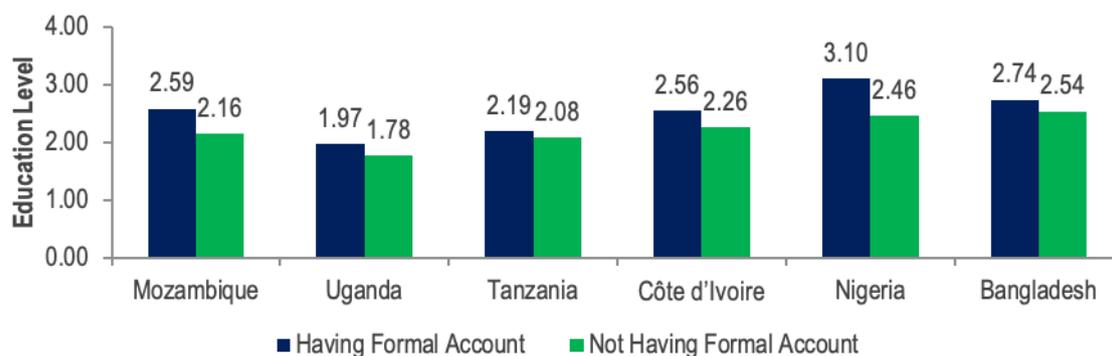


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

People with lower usage of formal financial services are likely to be living below the poverty line. Calculating the likelihood of formally included and excluded populations being below the benchmark for the Progress out of Poverty Index (PPI) we find that across the six countries, the probability of a smallholder without a formal account being below the poverty line is 86%; the equivalent figure for the financially included group is 63%.

Using the survey data, we also analyzed the relationship between formal/informal financial inclusion and level of education. By segmenting the population into four groups and ascribing a value to the highest level of education achieved (1 = No Schooling and Pre-Primary; 2 = Some Primary and Primary School; 3 = Secondary School; 4 = Post-Secondary and Graduates), we find that across all countries, formally banked households are better educated than informally banked ones.

FIGURE 13: HIGHEST LEVEL OF EDUCATION BY FORMALLY AND INFORMALLY BANKED

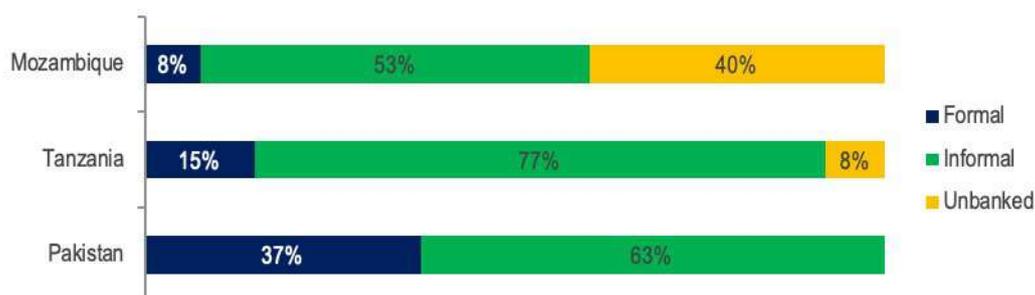


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASETS, 2016 AND 2017.

To explore questions around expenditures, commercialization, and the asset portfolio we turn to the smallholder financial diaries data. Here, we are dealing with very different population sizes for formally/informally/

unbanked in each country, which in some cases affects the comparability of results – for example, there is no category for unbanked smallholder families in Pakistan.

FIGURE 14: PERCENTAGE OF HOUSEHOLDS BY FORMALLY BANKED AND INFORMALLY BANKED BY COUNTRY



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Grouping the families into formally, informally and un-banked, we use the diaries data to explore variations in net total income, expenses and purchases and sales of physical assets.²⁰

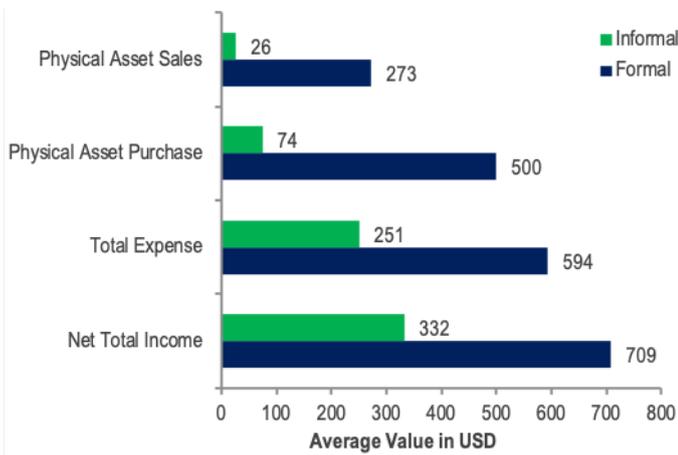
TABLE 17: USE OF FORMAL AND INFORMAL FINANCIAL TOOLS: SMALLHOLDER DIARIES HOUSEHOLDS BY COUNTRY

COUNTRY	DIARIES HOUSEHOLDS		
	Formal	Informal	Total
Mozambique	7	49	56
Tanzania	13	68	81
Pakistan	35	59	94

SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

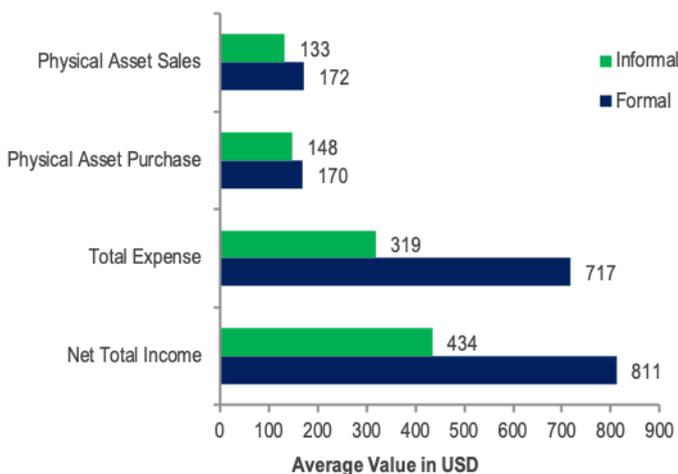
FIGURE 15: MOZAMBIQUE - AVERAGE INCOME, EXPENSES AND ASSET PURCHASES

²⁰ Sales of physical assets is a form of income. We therefore display this here alongside net total income.



In the Mozambique sample, formally banked smallholder families earn on average more than twice as much as informally banked households (in fact a very similar ratio to that in the Mozambique national survey). Incomes are very low in general with a lot of in-kind consumption. Physical asset purchases and sales are close to zero for the informally banked group, implying that financial services (e.g. credit) may be an important factor in determining ability to make purchases and sales of physical assets.

FIGURE 16: TANZANIA - AVERAGE INCOME, EXPENSES AND ASSET PURCHASES



In the Tanzania sample by contrast, there is only a small difference in physical asset purchases and sales between the formally and informally banked groups. This implies that financial services are not playing a significant role in households' ability to deal, buy and sell assets. It is somewhat surprising that even for formally banked smallholder families in this sample, physical asset purchases are less than a quarter of net total income, implying an opportunity for FSPs already serving this market to cross-sell asset loans, savings products, or layaway plans focused on asset purchases.

FIGURE 17: PAKISTAN - AVERAGE NET INCOME, EXPENSES AND ASSET PURCHASES

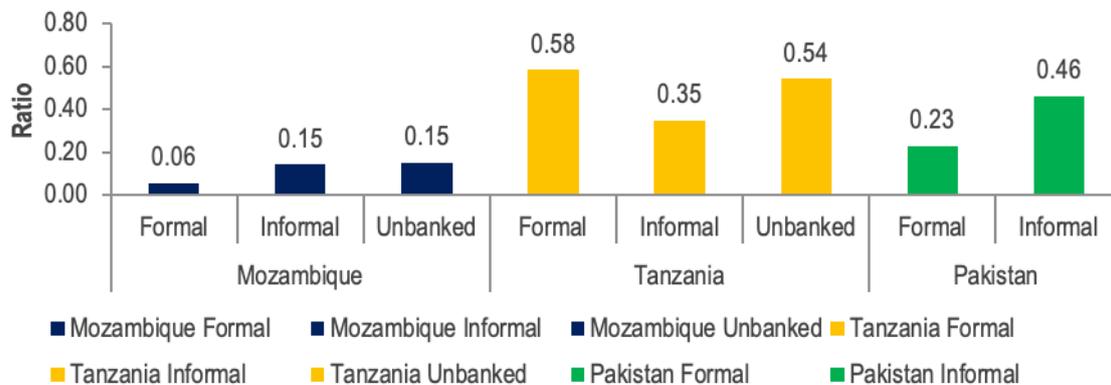


In Pakistan, the gap in income between formally- and informally banked households in the sample is smaller, and this is reflected in relatively small gaps in expenses and in assets purchases and sales. In fact, the informally banked group make more sales of physical assets by value and almost as many purchases, implying that informal providers (likely the input providers and buyers in the rice value chain) are providing effective credit and other services even when banks and other formal providers are absent.

Finally turning to the issue of commercialization, we use our commercialization index (explained in Research Question 7.3.4) that uses the percentage of total income that comes from agriculture as a proxy for level

of commercialization (the closer to 1, the higher proportion of income that comes from agriculture and therefore the more commercial the household is assumed to be).

FIGURE 18: AVERAGE COMMERCIALIZATION RATIO



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

In the Mozambique and Pakistan samples, we find that formally banked households are less focused on agriculture and more likely to derive income from alternative sources. The logic behind a lower value for formally banked households may be that, with more diversified income sources, a household may have greater need for financial services to manage the different streams. In Tanzania, by contrast we see that a more diversified income away from agriculture is associated with usage of informal financial services, and those with higher concentration of agricultural income in total income are more likely to either be formally banked or not-at-all banked (though this last result is from a very small sample size, and may be of limited utility).

An important conclusion from this for FSPs is that it is not necessarily the case that increased commercialization and increased financial inclusion will move in lockstep. Though both are associated with wealth, the structure of smallholder societies can be quite complex and hard to predict based solely on these indices. It is vital for FSPs to understand smallholders as a potential market and to develop an understanding of their cashflows, both in terms of daily in/out flows and purchases and sales of assets. Modelling cashflows, particularly in regard to how they relate to agriculture, can

provide the basis for modelling overall demand and liquidity profiles and hence provide a framework for improved financial services.

RESEARCH QUESTION 1.3

How is access to and use of financial solutions associated with the most positive livelihood outcomes (i.e. low poverty, high income, low income volatility) for smallholder households?

This research question builds closely on research question 1.1, which explores factors that determine income of smallholder farmers, as well as research question 1.2 which compares the average incomes of formally and informally banked households. Here a positive relationship between formal financial inclusion and income is found using both the smallholder diaries data and the national survey data.

To answer this research question, the relationship between positive livelihood outcomes and usage of financial solutions will be further explored using multiple regression analysis. National survey data will be used as these data include

information on a larger spectrum of financial tools. The regression analysis then tries to explain a household's average monthly income through use of different kinds of financial solutions as well as other demographic and socio-economic variables as independent variables. This allows us to quantify how income changes for smallholder households that use different kinds of financial solutions - while taking into account other factors that influence income such as household size, location, age, or education.

Table 18 below shows the different variables used to explain changes in income. Note that the socio-economic variables included are the same as in the regression model presented in research question 1.1. Different kinds of financial solutions are included in the regression such as formal bank accounts, mobile money accounts, and MFI or SACCO accounts. The analysis also looks at how having a savings plan for agricultural inputs correlates with income. The full regression output can be seen in Annex 3.

TABLE 18: DEPENDENT AND INDEPENDENT VARIABLES FOR MULTI REGRESSION MODEL USING NATIONAL SURVEY DATA²¹

Dependent variable	Independent variables (financial)	Independent variables (demographic & socio-economic)
HOUSEHOLD'S AVERAGE MONTHLY INCOME (USD)	Formal account ²² (Y/N)	Age Urban/Rural
	Mobile Money Account (Y/N)	Total number of household members Gender
	MFI, SACCO, VSLA ²³ (Y/N)	Whether household has a bicycle, motorcycle, or car
	Savings plan for agricultural inputs (Y/N)	Marital Status Education Income Source Region (country specific)

Figure 19 summarizes the regression coefficients for the different financial variables by country. Here the height of each bar stands for the impact of using a certain financial service on the average monthly income of a household denominated in USD. For Mozambique, for example, households that have a formal bank account are estimated to earn USD 32 more per month than a household that does not have a formal bank account. Interestingly, while having a savings plan for agricultural inputs correlates with earning USD 12 more per month, this effect is smaller compared to the estimated higher monthly income that is associated with having an account

with a MFI or SACCO or having a mobile money account – suggesting that households that make use of MFIs or other formal financial services have higher average incomes. As is highlighted in Annex 3 Table A3.3, the effect of having a formal bank account on monthly income is highly statistically significant for all target countries.

It is important to keep in mind that while we can hypothesize about causal links between usage of financial products and livelihoods, multiple regression coefficients only allow discussion of correlation between variables. In other words, it cannot be said with certainty that using a certain

²¹ It is important to caveat potential multicollinearity between some of the independent variables. For example, as has been found in research question 1.1, there is a high correlation between the variables education, rural/urban and income.

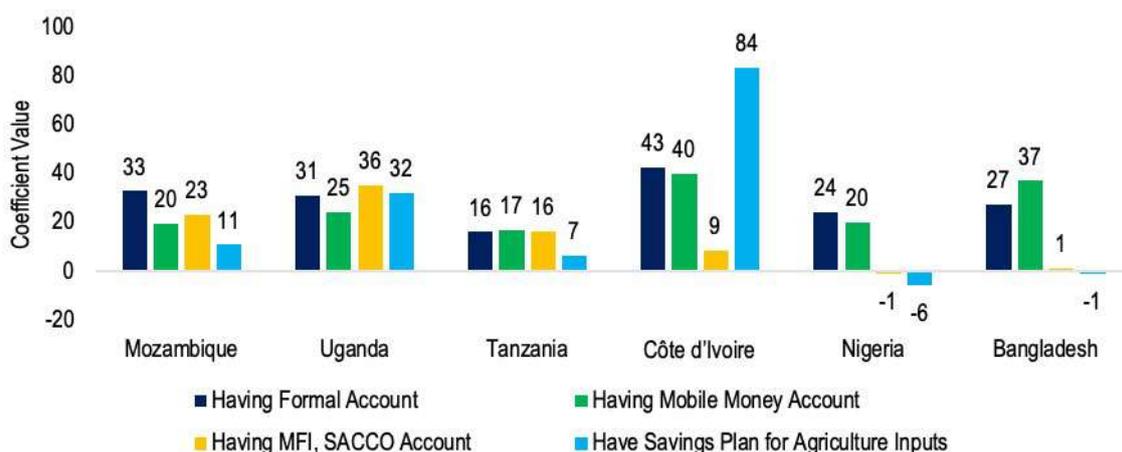
²² Households are considered as formal when they have responded with a 'Yes' to any of the following questions: F4: "Do you have a formal bank account"; F17: "Do you have an account with a MFI, SACCO, cooperative, credit union, VSLA or post office?"; and F33: "Do you have an account with [...] mobile money providers?"

²³ For Bangladesh, Nigeria and Tanzania, the national surveys include VSLAs as formal financial services.

financial product increases monthly income by X amount. Instead we can say that households that use certain financial products have a monthly income that is higher by X amount relative to households that do not use these products. It is also worth noting that the direction of causality between *usage of financial products* and *monthly income* could go both ways. While using financial products could increase a household's income over time, it could also be that because a household has a higher income it is more likely to use financial products. Conversely it is possible that a household can only access formal financial products once it reaches a certain income level due to account restrictions. In the

case of Mozambique, for example, people with lower incomes might not have access to formal accounts and therefore rely on savings plans. It could then be that only when incomes increase, more banking products are needed and become accessible. Furthermore, there are third variables that influence both financial inclusion and income, such as living in an urban area, which offers a more developed financial infrastructure as well as more economic opportunities. This was evidenced by analysis in research question 1.1 where it could be seen that smallholder farmers have, on average, higher incomes in urban areas.

FIGURE 19: REGRESSION COEFFICIENT SIZE FOR DIFFERENT FINANCIAL VARIABLES ACROSS NATIONAL SURVEY TARGET COUNTRIES (AVERAGE MONTHLY INCOME IN USD)²⁴



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015

Comparing different financial solutions in a multiple regression analysis allows for an analysis of which financial products are associated with the most positive livelihoods.

Figure 19 shows that, in most cases, having either a formal bank account, a mobile money account, an account with an MFI or SACCO or a savings plan for agricultural inputs is associated with higher average monthly incomes. Here the regression coefficients can be interpreted as the additional amount of monthly income in USD for households that make use of a certain financial product. For Côte d'Ivoire, for example, it can be found that households that have a credit or savings plan for agricultural inputs are

estimated to have a monthly income that is \$84 higher than the monthly income of households that do not have such credit or savings plan. Since coefficients of other products are smaller than that, it can be stated that having a credit or savings plan for agricultural inputs is associated with the most positive livelihood outcomes in Côte d'Ivoire. Here it could be hypothesized that credit or savings plans to finance inputs come with a certain value chain arrangement that leaves these farmers better-off compared to others – an area that should be further analyzed through follow-up research.

²⁴ Note that for Côte d'Ivoire and Bangladesh smallholder farmers who use MFIs, SACCOs, or VSLAs are predicted to have lower incomes than other smallholders.

On the other hand, it can also be observed that for households in Mozambique, Tanzania, Nigeria and Bangladesh having a credit or savings plan for agricultural inputs has a lower positive effect on income when compared to other financial services. This trend shows that while households that have a savings plan for inputs are still better off than those who don't, more formally financially included households – either in the form of MFIs, mobile money or formal bank accounts – have more positive livelihoods.

Another interesting trend is that having a formal account has a similar effect to having a mobile money account or an account with an MFI or SACCO in most countries. This, as such, is an interesting finding since it suggests that formal banking products are not necessarily associated with the most positive livelihood outcomes in all cases and that other, less-formal, financial products, such as mobile money, MFIs or SACCOs, can have similar associations with livelihoods.

Due to the challenge of causality, further investigation is required before concrete recommendations to financial service providers can be made. However, the overall analysis can be useful to show FSPs and policy makers which products correlate with the most positive incomes allowing them to tailor and target products and services accordingly. The analysis also makes a case for considering less traditional

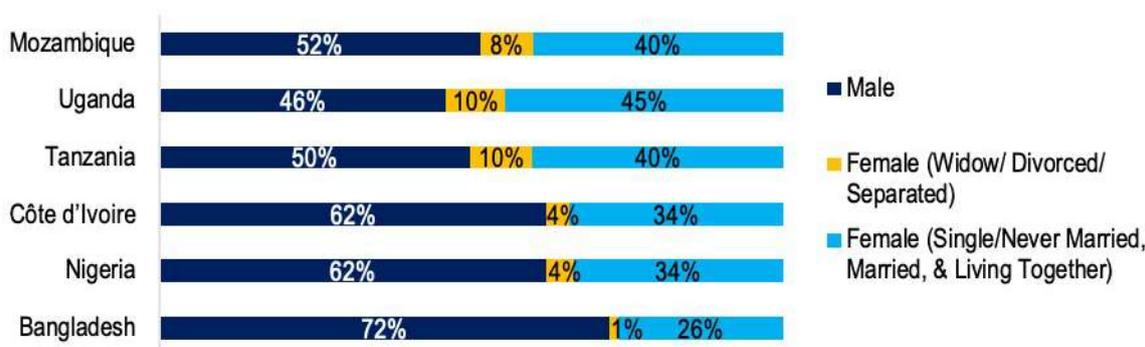
forms of banking as these have a similar association with income as the most formal products.

RESEARCH QUESTION 1.4

How does the financial activity of female household members differ from male, and how do the gender roles tend to vary between countries?

The high-level data provided by the National Surveys is a starting point to understanding the varying roles played by women and men in smallholder households. In five of the six study countries, majority of the survey respondents are male. Among female respondents, a greater number of respondents include women who are single/never married, married and living together compared to women who are divorced, widowed or separated. As a proxy for female household headship, we used the indicators of widow/divorced/separated since these households likely face particular challenges due to factors that may include social stigma, lower earnings, and time poverty of the household head. Disaggregating these household profiles is an important step in acknowledging their particular challenges and addressing their unique needs.

FIGURE 20: PERCENTAGE OF THE SMALLHOLDER HOUSEHOLD RESPONDENTS BY GENDER



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Income sources and decision making by gender in smallholder households

Women engage in agriculture at rates comparable to men. Across all contexts, farming is the primary source of income for the large majority of both men and women in smallholder households. Women are typically less likely than men to have non-farming primary sources of income. Very few female respondents reported their primary employment as owning a shop or working as a laborer. As a unique point, high proportions of women in smallholder households in Nigeria and Bangladesh derive their primary income from sources other than agriculture. In Bangladesh, 27% of women list “other” as their primary income source, which may include “Maid/Housework/Domestic work”, or “Fisheries/Fisherman”, while in Nigeria, 22% of women indicate that their primary job is the business they own.

Widowed, divorced, or separated women are consistently more likely than single, never married, or married women to rely on agriculture as their primary source of income, with the exception of Bangladesh. A slightly higher proportion of women in the group of widowed, divorced or separated females (on average of 80% across the 6 sample countries) reported this compared to women in the group of single, married or married and living together (on average of 75%).



TABLE 19: PRIMARY JOBS BY GENDER

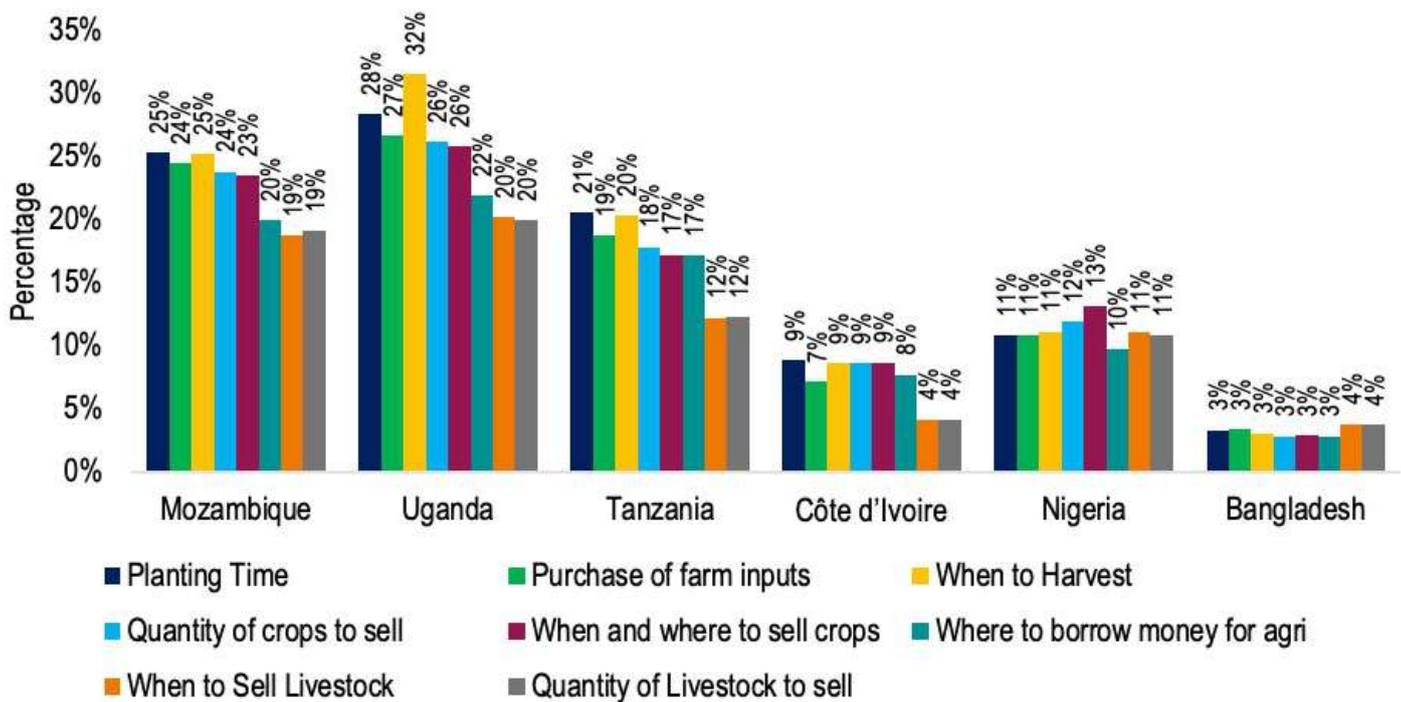
Country	Gender	Farmer	Professional	Shop owner	Business owner	Laborer	Other
Mozambique	Male	73%	4%	1%	8%	5%	10%
	Female	87%	1%	0%	4%	1%	6%
	Female (Widow/ Divorced/ Separated)	89%	1%	0%	5%	1%	4%
	Female (Single/Never Married, Married, & Living Together)	87%	2%	0%	4%	1%	6%
Uganda	Male	80%	3%	1%	5%	4%	7%
	Female	78%	2%	1%	4%	6%	9%
	Female (Widow/ Divorced/ Separated)	83%	1%	0%	3%	5%	8%
	Female (Single/Never Married, Married, & Living Together)	77%	3%	1%	4%	6%	10%
Tanzania	Male	81%	1%	1%	5%	3%	9%
	Female	81%	0%	0%	9%	2%	8%
	Female (Widow/ Divorced/ Separated)	83%	1%		7%	1%	8%
	Female (Single/Never Married, Married, & Living Together)	81%	0%	1%	9%	2%	7%
Côte d'Ivoire	Male	87%	2%	0%	1%	2%	8%
	Female	81%	1%	0%	1%	1%	16%
	Female (Widow/ Divorced/ Separated)	87%	1%	0%	2%	1%	9%
	Female (Single/Never Married, Married, & Living Together)	81%	1%	0%	1%	1%	16%
Nigeria	Male	78%	5%	1%	7%	3%	6%
	Female	61%	4%	4%	22%	2%	7%
	Female (Widow/ Divorced/ Separated)	79%	1%	2%	11%	3%	3%
	Female (Single/Never Married, Married, & Living Together)	59%	4%	4%	23%	2%	8%
Bangladesh	Male	66%	2%	2%	10%	11%	9%
	Female	63%	2%	0%	2%	5%	27%
	Female (Widow/ Divorced/ Separated)	59%	3%			9%	30%
	Female (Single/Never Married, Married, & Living Together)	64%	2%	0%	2%	5%	27%

Source: CGAP national surveys of smallholder households, 2016 and 2017.

Despite high participation of women in agricultural activities, the male respondents of the household dominate in household decision making on agricultural related activities. Only about 20% of the women respondents in Uganda, Tanzania and Mozambique report that they were involved in decision making on

agricultural related activities such as the planting time, when to harvest etc. In comparison to all countries, Bangladesh reports the least percentage of women respondents – only about 3% – who are involved in household decision making on agricultural activities.

FIGURE 21: DECISION MAKING ON AGRICULTURE ACTIVITY BY WIFE/GIRLFRIEND



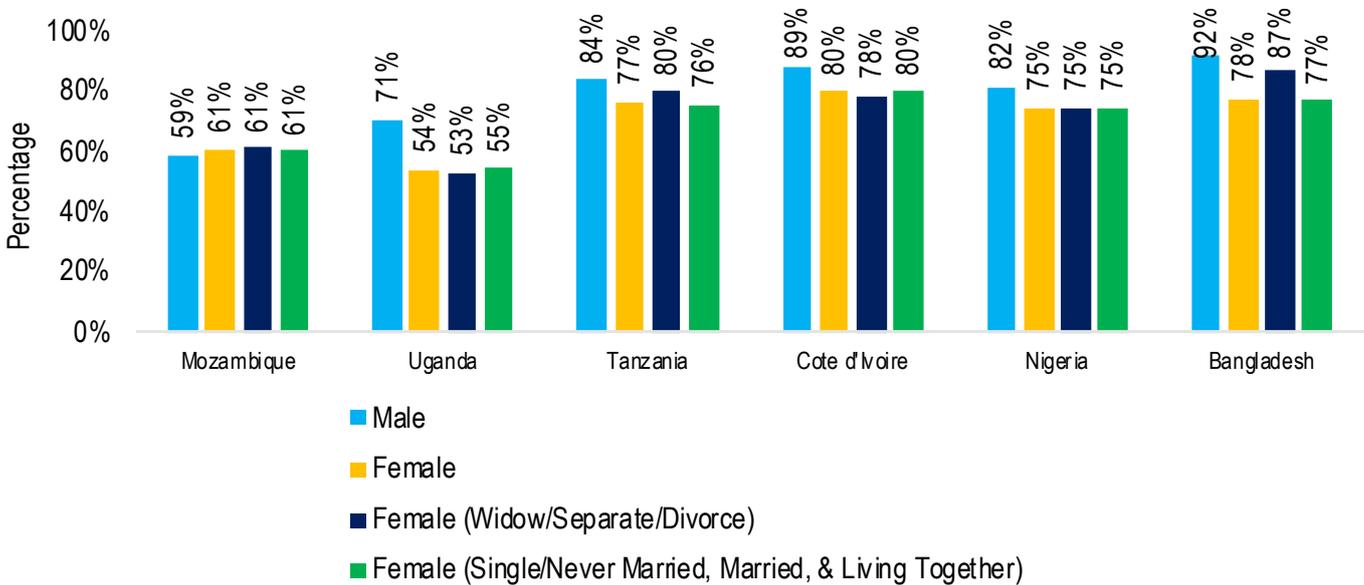
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD DATASET, 2016 AND 2017.

Access to mobile phones and information by gender in smallholder households

This analysis examined mobile phone ownership and mobile money usage by gender and relationship status. In five of the six countries (i.e. not Mozambique), there is a notable difference between the percentage of men and women members of smallholder households who own mobile phones. For instance, in Uganda, while 71% of male respondents own a mobile phone, only 54% of women respondents own a mobile

phone. Further, in all the six study countries, we did not find a meaningful difference on mobile phone ownership between two subgroups of women – women who are single/married/living together and women who are widowed/divorced/separated.

FIGURE 22: CURRENTLY OWN MOBILE PHONE



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Table 20 shows the purpose of mobile phone usage by gender. About 98% of female respondents who own a mobile phone are using mobile phone for talking to friends and family members. In Tanzania, more than half (53%) of women are using mobile phones for financial transactions. Very few stated that they are using mobile phone for social media or to access information on crop production or market prices.

TABLE 20: USAGE OF MOBILE PHONES

Country	Gender	Talking to friends and family	Running your business	Conducting financial transactions	Music, Games, Videos, Ringtones	Browsing social media	Getting information - Crop production & market price	Other/Don't Know
Mozambique	Male	95%	39%	13%	11%	7%	2%	4%
	Female	96%	29%	11%	8%	2%	1%	4%
	Female (Widow/Separate/Divorce)	98%	28%	5%	6%	0%	1%	2%
	Female (Single/Never Married, Married, & Living Together)	96%	29%	12%	8%	3%	1%	4%
Uganda	Male	98%	27%	29%	4%	3%	3%	1%
	Female	99%	20%	25%	3%	3%	1%	1%
	Female (Widow/Separate/Divorce)	98%	17%	29%	2%	0%	1%	2%
	Female (Single/Never Married, Married, & Living Together)	99%	21%	24%	3%	3%	1%	0%
Tanzania	Male	99%	15%	55%	3%	3%	3%	3%
	Female	98%	14%	53%	1%	3%	2%	4%
	Female (Widow/Separate/Divorce)	98%	13%	53%	0%	3%	2%	2%
	Female (Single/Never Married, Married, & Living Together)	98%	14%	53%	2%	3%	2%	4%
Côte d'Ivoire	Male	98%	37%	27%	35%	13%	5%	5%
	Female	98%	28%	17%	25%	8%	2%	2%
	Female (Widow/Separate/Divorce)	94%	24%	19%	19%	3%	6%	0%
	Female (Single/Never Married, Married, & Living Together)	98%	28%	17%	26%	9%	2%	3%
Nigeria	Male	98%	35%	7%	10%	9%	7%	0%
	Female	99%	30%	5%	6%	5%	5%	0%
	Female (Widow/Separate/Divorce)	99%	42%	7%	1%	1%	8%	0%
	Female (Single/Never Married, Married, & Living Together)	99%	28%	5%	7%	6%	5%	0%
Bangladesh	Male	98%	35%	20%	22%	4%	14%	0%
	Female	99%	19%	17%	13%	0%	17%	0%
	Female (Widow/Separate/Divorce)	99%	11%	7%	18%	1%	14%	0%
	Female (Single/Never Married, Married, & Living Together)	99%	20%	17%	12%	0%	17%	0%

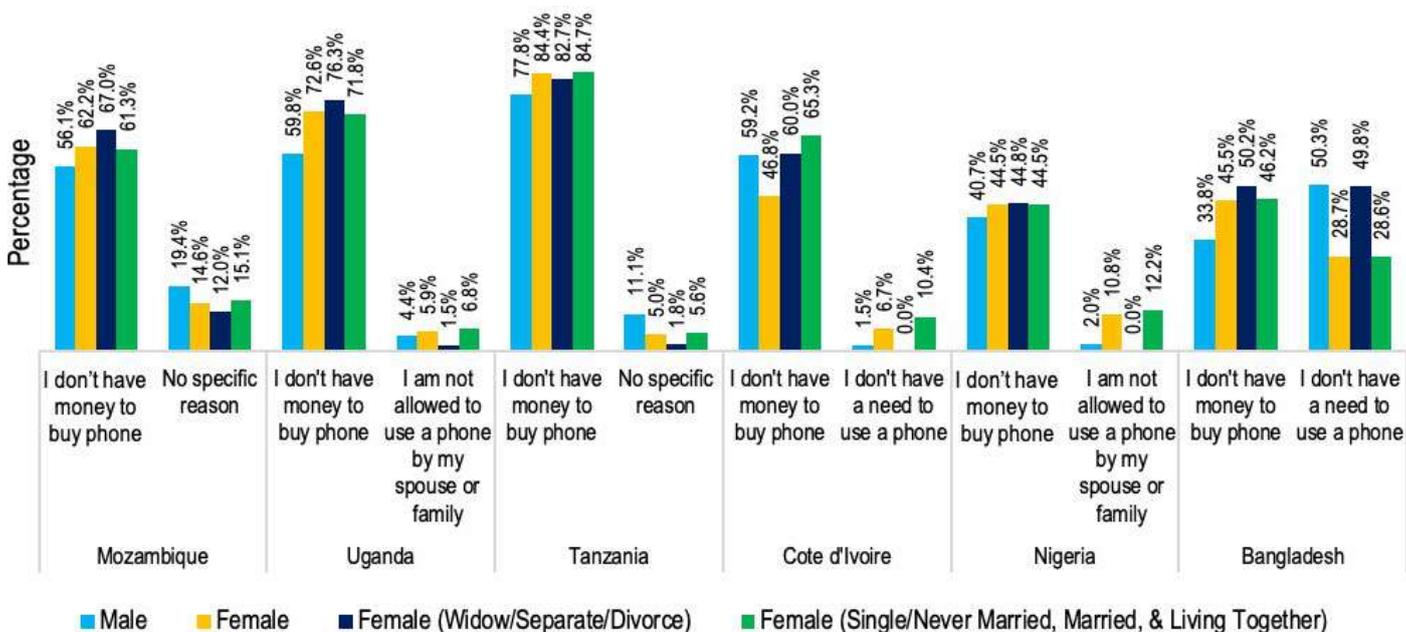
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

For women in smallholder households who do not have a mobile phone, across all countries, their most cited reason for not having a mobile was not enough money to buy one. In Bangladesh, after insufficient funds for buying phone, the most cited reason was not having a need to use a phone, reported majorly by the group of female respondents who are widowed, separated or divorced. In Tanzania, the fear of theft of the phone is another reason cited by female respondents for not owning a mobile phone.



Photo: Scott Wallace / World Bank

FIGURE 23: MAIN REASON CITED FOR NOT HAVING A MOBILE PHONE (RESPONDENTS ARE THOSE WHO DO NOT HAVE A PHONE)

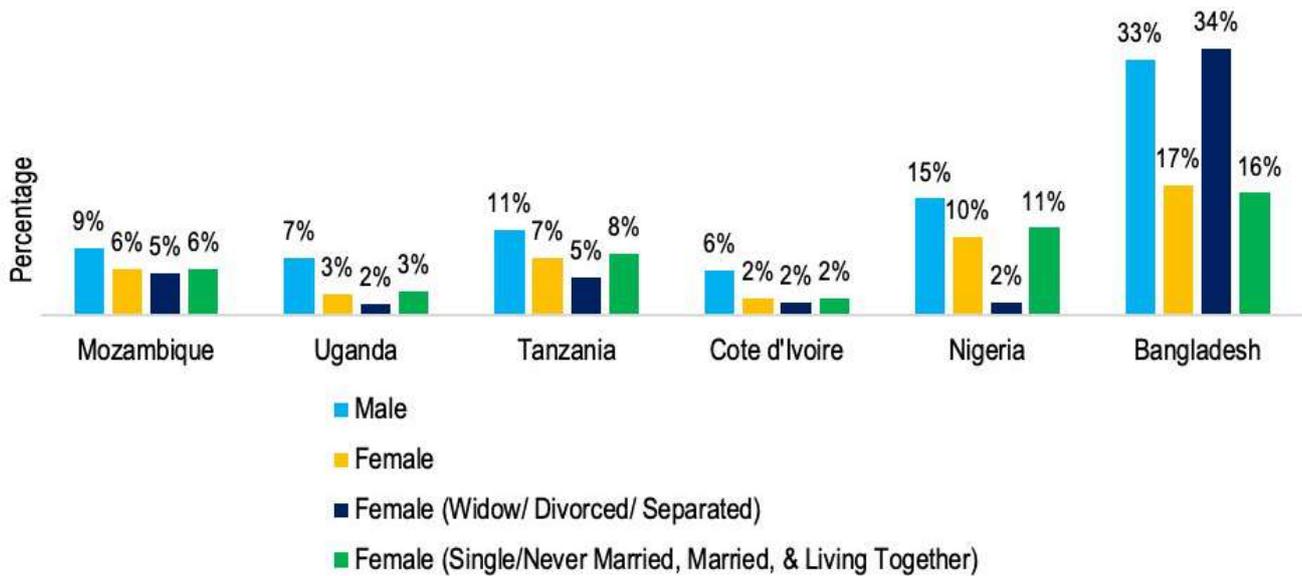


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

When it comes to using social media or the internet for information on agriculture, in all countries, higher percentage of men are using the internet than women respondents. The women who are “single/never married, married and living together” in Mozambique, Tanzania, Nigeria and Uganda show higher usage of these technology platforms compared to women who are “divorced, widowed or separated”.

In Bangladesh, women who are “divorced, widowed or separated” are using social media or the internet for information on agriculture more than the other group. Further, the highest usage of social media or internet by women is observed in Bangladesh where the advancement of e-commerce has rapidly led to an increased overall participation by women as buyers as well as sellers in both rural and urban areas.

FIGURE 24: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS WHO USED INTERNET BY COUNTRY AND GENDER



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

We also looked at how often the respondents have used various sources of information that are available for agricultural activities like Facebook, and WhatsApp, or another social networking site. As can be seen from Table 21, usage of these platforms is very low across all the countries except Bangladesh among all groups – men, women who are “widowed/separated or divorced”, women who are “single/never married/married/living together”. In Bangladesh, higher percentage of female respondents are often using social media and internet as source of information for agricultural activities compared to men.



Photo: Scott Wallace / CGAP

TABLE 21: USAGE OF SOCIAL MEDIA FOR AGRICULTURAL ACTIVITIES

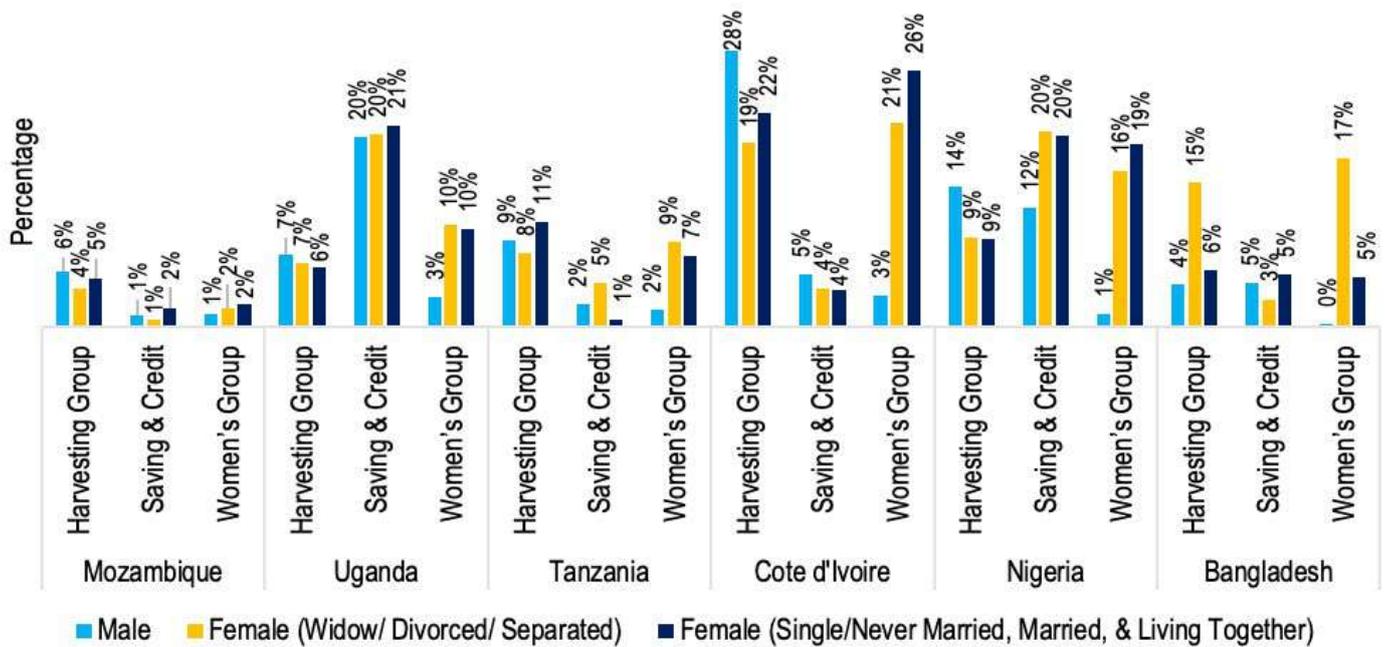
Country	Gender	Daily/ Weekly/ Monthly	More than Monthly	Never/ Don't Know
Mozambique	Male	2%	1%	98%
	Female	1%	1%	98%
	Female (Widow/ Divorced/ Separated)	2%	0%	98%
	Female (Single/Never Married, Married, & Living Together)	1%	1%	98%
Uganda	Male	1%	1%	97%
	Female	1%	0%	99%
	Female (Widow/ Divorced/ Separated)	0%		100%
	Female (Single/Never Married, Married, & Living Together)	1%	0%	99%
Tanzania	Male	3%	2%	95%
	Female	2%	1%	96%
	Female (Widow/ Divorced/ Separated)	1%	0%	98%
	Female (Single/Never Married, Married, & Living Together)	3%	2%	96%
Côte d'Ivoire	Male	3%	1%	96%
	Female	1%	0%	99%
	Female (Widow/ Divorced/ Separated)	1%		99%
	Female (Single/Never Married, Married, & Living Together)	1%	0%	99%
Nigeria	Male	4%	2%	95%
	Female	3%	1%	96%
	Female (Widow/ Divorced/ Separated)	0%	1%	99%
	Female (Single/Never Married, Married, & Living Together)	4%	1%	95%
Bangladesh	Male	4%	3%	93%
	Female	6%	2%	92%
	Female (Widow/ Divorced/ Separated)	7%	3%	91%
	Female (Single/Never Married, Married, & Living Together)	6%	2%	92%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Although local groups can be an important source of information, participation in groups and associations is low among both women and men in smallholder households. This analysis examined the membership of smallholder household members in various groups such as harvesting, savings and credit groups, women's groups etc. In Uganda and Nigeria, almost 20% of the female respondents (whether single / married or divorced / widowed), are members of savings groups. Participation of women in these groups is in fact greater than the male respondents. In Cote d'Ivoire, more members of

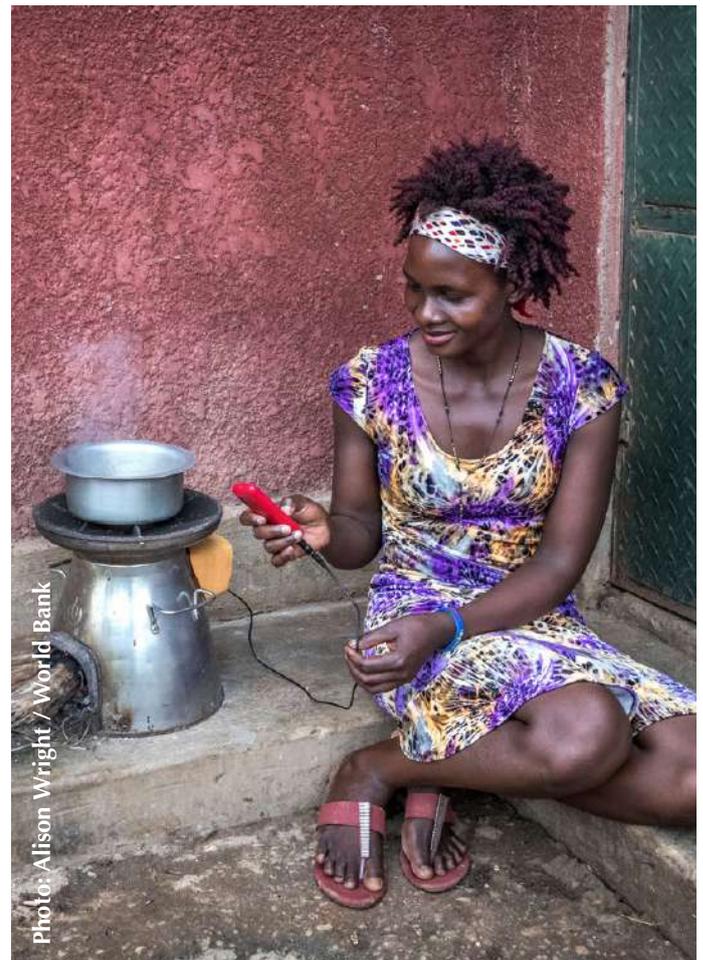
women and men participate in the harvesting group. In Nigeria and Côte d'Ivoire, we see that on average, 23% female respondents who are single or married are members of women's groups, slightly higher than the average participation in these groups by widowed or separated women.

FIGURE 25: PARTICIPATION²⁵ IN GROUPS BY GENDER



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Despite the usage of internet by women members of smallholder households across the countries being limited, we observe that a significant proportion of women respondents give high importance to the ability to access farming information, market pricing information and weather-related information through a mobile phone. As seen in Table 22, more than 40% of the women respondents across all the countries give high importance to accessing various types of information through a mobile phone.



²⁵ “Harvesting group” includes planting, weeding and harvesting groups.

TABLE 22: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS WHO PLACE HIGH IMPORTANCE ON THE ABILITIES FOR ACCESSING INFORMATION FOR AGRICULTURAL ACTIVITIES THROUGH MOBILE PHONE

ABILITIES	GENDER	VERY IMPORTANT AND SOMEWHAT IMPORTANT					
		Mozambique	Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
Ability to access weather information on a mobile phone	Male	59%	79%	91%	83%	63%	73%
	Female	63%	73%	90%	72%	51%	70%
	Female (Widow/ Divorced/ Separated)	56%	63%	86%	71%	39%	45%
	Female (Single/Never Married, Married, & Living Together)	64%	75%	91%	72%	52%	72%
Ability to access market pricing information on a mobile phone	Male	58%	80%	92%	84%	63%	79%
	Female	63%	73%	90%	72%	52%	74%
	Female (Widow/ Divorced/ Separated)	57%	67%	85%	69%	42%	52%
	Female (Single/Never Married, Married, & Living Together)	64%	74%	91%	72%	53%	76%
Ability to access farming information on a mobile phone	Male	59%	80%	93%	83%	61%	76%
	Female	64%	73%	90%	71%	52%	67%
	Female (Widow/ Divorced/ Separated)	58%	64%	87%	71%	45%	40%
	Female (Single/Never Married, Married, & Living Together)	65%	75%	91%	72%	52%	68%
Ability to track shipments of inputs and crops on a mobile phone	Male	55%	72%	91%	76%	54%	61%
	Female	59%	65%	87%	64%	45%	56%
	Female (Widow/ Divorced/ Separated)	56%	58%	84%	66%	39%	31%
	Female (Single/Never Married, Married, & Living Together)	60%	67%	88%	64%	45%	57%
Ability to buy and sell on a mobile phone	Male	55%	78%	84%	70%	54%	70%
	Female	58%	70%	82%	62%	42%	66%
	Female (Widow/ Divorced/ Separated)	52%	62%	79%	58%	30%	45%
	Female (Single/Never Married, Married, & Living Together)	59%	71%	83%	63%	44%	67%
Ability to charge my phone at a central location	Male	55%	79%	92%	76%	59%	59%
	Female	56%	70%	89%	65%	49%	56%
	Female (Widow/ Divorced/ Separated)	52%	64%	87%	63%	39%	39%
	Female (Single/Never Married, Married, & Living Together)	57%	71%	89%	65%	50%	57%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Across all countries, most of the respondents who currently do not use mobile phones for agricultural activities reported that they want to have the ability to use mobile phones for these purposes in the future (see Table 23). For instance, in Uganda, 69% of women

respondents, on average, reported that they want to avail the ability to access weather, market pricing, financial services or transportation related information through their mobile phones.

TABLE 23: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS WHO CURRENTLY DO NOT HAVE THE ABILITIES TO USE MOBILE PHONE FOR AGRICULTURAL ACTIVITIES BUT WANT TO HAVE THESE ABILITIES IN FUTURE²⁶

ABILITIES		GENDER	YES				
			Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
Ability to access weather information on a mobile phone	Male		80%	90%	78%	60%	66%
	Female		69%	89%	65%	42%	63%
	Female (Widow/ Divorced/ Separated)		65%	83%	56%	34%	43%
	Female (Single/Never Married, Married, & Living Together)		70%	90%	66%	43%	64%
Ability to access market pricing information on a mobile phone	Male		81%	90%	80%	60%	68%
	Female		72%	88%	66%	46%	61%
	Female (Widow/ Divorced/ Separated)		64%	84%	57%	37%	36%
	Female (Single/Never Married, Married, & Living Together)		73%	89%	67%	48%	63%
Ability to access farming information on a mobile phone	Male		81%	91%	79%	61%	68%
	Female		71%	88%	66%	45%	60%
	Female (Widow/ Divorced/ Separated)		63%	84%	60%	35%	41%
	Female (Single/Never Married, Married, & Living Together)		73%	89%	66%	46%	61%
Ability to track shipments of inputs and crops on a mobile phone	Male		71%	87%	72%	54%	53%
	Female		63%	84%	55%	39%	44%
	Female (Widow/ Divorced/ Separated)		56%	80%	45%	27%	27%
	Female (Single/Never Married, Married, & Living Together)		65%	85%	56%	41%	45%
Ability to buy and sell on a mobile phone	Male		76%	83%	68%	48%	68%
	Female		67%	80%	56%	40%	62%
	Female (Widow/ Divorced/ Separated)		58%	76%	43%	32%	36%
	Female (Single/Never Married, Married, & Living Together)		69%	82%	58%	41%	63%
Ability to charge my phone at a central location	Male		75%	88%	68%	47%	45%
	Female		67%	84%	57%	42%	43%
	Female (Widow/ Divorced/ Separated)		58%	83%	49%	39%	37%
	Female (Single/Never Married, Married, & Living Together)		68%	85%	58%	42%	43%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Such information can play a critical role in improving the access to marketplace for women and also

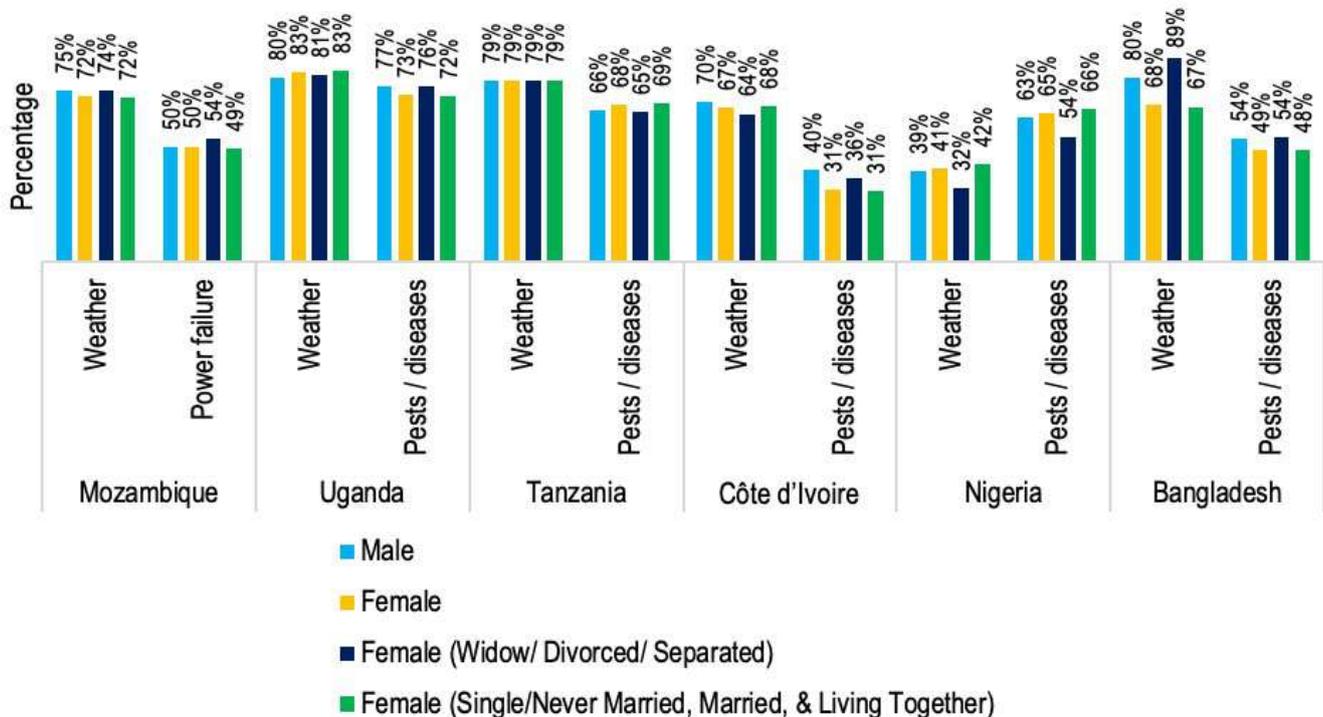
²⁶ This particular question is not available for Mozambique.

aid them in preparing for adversities related to weather. For instance, in Mozambique, weather related events have seriously affected the agricultural activities for women members of smallholder households, irrespective of their relationship status. These women could more ably overcome these risks with the ability to access weather related information. Further, after weather related events, most women respondents across all countries (except Mozambique) reported that pests/diseases have seriously affected their agricultural activities. We also found that a significant percentage of women respondents have reported that limited awareness about market prices also affected their agricultural activities.²⁷ Hence, increased access to technological applications such as mobile phones will greatly empower women members of smallholder households.



Photo: Ayesha Vellani / CGAP

FIGURE 26: EVENTS THAT HAVE SERIOUSLY AFFECTED AGRICULTURAL ACTIVITIES DISAGGREGATED BY COUNTRY AND GENDER



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

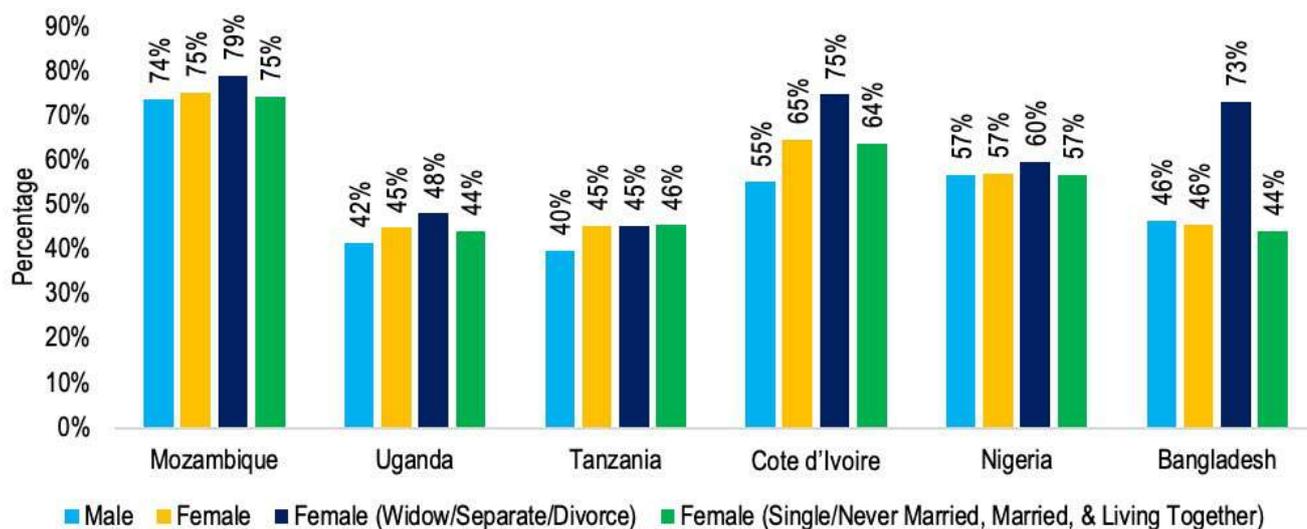
²⁷ Limited awareness of market prices indicates unexpected price fluctuation in markets and unexpected price fluctuation of inputs. Due to feasibility issues, Figure 7 does not depict these risk factors that were reported by the respondents.

Use of financial services by gender in smallholder households

Most members of smallholder households are excluded from financial services. To determine the respondents' accessibility to finance, we looked at if they had any financial accounts registered in their names. Highest levels of exclusion from financial instruments – meaning

that the respondent did not have any kind of bank, MFI, or mobile money account in their name and that they had not used an informal mechanism like a savings group in the past 12 months – were reported in Mozambique and the lowest in Tanzania. In most countries, widowed, separated or divorced women contributed to a higher percentage of the financially excluded segment, compared to single or married women, or men.

FIGURE 27: FINANCIALLY EXCLUDED

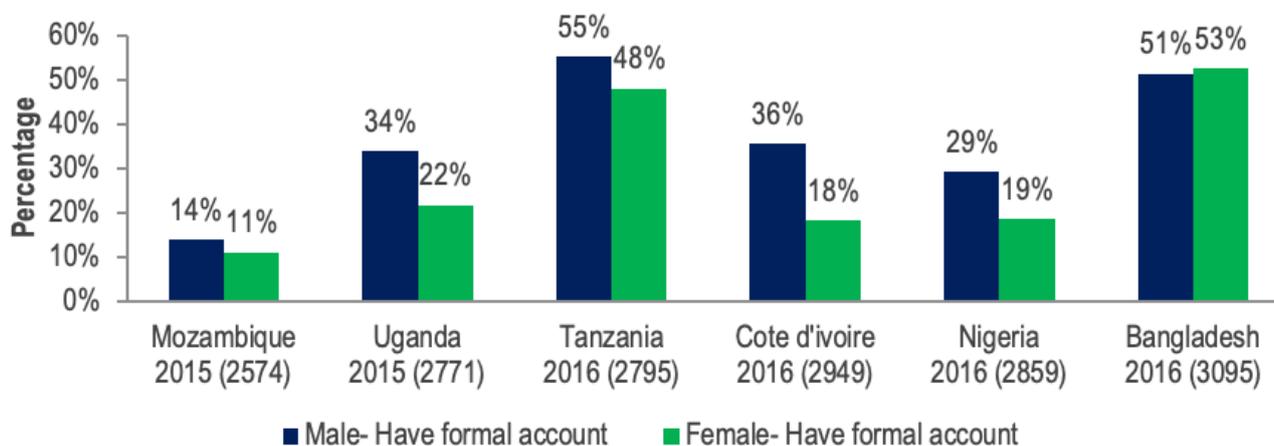


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Across the six countries we see a gender gap of approximately 3-18% on use of formal bank accounts, with the highest disparity between male/female smallholder inclusion in Côte d'Ivoire (18%) and the smallest in Bangladesh

(1.3%). Unlike other countries, in Bangladesh, more women are likely to have formal accounts than men. These are broadly in line with the latest national financial inclusion figures for these countries.

FIGURE 28: PERCENTAGE OF MALES AND FEMALES WITH FORMAL BANK ACCOUNTS (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

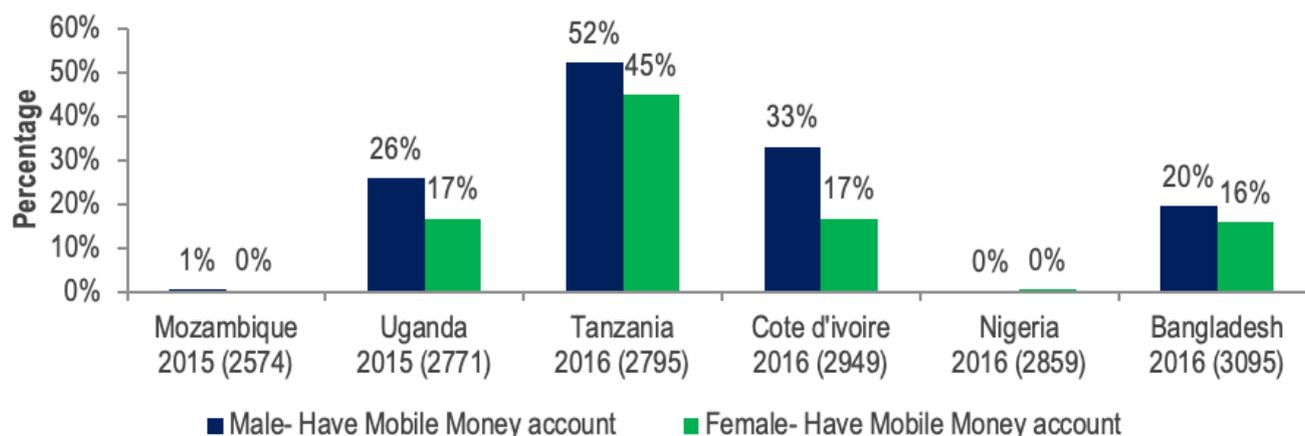
TABLE 24: COMPARING SMALLHOLDER SURVEY DATA WITH OTHER DATA SOURCES

Country	FINANCIAL INCLUSION GENDER GAP		
	Smallholder surveys	Alternative source %	Alternative source name
Mozambique	3%	8%	Finscope 2014
Uganda	12%	15%	FII 2015
Tanzania	7%	9%	FII 2015
Côte d'Ivoire	18%	10%	Global Findex 2014
Nigeria	11%	14%	FII 2015
Bangladesh	-1%	10%	FII 2015

This indicates that smallholder families are mostly representative of national populations as a whole in terms of the **gender gap in financial inclusion**. Note that some of the differences in the gender gaps across sources could be due to different definitions of how formal and informal products are defined. The one country in which the gender gap for smallholder families is significantly different to that of the national population as a whole is Bangladesh, where women in smallholder families are slightly

more financially included than men. (This lack of a gender gap is driven by the penetration of microfinance services in Bangladesh, which is a good example of a rural financial inclusion initiative that effectively and disproportionately targets female clients.) However, we also observe from the smallholder survey (Figure 29) that men are disproportionately served by mobile money services and this might explain partially the larger gender gap in terms of overall financial inclusion.

FIGURE 29: PERCENTAGE OF MOBILE MONEY ACCOUNTS BY GENDER

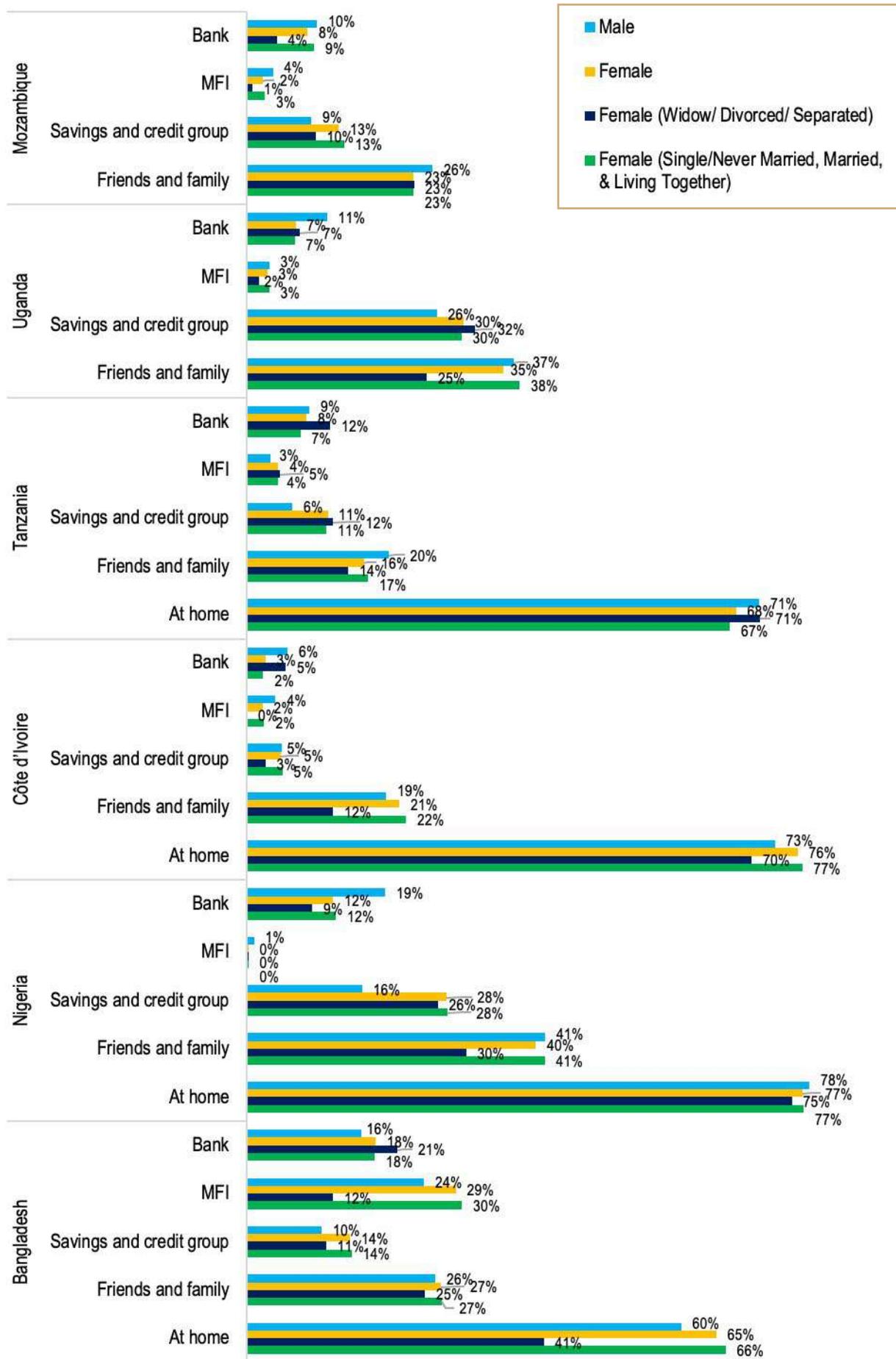


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The following analysis considered the financial behavior of women who are “single / never married, married and living together” and women who are “divorced, widowed or separated”. With respect to savings, most women (more than 60%) irrespective of being “single / never married, married and living together” or divorced, widowed or separated, save at home or with friends and family. In case of accounts with formal financial institutions like banks, MFIs, cooperatives, the trend between the two

groups of women respondents varies across the countries. In Mozambique, Uganda, Bangladesh and Nigeria, on an average, a higher percentage of women who are single/married/living together, save more with banks, microfinance institutions and cooperatives. However, the percentage of women who save with informal channels such as savings and credit groups, are higher than the percentage who save with formal financial channels in all the countries.

FIGURE 30: SAVINGS BEHAVIOR OF SMALLHOLDER HOUSEHOLDS

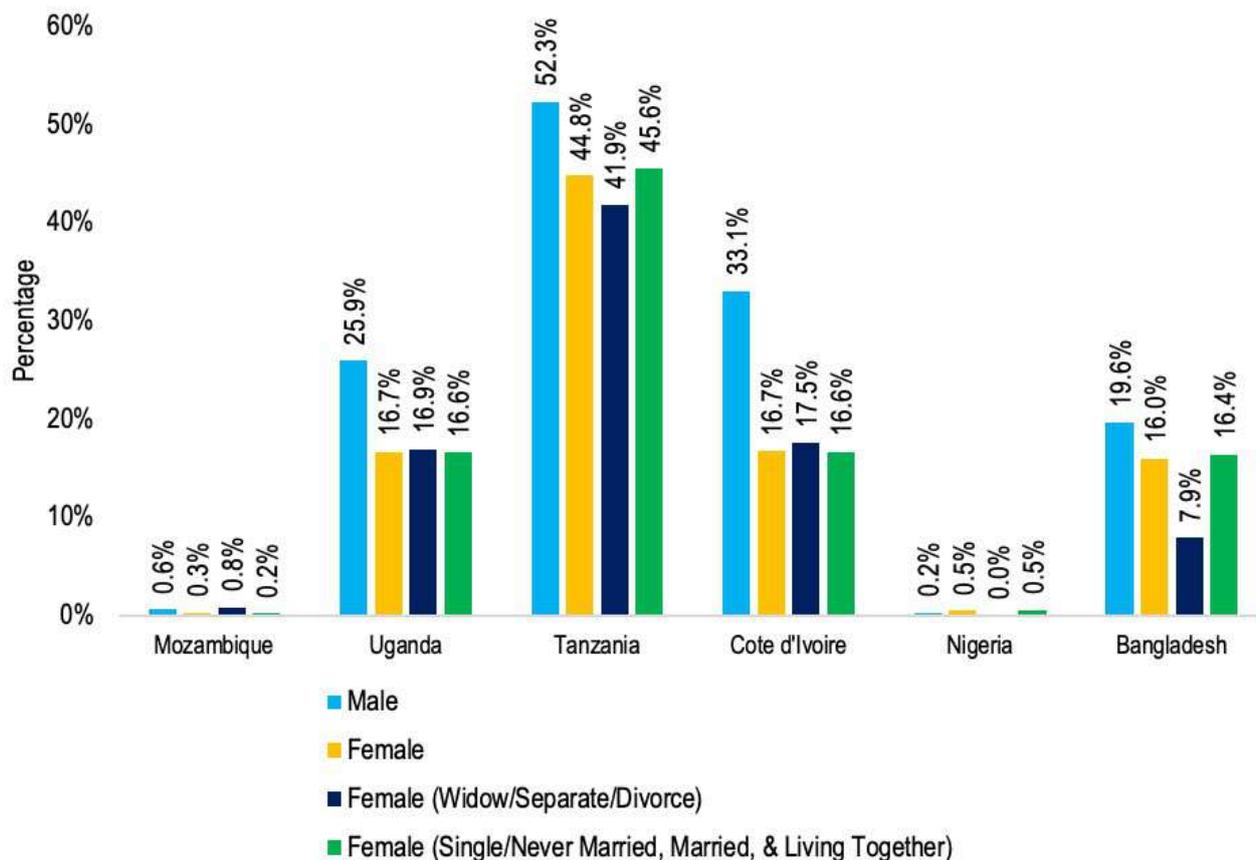


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

In all countries, a higher percentage of male respondents are using mobile money than women respondents. In Tanzania and Bangladesh, only a slightly higher percentage of women who are “single / never married, married and living together” compared to women who are “divorced, widowed or separated” have accounts with mobile money providers.

In Côte d’Ivoire, the difference between the two groups is marginal. There is no difference in mobile money usage in Uganda between the groups. In Mozambique and Nigeria, the overall usage of mobile money by women respondents is negligible, while in Tanzania, 4 out of 10 females have a registered mobile money account in their name.

FIGURE 31: MOBILE MONEY USERS²⁸



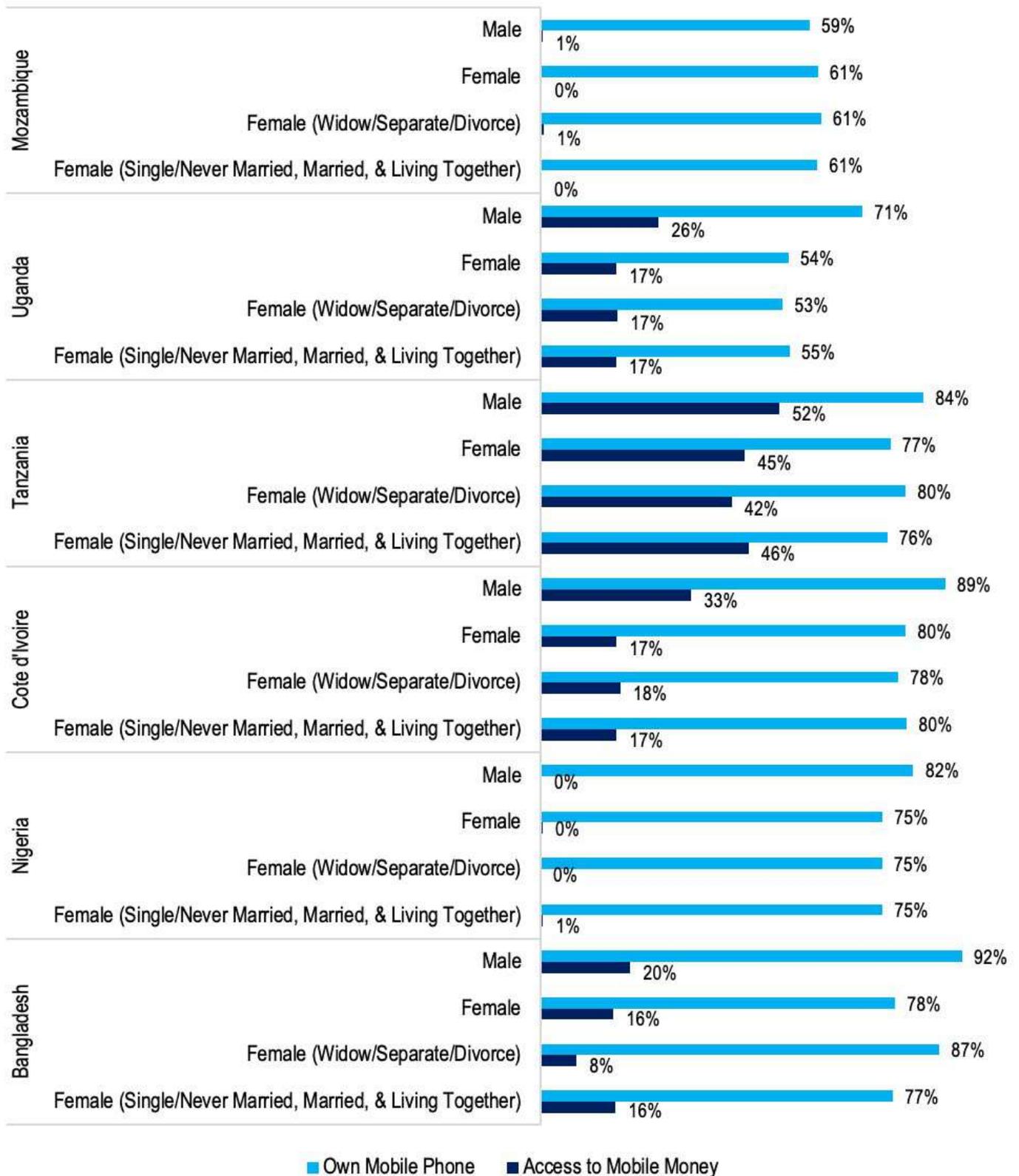
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The analysis also compared mobile phone ownership and mobile money usage by country and gender. In all the six countries, usage of mobile money is very less compared to ownership of mobile phone. Among the six countries, mobile money is mostly prevalent among smallholder household members in

Tanzania. While in Mozambique and Nigeria, usage of mobile money among the smallholder household members is negligible.

²⁸ F33. Do you have a registered account (account registered in your name) with this mobile money provider?"

FIGURE 32: OWNERSHIP OF MOBILE PHONE AND ACCESS TO MOBILE MONEY

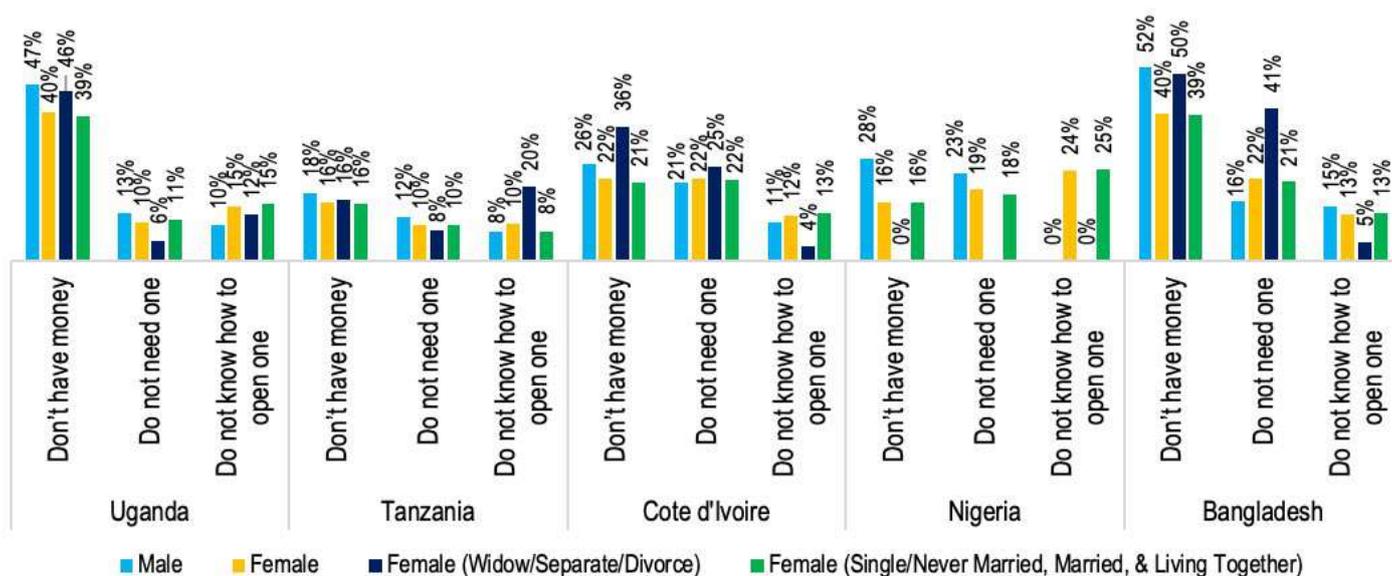


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

In terms of why mobile money is not used, across all countries except Bangladesh, women are more likely to indicate that they do not know how to open mobile money accounts

than men. In Uganda, Côte d'Ivoire, Tanzania, and Bangladesh, most respondents say that they don't have money to make transactions with the mobile money services.

FIGURE 33: REASONS FOR NOT USING MOBILE MONEY BY COUNTRY²⁹



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Financial behaviour by gender in the smallholder diaries

The smallholder diaries allow us to dig deeper into the differences between men and women in smallholder households in terms of financial and non-financial behavior. A high-level summary of the three country databases demonstrates some of the major differences between the activities of men and women.



Photo: The Food and Agriculture Organization (FAO)

²⁹ Mozambique and Nigeria are not included in this figure since the number of respondents is very low.

TABLE 25: MEAN COMPARISONS OF TRANSACTION VOLUMES ACROSS THE YEAR BETWEEN MALE AND FEMALES USING SMALLHOLDER DIARIES DATA

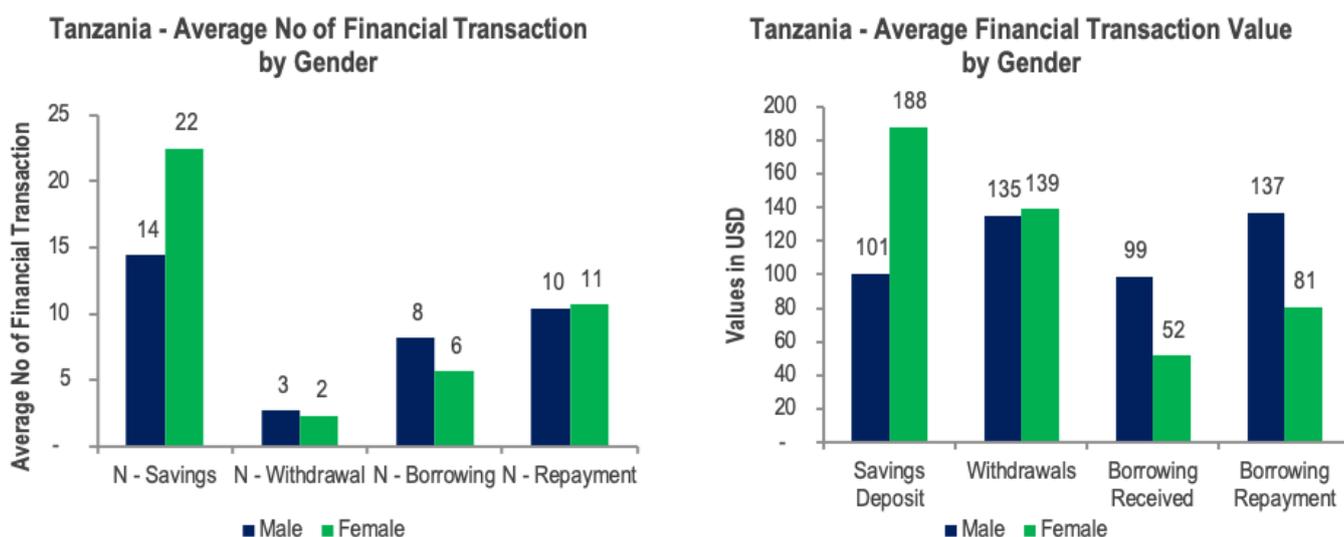
VARIABLES	MOZAMBIQUE			TANZANIA			PAKISTAN		
	Annual Mean - Male	Annual Mean - Female	Mean Comparison Test - Significance [1]	Annual Mean - Male	Annual Mean - Female	Mean Comparison Test - Significance [1]	Annual Mean - Male	Annual Mean - Female	Mean Comparison Test - Significance [1]
Net agricultural income	65.3	27.2	***	89.5	31.4	***	662.7	147.3	
Net self-employment	94.8	33.3	***	119.1	41.9	***	349.2	177.0	***
Net casual employment	127.0	21.6	***	150.7	47.8	***	204.3	76.5	***
Net total income	271.3	71.7	***	193.0	109.2	*	824.1	128.2	***
Total expenses	92.5	50.0	***	177.9	134.9	***	473.8	73.5	***
Physical asset purchase	104.3	17.0	***	157.0	62.9	***	975.9	242.7	***
Physical asset sale	89.2	15.6	***	137.6	84.9		1,076.1	785.8	***
Savings deposit	205.2	46.1	***	100.7	187.9	***	845.1	50.0	***
Withdrawals	189.3	130.0		135.0	132.5	***	738.1	87.8	***
Borrowing received	23.3	34.2	**	197.8	102.5	**	1,394.9	102.4	***
Borrowing repayment	63.5	30.6	***	273.2	161.4	***	2,080.3	295.1	***
No of Expenses transactions	47.8	33.9	***	149.3	128.1		270.7	64.7	***
No of Physical asset purchase transactions	5.9	4.0	**	2.6	2.3	***	2.6	2.8	***
No of Physical asset sale transactions	1.9	1.4	***	2.1	1.3		2.4	1.6	*
No of Savings deposit transactions	2.8	9.8	***	14.4	22.5		1.7	2.9	***
No of Withdrawals transactions	3.1	3.3		2.7	2.2		2.7	1.1	***
No of Borrowing received transactions	1.4	2.1		8.2	5.6	***	42.5	4.7	***
No of Borrowing repayment transactions	2.5	2.7		10.4	10.7		13.9	1.8	***

SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015

By simply comparing the mean values in each category it is immediately clear that in Pakistan, the financial and non-financial lives of men and women in smallholder families are extremely different. The averages are in every case statistically different, implying that in these Pakistani households almost all financial activity is carried out by the men. In Mozambique, there does appear to be significant variation in income, expenditures, and purchases of assets, which differ significantly between men and women.

There is however little variation in financial transactions, such as savings and borrowings. It is important to point out that the Mozambique data are hampered by low overall activity – average number of savings and borrowings transactions over the year was less than one per month for both men and women. In Tanzania however the gender gap is much less pronounced in both financial and non-financial activities, and the details of the variations can be quite revealing.

FIGURE 34: AVERAGE NUMBER OF FINANCIAL TRANSACTIONS VS. AVERAGE TRANSACTION VALUE (PER YEAR)

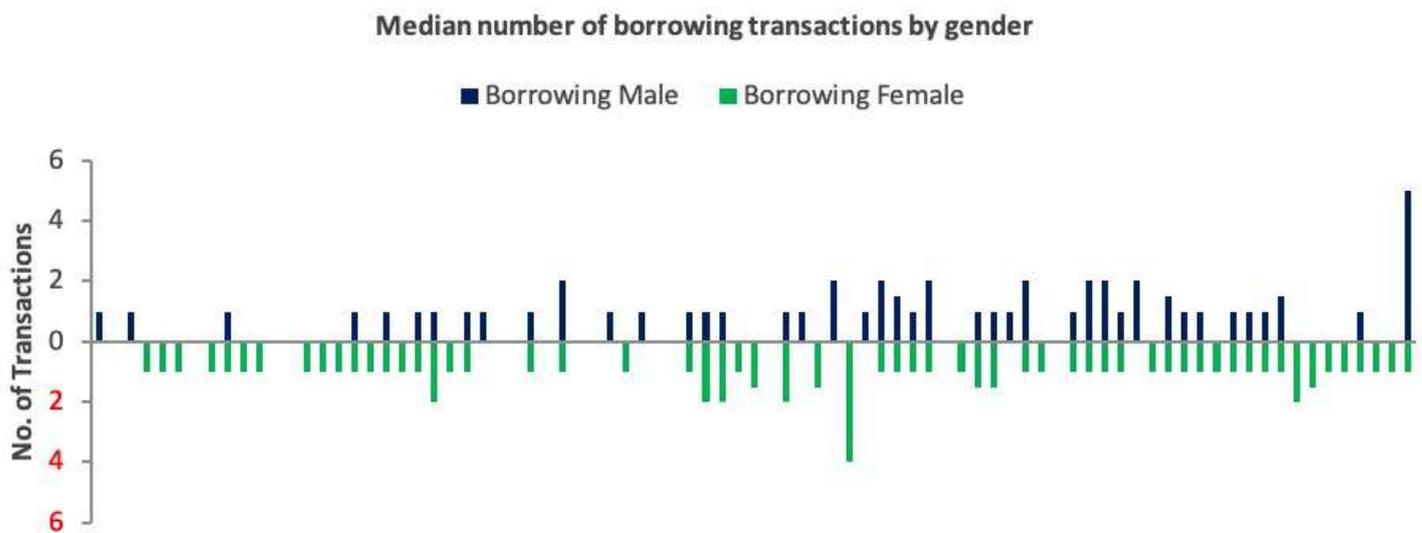


SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015

A number of interesting observations emerge from this analysis. Women are making more savings transactions, and of higher value, than men in this sample. Given that women’s incomes in this Tanzania sample are on average just over half that of male incomes, this implies that women are likely to be managing household income and taking responsibility for household savings, or at least giving it higher priority. And while women make a similar number of withdrawals to men, they tend to be higher amounts, possibly for larger household expenditures. Men make more borrowing transactions and are more likely to repay debts in a smaller number of larger chunks, while women tend to make more, lower value borrowing transactions.

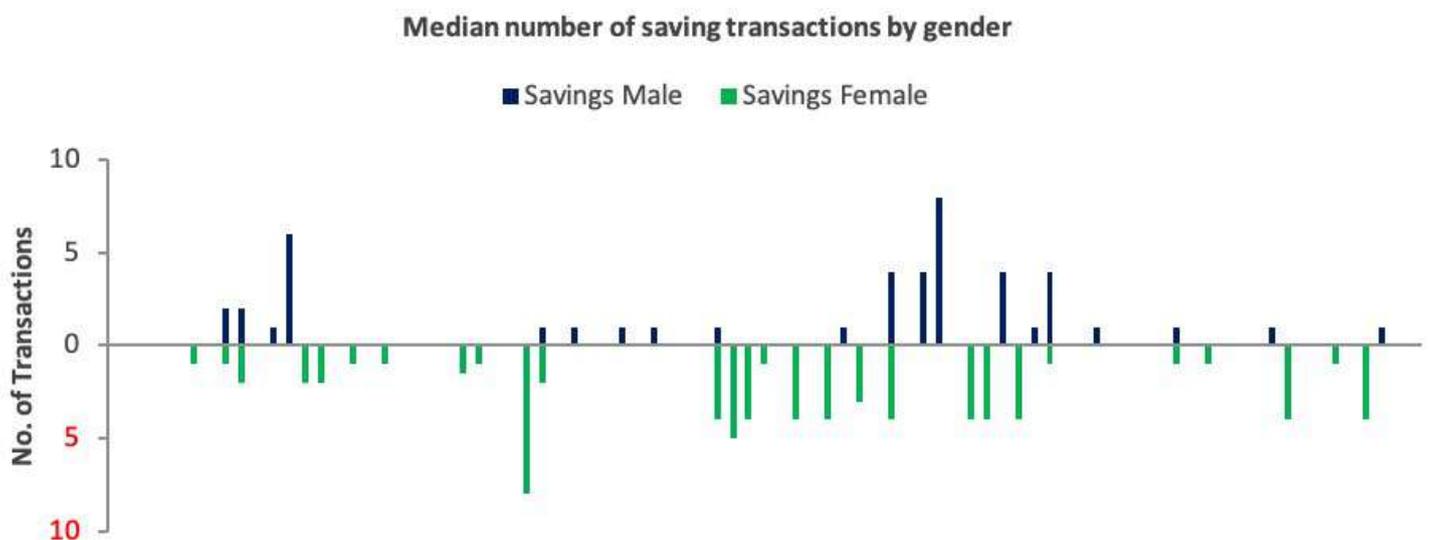
Finally, we can also see that there is greater consistency of behavior within women in the Tanzanian sample than men. Though the number of borrowing transactions is higher for men on average, there is large variability within the sample - the average is skewed by a small number of men making a larger number of transactions. In the graph below, each line represents a male or female member of a household in the Tanzanian diaries data set.

FIGURE 35: DISTRIBUTION OF NUMBER OF BORROWING TRANSACTIONS BY GENDER



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE 36: DISTRIBUTION OF NUMBER OF SAVINGS TRANSACTIONS BY GENDER



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

The women within the sample are however far more consistent as a group, which is reflected in a higher median value. Identification of a group like this with relatively uniform and predictable behavior can be important for an FSP looking for quick scalability within a new market. Profitability of a low-cost product has to come from scale, and scale comes from homogeneity and predictability of behaviors. While males may seem to be more attractive

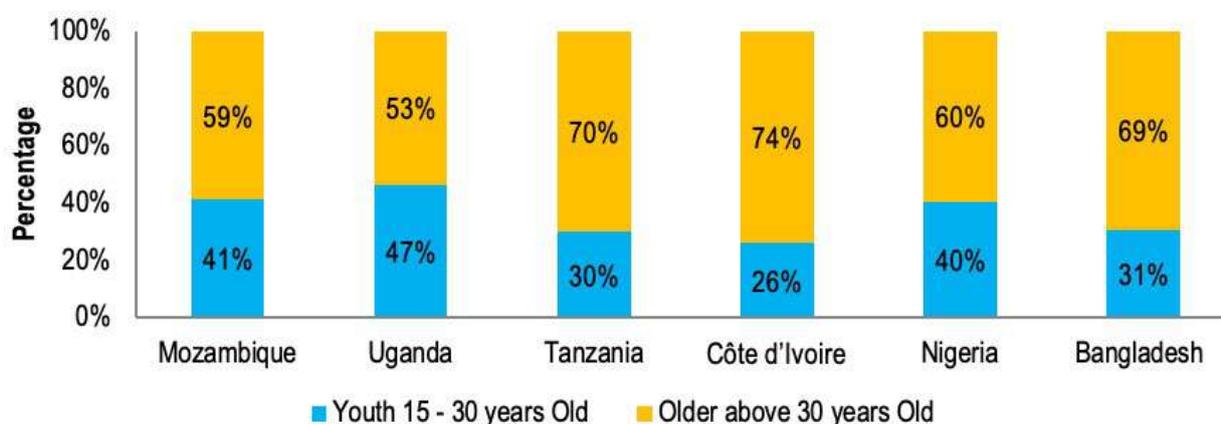
customers at an individual level, they may be less easily served by one uniform product. Seen as a group, females should become a more attractive proposition to financial institutions. In particular, there seems to be considerable outstanding demand for a simple, accessible bank account that can convert small savings into larger purchases (possibly with a commitment mechanism), while credit might be relatively less important.

RESEARCH QUESTION 1.5

How does the behavior of older family members compare to younger family members?

Figure 37 shows the distribution of members of smallholder households by country and age. On an average, 36% of the sample surveyed are young (i.e., 15-30 years old). Among the study countries, Uganda has the highest number of young members and Côte d'Ivoire has the least.

FIGURE 37: SMALLHOLDER HOUSEHOLD RESPONDENT DISTRIBUTION BY COUNTRY AND AGE



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Income sources, land, and perceptions of risk by age in smallholder households

In all the countries in our sample, a majority of the youth (more than 50%) spend most of their time farming i.e. farming is their primary job. (Table 26) The percentage of young members of smallholder households who consider farming as their primary job, is the least for Bangladesh (56%) and highest for Tanzania at 80%. Comparison with the data of the older members of smallholder households reveals that the percentage of young members who are farmers is lower compared to the older farmers. Bangladesh, Nigeria, Côte d'Ivoire and Mozambique, have a higher percentage of older members of smallholder households who perceive their farms to be businesses in comparison to younger members. In Uganda,

a slightly higher percentage of younger respondents (64%) compared to older members (62%) perceive their farms to be their businesses, while in Tanzania, similar percentage of the two groups have this perception.

In all the countries in the sample, more than 70% of the respondents want to expand agricultural activities by looking at new products or markets. Only a slight variation is observed between the older and the younger respondents, wherein a higher percentage of older members of smallholder households want to expand their agricultural activities.

TABLE 26: RESPONDENT PRIMARY JOB BY COUNTRY AND AGE

Respondent's Primary Job	Mozambique		Uganda		Tanzania		Côte d'Ivoire		Nigeria		Bangladesh		Overall	
	Youth 15 - 30 years Old	Older above 30 years Old	Youth 15 - 30 years Old	Older above 30 years Old	Youth 15 - 30 years Old	Older above 30 years Old	Youth 15 - 30 years Old	Older above 30 years Old	Youth 15 - 30 years Old	Older above 30 years Old	Youth 15 - 30 years Old	Older above 30 years Old	Youth 15 - 30 years Old	Older above 30 years Old
Farmer	78%	82%	78%	81%	80%	82%	79%	87%	64%	75%	56%	70%	72%	79%
Professional	1%	4%	3%	3%	1%	1%	1%	1%	4%	5%	2%	2%	2%	3%
Shop owner	0%	1%	1%	1%	1%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Business	8%	5%	4%	5%	7%	7%	1%	1%	14%	13%	7%	8%	7%	6%
Laborer	3%	3%	5%	5%	2%	2%	3%	1%	4%	1%	13%	8%	5%	3%
Others	11%	6%	10%	6%	11%	7%	16%	9%	11%	3%	20%	11%	13%	7%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, 2016 AND 2017.

Table 27 shows the perceptions of the respondents regarding agriculture. When studied along with the observations from **Table 26** on the primary job of the respondents, interesting insights emerge. As an example, in Mozambique, 78% of the youth spend most of their time farming. However, only 32% consider it to be a business activity. Yet, 72% intend to expand agricultural activities on their farms.

TABLE 27: RESPONDENT PERCEPTIONS AND MOTIVATIONS RELATED TO AGRICULTURE BY COUNTRY AND AGE

COUNTRY	Intent to Expand Agricultural Activities		Perception Regarding Farm to be a Business Activity	
	Youth 15-30 years Old	Older above 30 years Old	Youth 15-30 years Old	Older above 30 years Old
Mozambique	72%	74%	32%	39%
Uganda	87%	86%	64%	62%
Tanzania	93%	94%	53%	53%
Côte d'Ivoire	94%	95%	47%	59%
Nigeria	89%	90%	79%	88%
Bangladesh	87%	89%	73%	76%
Average	87%	88%	58%	63%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, 2016 AND 2017.

Next, we compared the sources of income considered as most important by younger and older respondents. In all the countries in our sample, "Growing something and selling it such as crops, fruits or vegetables" was the most important source of income for both younger and older members of smallholder households. (**Table 28**)

TABLE 28: SOURCES OF INCOME SEGMENTED BY AGE

MOST IMPORTANT INCOME SOURCES	Mozambique		Uganda		Tanzania		Côte d'Ivoire		Nigeria		Bangladesh		Overall	
	Youth 15-30 years Old	Older above 30 years Old	Youth 15-30 years Old	Older above 30 years Old	Youth 15-30 years Old	Older above 30 years Old	Youth 15-30 years Old	Older above 30 years Old	Youth 15-30 years Old	Older above 30 years Old	Youth 15-30 years Old	Older above 30 years Old	Youth 15-30 years Old	Older above 30 years Old
Earning Wages or Salary from Regular job/ Occasional Job	20%	21%	8%	9%	12%	11%	6%	4%	9%	8%	15%	9%	12%	10%
Business (Retail/Manufacturing/Service)	9%	8%	6%	7%	13%	16%	3%	3%	17%	17%	13%	11%	10%	10%
Getting Money from Grants, Pension, Family or Friends	14%	9%	8%	5%	4%	4%	3%	2%	3%	2%	3%	5%	6%	5%
Growing Something and Selling such as Crops, Fruits	38%	41%	65%	68%	60%	58%	81%	85%	61%	68%	44%	53%	58%	62%
Rearing Livestock, Poultry, Fish, or Bees and Selling it	3%	5%	6%	6%	3%	6%	1%	1%	5%	6%	17%	17%	6%	7%
Others	16%	15%	7%	4%	7%	6%	7%	4%	4%	1%	7%	6%	8%	6%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, 2016 AND 2017.

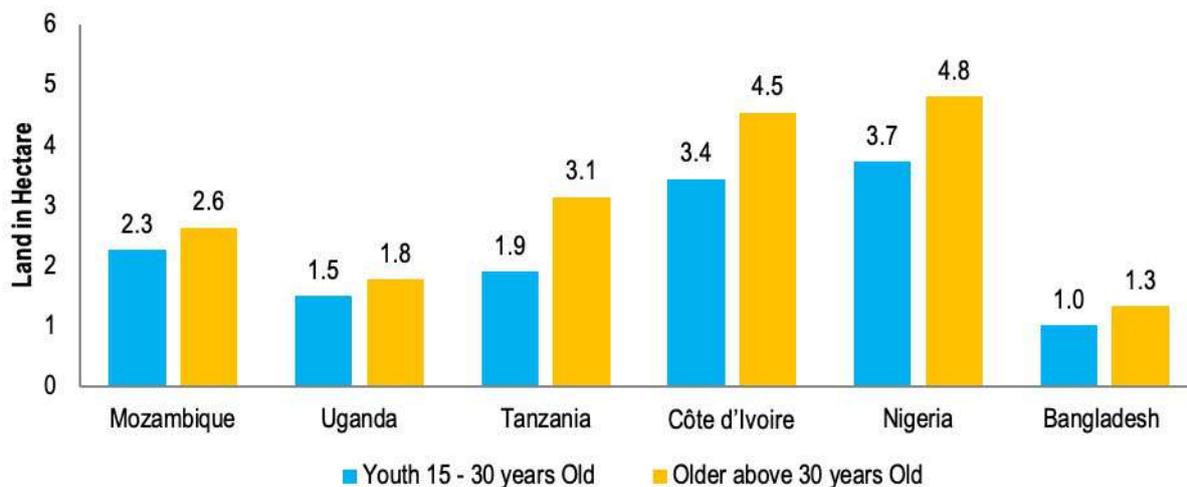
Figure 38 shows the average amount of land owned or rented by members of smallholder households in the countries in our sample disaggregated by age.³⁰ As expected, the older members of smallholder households in all countries have greater land area compared to the youth. Nigeria has the highest number of smallholder household members reporting area owned or rented by the youth (3.7 hectares), while Bangladesh has the least (1 ha).



Photo: Ayesha Vellani / CGAP

³⁰ The respondents of this question include all household members above 15 years of age, including the household head.

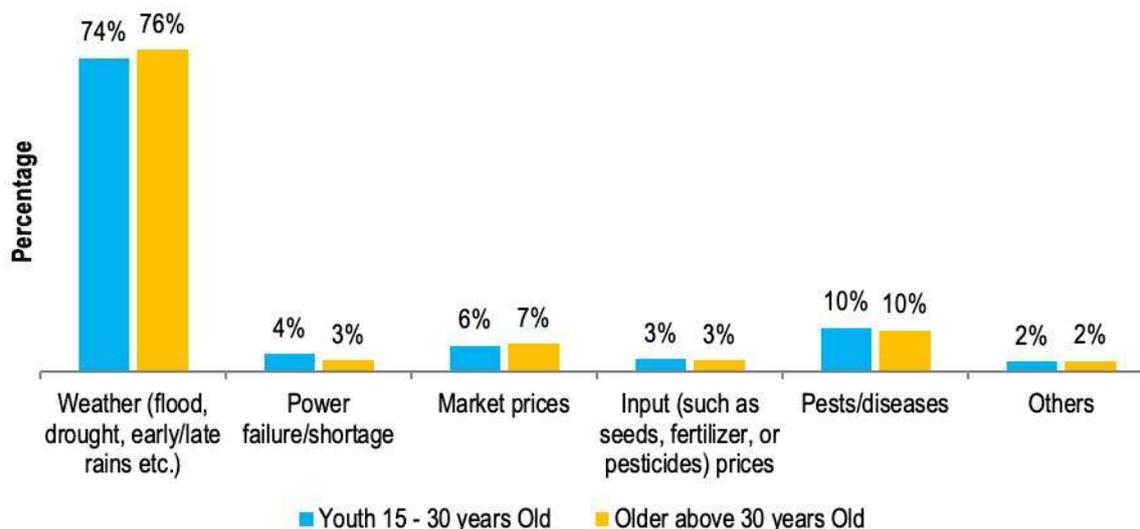
FIGURE 38: AVERAGE LAND (IN HECTARE) OWNED OR RENTED BY COUNTRY AND AGE



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, 2016 AND 2017.

We studied the perception of young members of the smallholder households with respect to the risk they attach to different factors affecting their agricultural activities. In all the countries, weather and pests are considered the most important risk by the young respondents followed by pests (as shown in case of Mozambique in **Figure 39**).

FIGURE 39: RISKS FACED BY SMALLHOLDER HOUSEHOLD MEMBERS IN THEIR AGRICULTURAL ACTIVITIES SEGMENTED BY AGE – MOZAMBIQUE



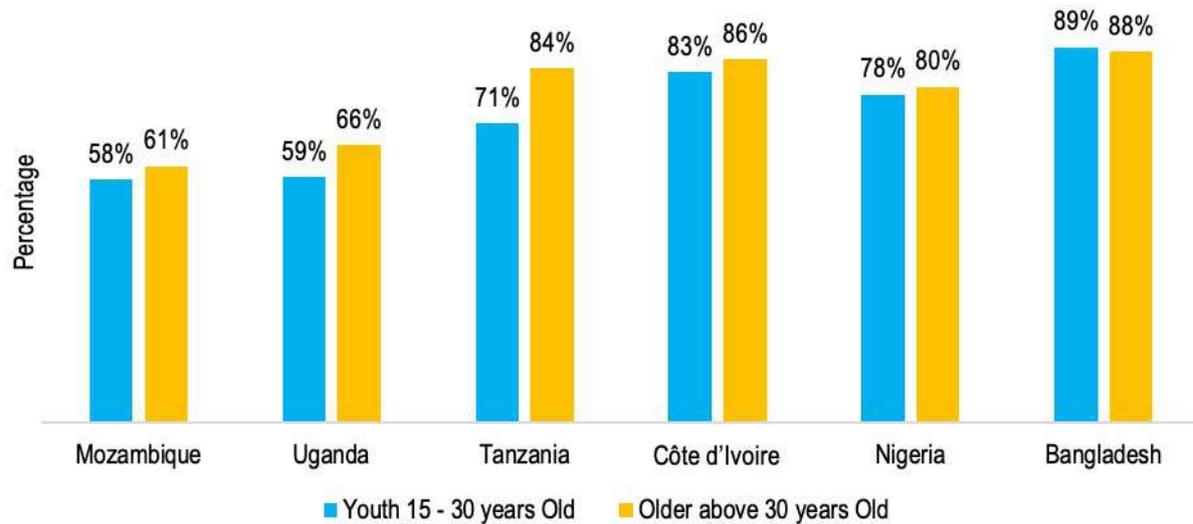
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, 2016 AND 2017.

Access to mobile phones and information by age in smallholder households

To assess the respondents' access to and usage of technology, we looked at whether they owned mobile phones and whether they used their mobile phones to access information or make and receive payments. **Figure 40** below shows

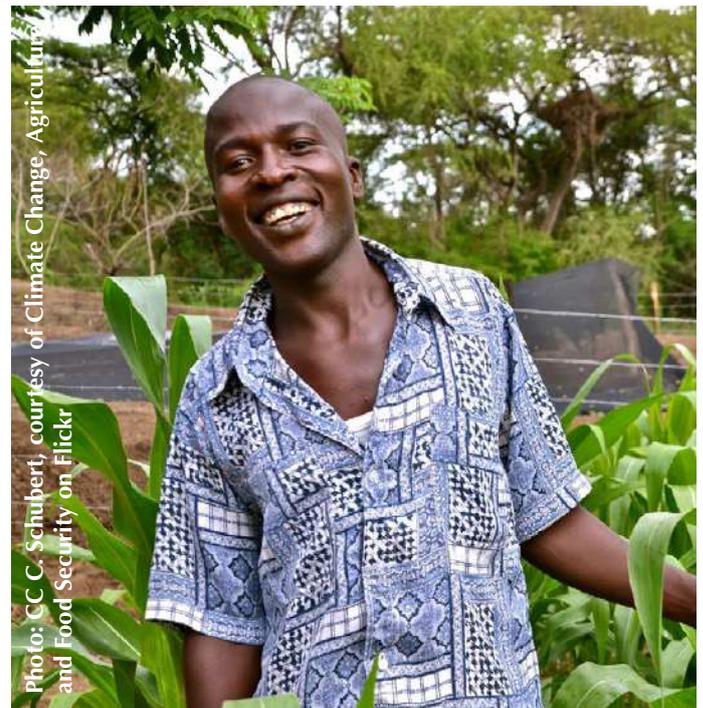
the percentage of respondents who own mobile phones segmented by country and age. More than 50% of the youth across all the countries own mobile phones. When compared with the older members of smallholder households, the difference in mobile phone ownership is marginal.

FIGURE 40: SMALLHOLDER HOUSEHOLD RESPONDENTS HAVING MOBILE PHONE SEGMENTED BY COUNTRY AND AGE



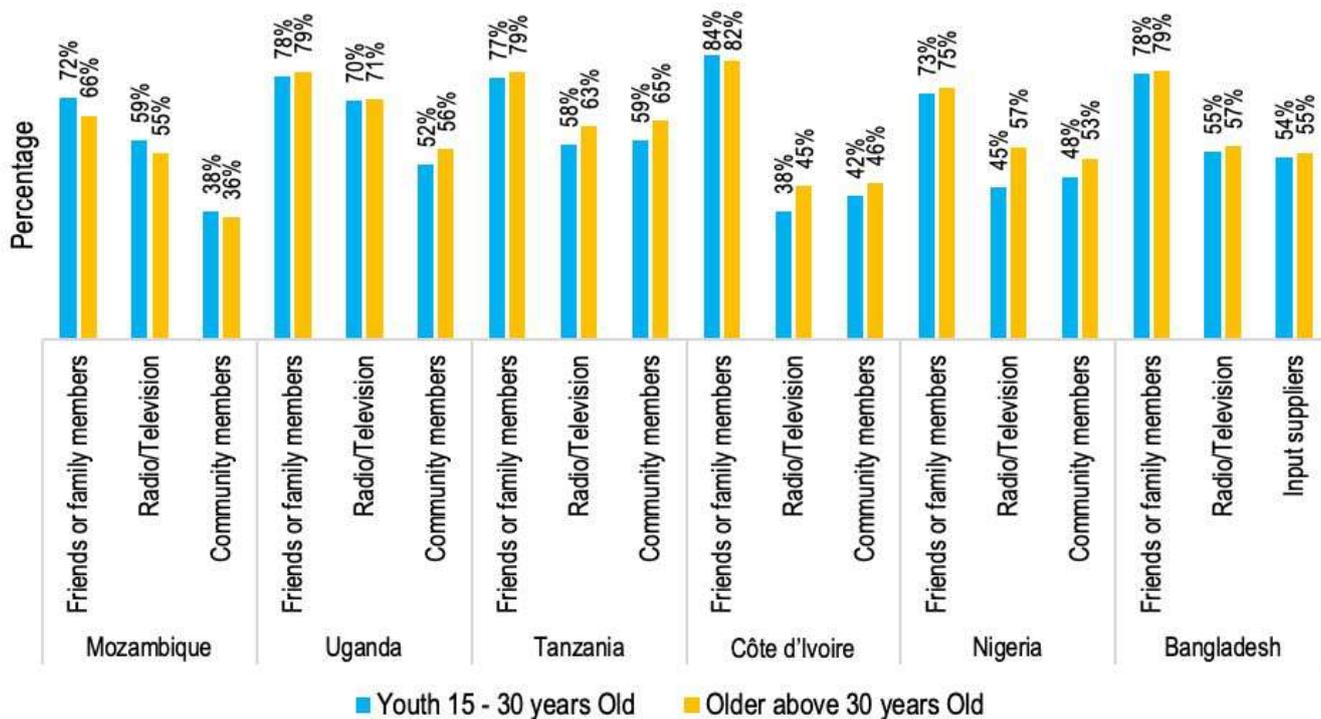
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, 2016 AND 2017.

We looked at the sources of information which the youth rely on for their agricultural activities. **Figure 41** shows the top three sources of information which the youth use.³¹ In each of the 6 countries, majority of the members rely on the information provided by friends or family for their agricultural activities. The age wise distinction between the respondents in this regard is however negligible. In all countries, barring Bangladesh, radio/television and community members follow friends or family as the most relied upon source of information. In Bangladesh, smallholder household members rely on television and input suppliers for obtaining information for their agricultural activities apart from radio/television.



³¹ We have presented only the top 3 sources of information for convenience of demonstration. For the remaining sources, the response rate was relatively low.

FIGURE 41: TOP 3 SOURCES OF INFORMATION USED - DISAGGREGATED BY COUNTRY AND AGE



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, 2016 AND 2017

Use of financial services by age in smallholder households

This analysis considered the formal and informal sources of finance used by smallholder household members by age. **Table 29** shows the percentage of youth and older members who have formal or informal financial accounts, where a formal account includes having accounts with banks, microfinance institution, SACCOs, Co-operatives or mobile money and an informal account is an account with informal savings group, neighborhood, shop keepers, money lenders etc. While informal finance is the most prevalent source of finance in Uganda, mobile money is the most widely used platform of formal finance in Tanzania and Côte d'Ivoire.



Photo: Ayesha Vellani / CGAP

TABLE 29: PERCENTAGE OF RESPONDENTS ACCESSING FINANCIAL SERVICES BY COUNTRY AND AGE GROUP

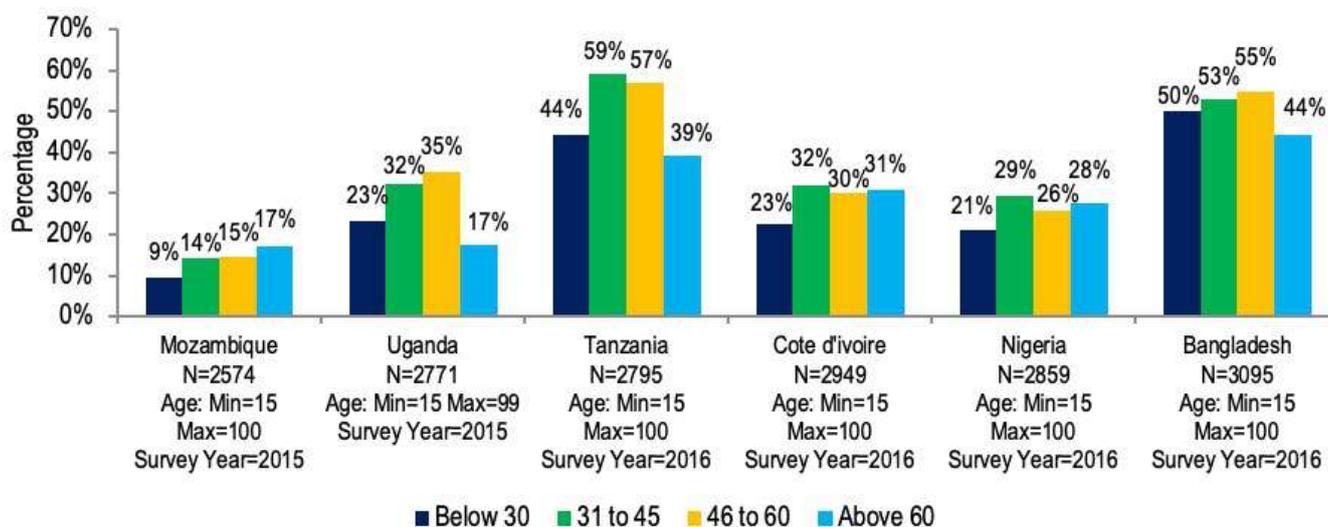
COUNTRY	AGE GROUP	BANKED	MOBILE MONEY	FORMAL	OTHER FORMAL	INFORMAL	EXCLUDED
Mozambique	Youth 15 - 30 years Old	7%	0%	4%	9%	20%	76%
	Older above 30 years Old	12%	0%	4%	15%	19%	73%
Uganda	Youth 15 - 30 years Old	7%	19%	4%	23%	39%	48%
	Older above 30 years Old	12%	23%	10%	31%	47%	39%
Tanzania	Youth 15 - 30 years Old	5%	42%	4%	44%	13%	52%
	Older above 30 years Old	12%	51%	10%	55%	21%	39%
Côte d'Ivoire	Youth 15 - 30 years Old	3%	22%	2%	23%	19%	63%
	Older above 30 years Old	6%	29%	5%	31%	16%	58%
Nigeria	Youth 15 - 30 years Old	19%	0%	3%	20%	25%	59%
	Older above 30 years Old	23%	0%	6%	27%	25%	55%
Bangladesh	Youth 15 - 30 years Old	16%	22%	30%	50%	13%	48%
	Older above 30 years Old	24%	17%	31%	52%	12%	46%
Average	Youth 15 - 30 years Old	9%	18%	8%	28%	21%	58%
	Older above 30 years Old	15%	20%	11%	35%	23%	52%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, 2016 AND 2017.

In the six countries smallholder household surveys data, there is a similar distribution of financial inclusion across the age groups. People in the 31-45 age group are included more than those in 46-60 age group, and oldest and youngest groups are most excluded from financial services. This is as would be expected given other social and economic variables – people aged 31-45 are more likely to be formally employed, have credit histories and a greater

need for financial services. It is interesting to note that in the two West African countries covered by the surveys, people aged 60 and above are more likely to have a formal bank account than those below 30. Given that the median age in both of these countries is below 20, this is a strong indication that formal financial services are not working effectively for the very large youth populations in Nigeria and Côte d'Ivoire.

FIGURE 42: PERCENTAGE OF SMALLHOLDERS WITH FORMAL BANK ACCOUNT BY AGE GROUP

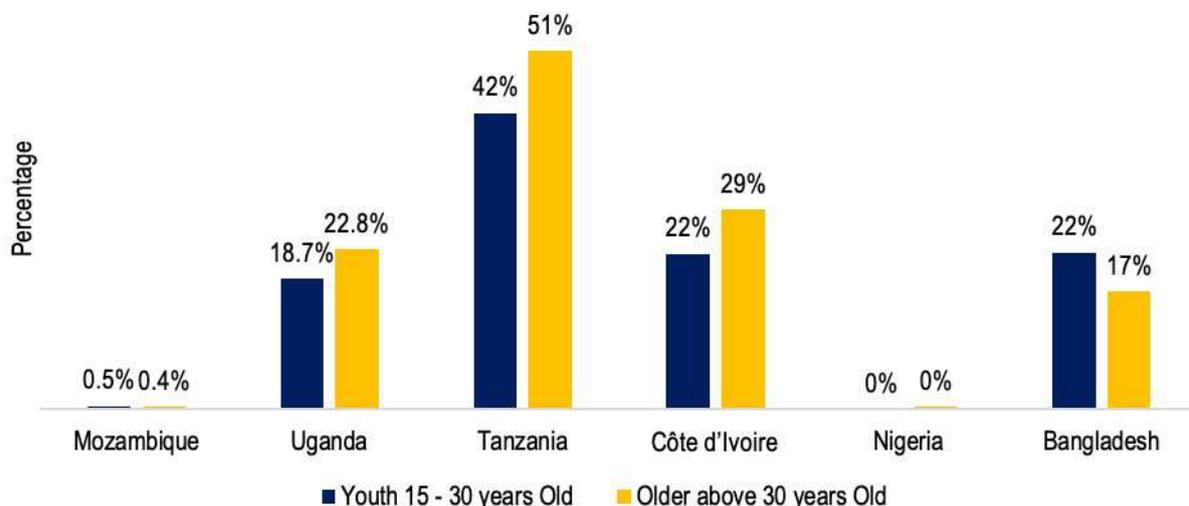


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

When we compare the older and younger members of smallholder households who have a registered mobile money account, Nigeria shows the least percentage of respondents, both younger and older who have a mobile money

account. On the other hand, Tanzania shows the highest access - approximately 42% of youth and 51% of older members of smallholder households have registered mobile money accounts.

FIGURE 43: PERCENTAGE OF SMALLHOLDERS WHO HAVE MOBILE MONEY ACCOUNT BY COUNTRY AND AGE

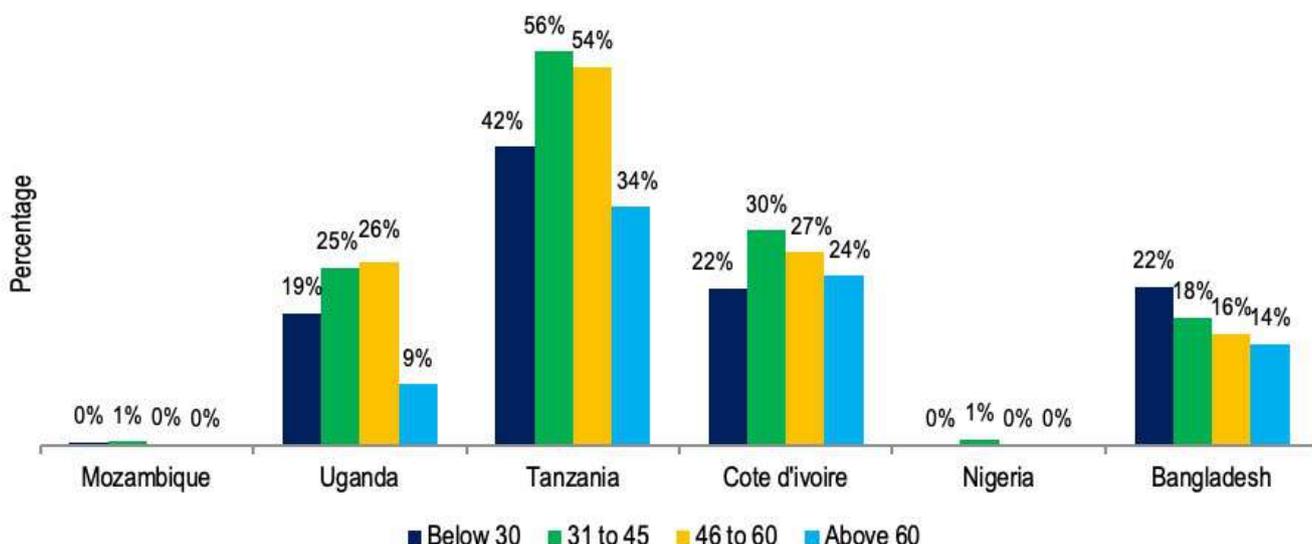


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, 2016 AND 2017.

Further disaggregating the age groups, mobile money coverage skews more towards younger age groups than overall formal financial inclusion. In three of the four countries (except Côte d'Ivoire) with non-negligible mobile money penetration, smallholders aged below 30 are

more likely to have a mobile money account than those over 60. Account ownership peaks in the 31 to 45 year old age group in Tanzania and Côte d'Ivoire, in the below 30 age group in Bangladesh.

FIGURE 44: PERCENTAGE OF SMALLHOLDERS WITH MOBILE MONEY ACCOUNTS BY AGE GROUP

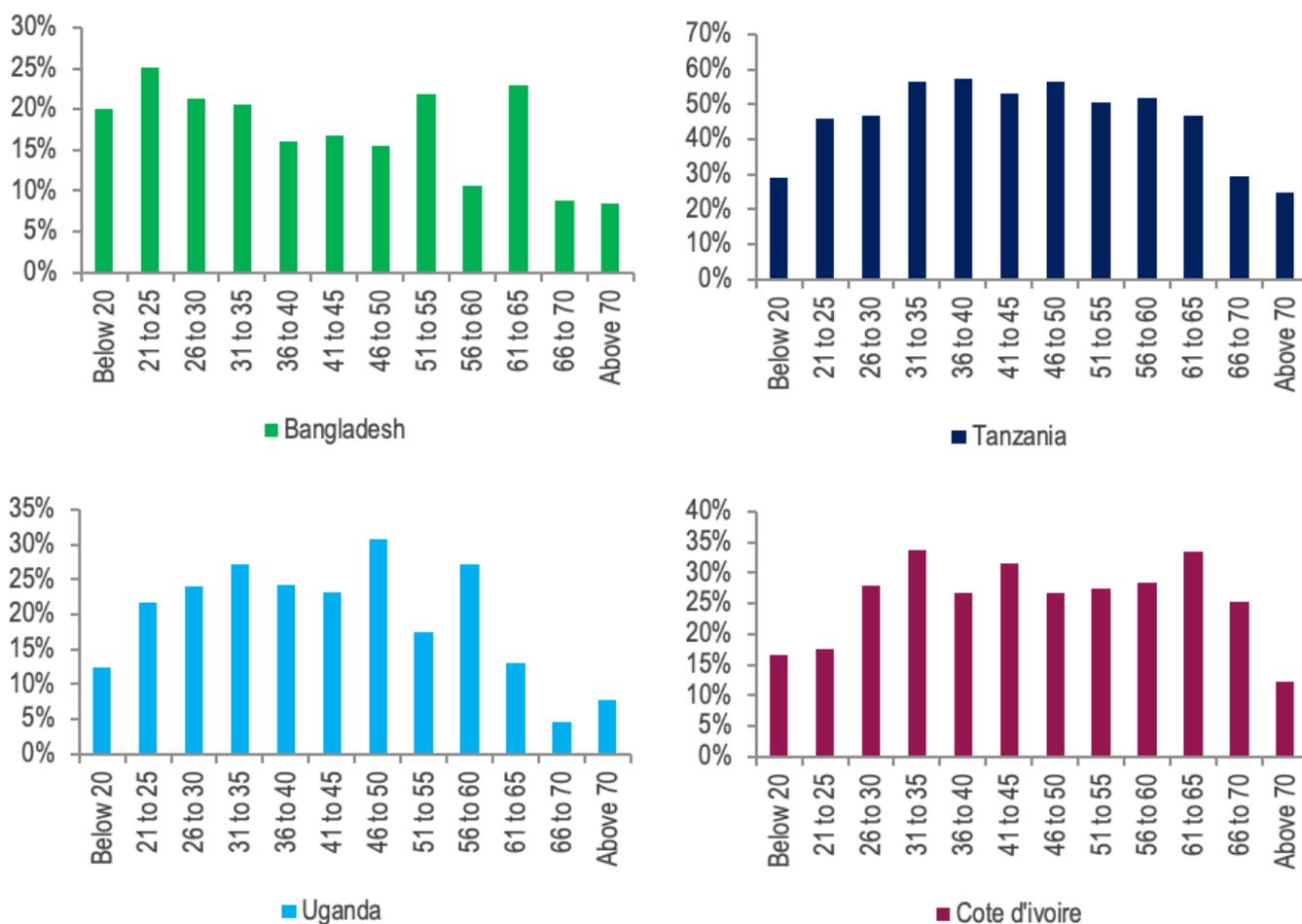


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

In Bangladesh, while those under 30 are the most excluded from formal financial services, they are the more likely to have a mobile money account than any other age group. The youth segment here represents a large segment of the smallholder population who are financially excluded but also have higher potential to be served by DFS than any other age group.

Leaving aside Mozambique and Nigeria and breaking down the age distribution in Bangladesh, Tanzania, Uganda and Côte d'Ivoire to a more granular level provides deeper insights into the digital finance behavior of their smallholder populations.

FIGURE 45: PERCENTAGE OF SMALLHOLDERS WITH MOBILE MONEY ACCOUNTS BY DETAILED AGE GROUPS



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

At first glance a similar picture is clear – digital financial inclusion tends to spike around the 31-35 bracket. These are populations that have many financial needs and are also more likely to have had the opportunity to use digital services for a significant portion of their adult lives. Here however we are also able to identify interesting trends at the tails of the distributions. For example, the data show relatively high digital financial inclusion for older groups, while those

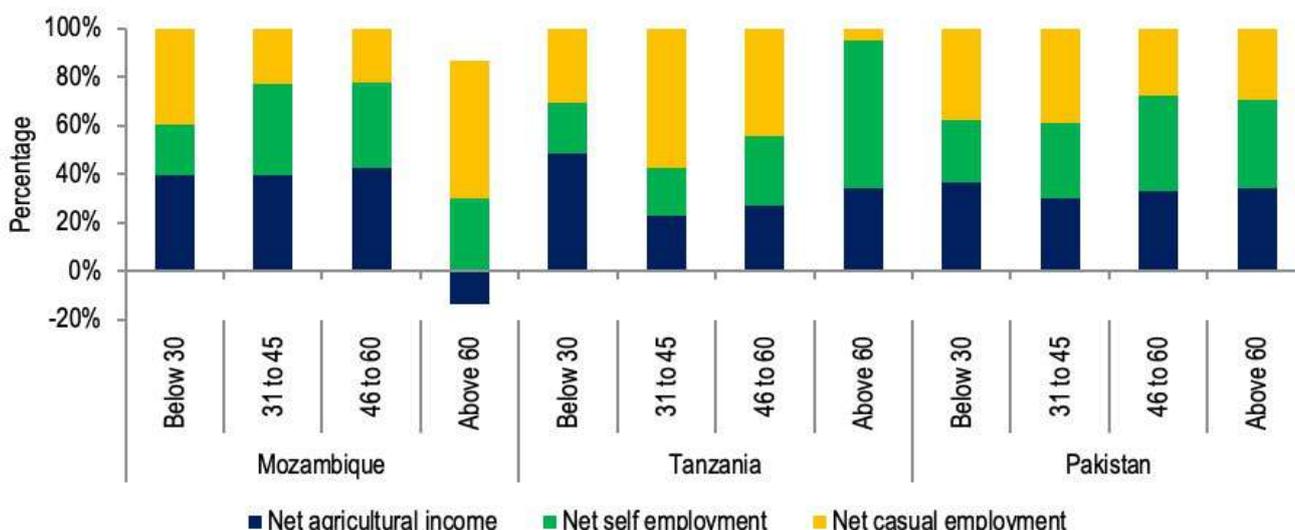
under 20 who we might expect to have higher capacity for digital services may have very low levels of digital financial inclusion or less availability of cash for transactions. While mobile money accounts tail off for older populations, in all countries a significant portion of smallholders over 70 do have a mobile money account. In Bangladesh, smallholders aged 61-65 are more likely to have a mobile money account than those below 20. In Côte d'Ivoire, all age groups

from 30-70 are more digitally included than those under 30. In Tanzania, somebody aged 16-20 in a smallholder household (who by definition does contribute to household income or participate in agricultural activities, so could not be classed strictly as a dependent) is half as likely to have a mobile money account than someone in the 31-35 bracket. This provides a more nuanced picture of the youth emphasis in mobile money penetration that the high-level numbers had pointed to.

Financial behaviour by age in the smallholder diaries

The diaries complement the previous analysis by providing additional data on the financial and non-financial behaviors of younger and older populations. In Pakistan, there is relative consistency across the age groups as to how income is earned: for all ages, approximately 25% of income is agricultural, 25% is casual employment and 25% is self-employment.³² In the other samples, however there is larger variability. In Tanzania, over 40% of income for the youngest smallholders comes from agriculture, double the value for those aged 31-60. Furthermore In Mozambique, smallholders above 60 have a negative net agricultural income which means that more expenses are exceeding the income from selling agricultural products. This could be due to several reasons, including that agricultural products are consumed by the household as opposed to sold or traded – and therefore do not generate monetary or in-kind income.

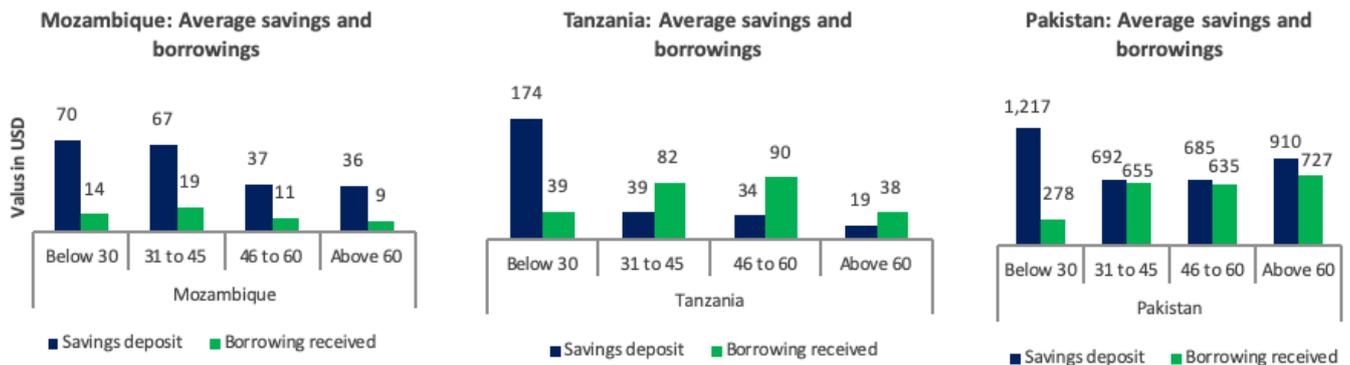
FIGURE 46: BREAKDOWN OF INCOME SOURCES FOR DIFFERENT AGE GROUPS



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

³² In smallholder diaries data, “self-employment” does not include managing your own farm but refers to non-agri business such as running a small shop. “Casual employment” includes working on someone else’s farm, in addition to other unfixed irregular jobs.

FIGURE 47: AVERAGE ANNUAL SAVINGS AND BORROWING VOLUMES IN USD BY AGE GROUPS



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

RESEARCH QUESTION 1.6

How do educated household members compare to less educated household members in terms of income generating activities, household expenditures, asset purchases/sales, and savings/borrowing behavior?

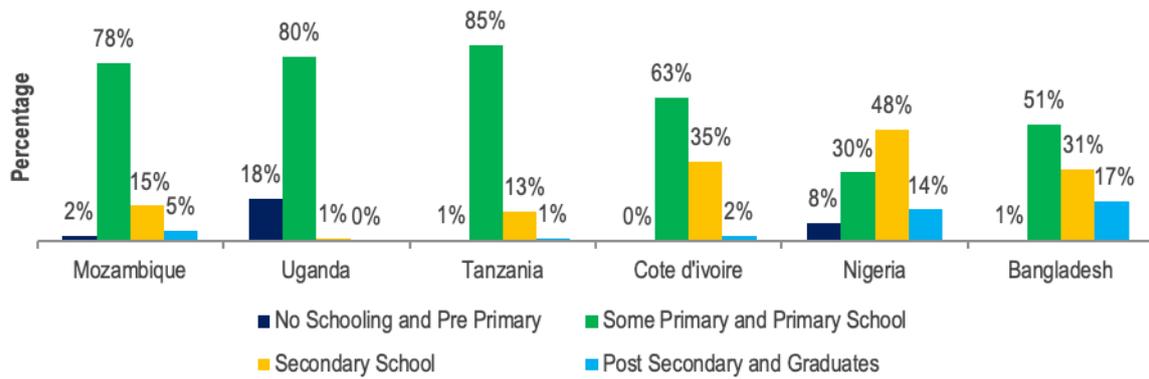
The national survey data allows us to get a grasp of the education levels³³ of smallholder farmers across countries. Figure 48 presents the percentage of smallholder farmers by education level by country. Across the 6 countries, we find that most smallholder farmers' education levels do not exceed primary education. In Tanzania, for example, only 13% of smallholders in the sample have attended secondary school and only 1% continued education post-secondary.³⁴ However, in Bangladesh, we find a relatively (relative to the other five countries) higher percentage of smallholder farmers who have attended secondary and higher education while in Nigeria we find that 48% of smallholder farmers have attended or graduated from secondary school. It is important to point out here that in research question 1.1 we found that higher levels of income³⁵ were associated with higher levels of education.

³³ To proxy education responses to question D8 'What is the highest grade attended' from the national household survey is used.

³⁴ Our review has shown that there is a high rate of non-respondents to education related question in most country data sets. The percentages shown above take the overall number of respondents as denominator and exclude observations with missing information.

³⁵ The smallholder surveys report total monthly, self-reported income from all different household sources and members. This income figure does not account for any costs or expenses associated with income-generating activities.

FIGURE 48: NATIONAL SURVEYS SAMPLE SPLIT BY EDUCATION ACROSS COUNTRIES³⁶



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Understanding the education level of smallholder farmers in a country context is vital for developing and targeting financial products. The current research could for example be complemented with a thorough analysis of literacy and numeracy rates for each country. Illiteracy rates can be high in areas where smallholders' education does not exceed primary education, and this should be taken into account when designing products in a way that these are usable by individuals who only have very limited literacy and numeracy skills.

To better understand how education is correlated with usage of financial products we calculated the average education level of those households that are using a certain financial product and compared this to the average education of those who do not use this product. Table 30 shows results from a mean comparison test of the average level of education of users and non-users of formal banking, mobile money and informal groups such as MFIs, Saccos, VSLA and POs.³⁷ Level of education here is defined by different categories which are represented by numbers in the data set (1 = no formal education; 2 = primary education; 3 = secondary education; 4 = post-secondary and higher education). The education attainment numbers were then averaged across the users and non-users of each of the financial products, by country. A mean

value of 3 therefore implies that on average the group has achieved secondary education. We find that in all but one case, users of formal or informal financial products have a higher average education level than non-users. All these differences are found to be statistically significant. Annex 3 shows the corresponding charts disaggregated by the 4 education levels as was done in Figure 48.

This is a significant finding as it implies a correlation between education and usage of formal financial products. This highlights the importance for financial service providers to consider the financial literacy of potential clients.



Photo: CGAP

³⁶ For Uganda, no data entries above grade 10 were found.

³⁷ MFI: Microfinance Institutions, SACCO: Community Savings and Credit Cooperatives, VSLA - Village Savings and Loan Association and PO – Post office bank.

TABLE 30: NATIONAL SURVEY DATA OF AVERAGE LEVEL OF EDUCATION FOR USERS AND NON-USERS OF FORMAL BANKING, MOBILE MONEY AND MFI/SACCO/VSLA/POS

Type of Account	Mozambique	Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
FORMAL BANK ACCOUNT						
Users	2.59	1.97	2.19	2.56	3.10	2.74
Non-Users	2.16	1.78	2.08	2.26	2.46	2.54
MOBILE MONEY						
Users	3.15	1.98	2.20	2.57	4.00	2.94
Non-Users	2.22	1.79	2.08	2.26	2.67	2.57
MFI/SACCO/VLS/PO						
Users	2.43	1.98	2.23	2.52	2.83	2.55
Non-Users	2.22	1.82	2.14	2.38	2.67	2.69

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

To triangulate these correlations, we investigated the smallholder diaries data. Here it is important to note that national surveys implement a representative sampling approach that allows inference on the national population of smallholder farmers. The diaries on the other hand are not representative in the same sense but allow a much more granular analysis of day-to-day household transactions.

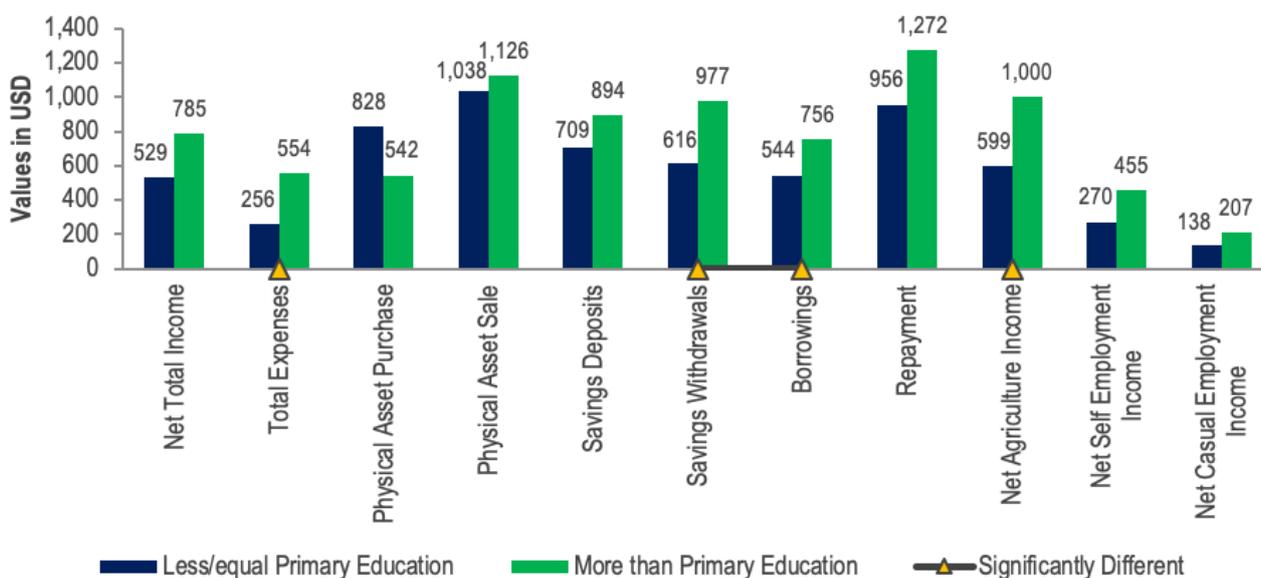
We therefore use the diaries data to look into how more educated individuals save and borrow, and their income and expenditures vis-à-vis less educated individuals. For our analysis, we divided individuals into two separate groups. The more educated group is defined based on whether they at least attended secondary school while the less educated group comprised of those who had gone to primary school (and not higher) or has no education. We then compared the average value of transactions of each group for different transaction types such as formal/informal savings or borrowings, expenses and income streams.

Figure 49 compares the average transaction value³⁸ of more and less educated individuals in Pakistan in terms of net income, expenses, physical asset purchases and sales, savings, borrowings, repayments, and other income types.

Annex 3 includes similar charts for Tanzania and Mozambique. The yellow triangles in the chart below indicate where the average values of the two groups are statistically significantly different from each other. Note that to calculate the average transaction sizes, the overall amount of, for example, savings withdrawals were summed up for the less educated and the more educated households and then divided by the number of households who transacted. While all households engage in income and expenses, not all households engage in savings or borrowing transactions. The sample size of calculating the average transaction size for the two groups does therefore vary between the different transactions categories.

³⁸ Note that as transaction we understand both incoming and outgoing transactions. This can include income, expenses, asset sales and purchases or any kind of financial transactions.

FIGURE 49: SMALLHOLDER DIARIES DATA AVERAGE TRANSACTION VALUES FOR MORE VS LESS EDUCATED INDIVIDUALS IN PAKISTAN

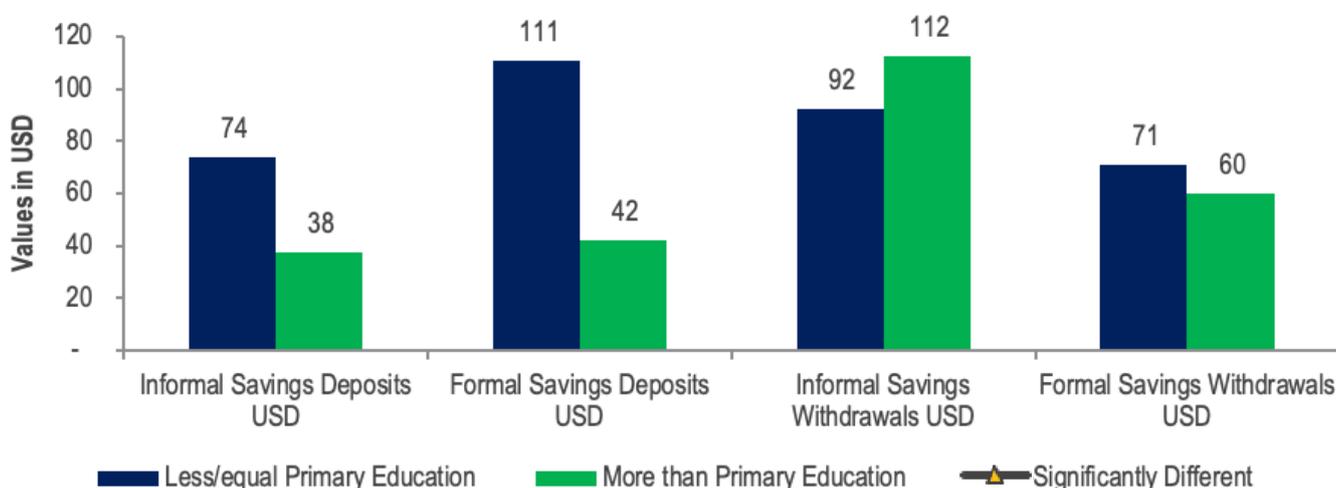


SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

A common finding across all three countries is that the more educated group has higher total net income and higher expenses than the less educated group. A similar trend was found when we look at incomes for different education levels using national surveys under research question 1.1. We also find statistically significant differences in savings withdrawals and borrowings of the more educated group as well as a higher net income from agricultural activities.

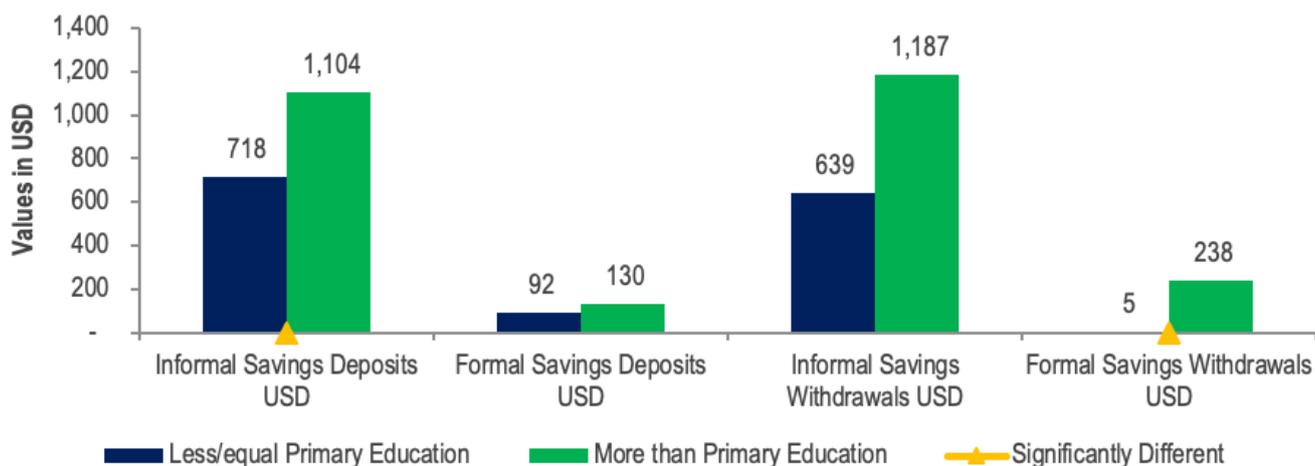
However, a clear trend could not be observed when we compared formal versus informal savings transactions across more educated and less educated individuals. In Pakistan, more educated engage more in both informal and formal savings transactions than less educated (Figures 50). In Tanzania, except in one instance, less educated engage more in both informal and formal savings transactions compared to more educated (Figure 51).

FIGURE 50: SMALLHOLDER DIARIES DATA AVERAGE TRANSACTION VALUES FOR MORE VS LESS EDUCATED INDIVIDUALS IN TANZANIA



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE 51: SMALLHOLDER DIARIES DATA AVERAGE TRANSACTION VALUES FOR MORE VS LESS EDUCATED INDIVIDUALS IN PAKISTAN



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

RESEARCH QUESTION 1.7

What are the important factors in determining propensity to use digital financial services? How important is age in this?

The uptake of digital financial services varies considerably across the countries covered by the smallholder surveys. Two countries – Mozambique and Nigeria – had extremely low penetration of mobile money among smallholder families (<1% of the smallholder population) and there was very little data to explore the driving factors behind propensity to use DFS.

As a starting point for this analysis, we modeled the decision of smallholder farmers to have a mobile money account as a function of several factors including age, education, income, gender and location. The limited dependent variable model was estimated using a probit regression and the results are presented in Table 31.

There are several interesting conclusions that can be drawn from these results. In all four countries, the household's average monthly income is significant at the 1% level. This implies that households that have a higher overall income are more likely to have a mobile money account – meaning that at least one household member is enrolled. The income effect is largest in Tanzania.

In other words, wealthier households are more likely to have a mobile money account in Tanzania than in the other countries.

The source of income is also an important determinant of whether a smallholder has a mobile money account or not. In Tanzania, Bangladesh and Côte d'Ivoire, smallholders who's main income source is selling agricultural produce are less likely to have a mobile money account. Smallholders who's main income source is through earning wages, either through casual employment or through a fixed employment contract, are more likely to be enrolled.

In all four countries, males are more likely to have a mobile money account than females (this relationship is analyzed in more detail in Research Question 1.4). Age is also a good predictor, though the age effect varies by country and is often less pronounced than we might expect. In Tanzania and Bangladesh, the average age of a smallholder with mobile money is one to three years younger than a smallholder without mobile money, while in Uganda and Côte d'Ivoire, there is not much difference between the average age of smallholder with mobile money and smallholder without mobile money.

TABLE 31: PROBIT REGRESSION ANALYSIS ON MOBILE MONEY ENROLMENT

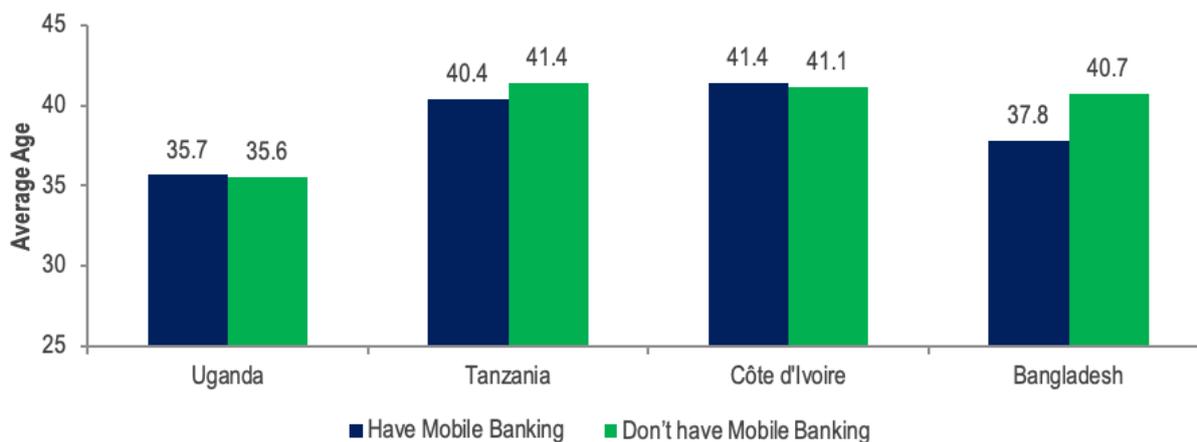
PARTICULARS	MARGINAL EFFECT CO-EFFICIENT							
	Uganda		Tanzania		Côte d'Ivoire		Bangladesh	
Age Group								
1 (Less than 30)	0.00		0.00		0.00		0.00	
2 (31-45)	0.06	***	0.11	***	0.11	**	-0.01	
3 (46-60)	0.09	***	0.10	***	0.11		-0.05	*
4 (More than 61)	-0.05		-0.07		0.10		-0.07	
Household's average monthly income								
Income	0.00	***	0.00	***	0.00	**	0.00	***
Gender								
Male	0.00		0.00		0.00		0.00	
Female	-0.06	***	0.12	***	-0.10	**	-0.06	**
Household Head Education Status								
No Schooling and Pre-Primary	0.00		0.00				0.00	
Some Primary and Primary School	0.14	***	-0.04					
Secondary School	0.35	***	0.18				0.04	
Post-Secondary and Graduates			0.21				0.18	***
Household's Largest Source of Income								
Agricultural income	0.00		0.00		0.00		0.00	
Grants, subsidies, or non-refundables from family/friends	0.03		0.21	***	0.12		0.02	
Self-employment	0.09	**	0.16	***	-0.05		0.11	***
Earning Wages	0.12	***	0.08	*	0.16	**	0.06	*
Others	-0.06	**	0.08		0.10		0.04	
Residence in Urban/Rural								
Rural	0.00		0.00		0.00		0.00	
Urban	0.07	***	0.11	***	0.22	***	0.07	
Zone								
Central	0.00							
Eastern	-0.12	***						
Northern	-0.19	***						
Western	-0.13	***						
Border			0.00					
Coastal			0.06					
Inland			0.00					
Lake			-0.05					
Zanzibar			-0.45	***				
Foret Est					0.00			
Foret Ouest					0.00			
Savane					-0.01			
Barisal							0.00	
Chittagong							0.16	***
Dhaka							0.05	
Khulna							0.01	
Rajshahi							0.19	***
Rangpur							0.08	**
Sylhet							-0.03	
Pseudo R2	12%		12%		10%		11%	
No of Observations	2,729		2,059		1,186		2,191	

[1] Smallholder National Surveys.

[2] *10% significant, ** 5% significant, *** 1% significant.

[3] We have increased the decimals where possible - the remaining zeros are base category for dummy variables.

FIGURE 52: AVERAGE AGE OF SMALLHOLDER FARMERS THAT DO AND DO NOT HAVE A MOBILE MONEY ACCOUNT

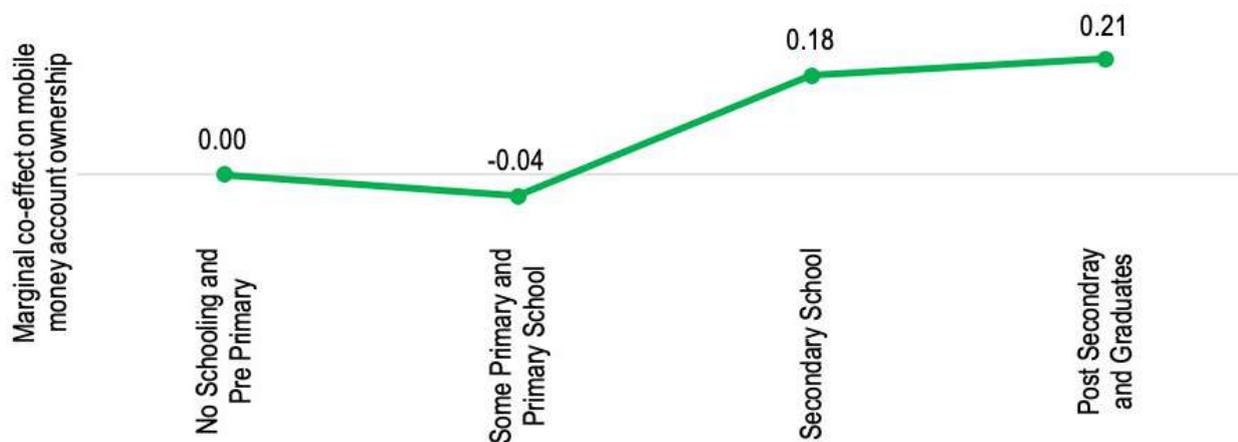


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

To address Research Question 1.7, we conduct a deeper analysis of the relationship between mobile money accounts and age, and find that while digital financial inclusion tends to spike around the 31-35 age bracket, data also show relatively high digital financial inclusion for older groups, while those under 20 (who we might expect to have higher capacity for digital services) have very low levels of digital financial inclusion.

In the data for Bangladesh and Uganda, we also find strong evidence that the level of education is a good predictor of mobile money account ownership. Breaking down the population by highest educational grade attended, for those who have not completed secondary schooling, education is a weak predictor (there is little correlation between the variables). However, at higher levels of educational attainment, education is a significant variable. So, beyond a level of some secondary education, with every increase in the level of education, a smallholder is more likely to use mobile money. This can clearly be seen in the Tanzania data in Figure 53.

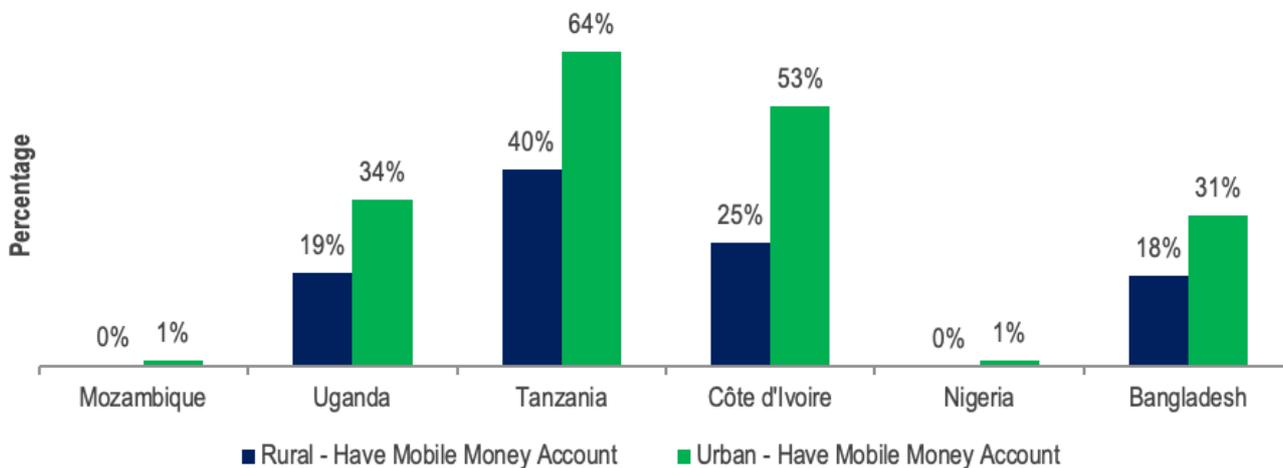
FIGURE 53: IMPACT OF EDUCATIONAL STATUS ON LIKELIHOOD OF MOBILE MONEY ACCOUNT OWNERSHIP



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Smallholder farmers living in urban environments are more likely to have mobile money than those in rural communities in some part due to better network coverage. Though not entirely surprising, this does provide useful information for FSPs looking to find the ‘low-hanging’ smallholder families to reach digitally.

FIGURE 54: RURAL/URBAN SPLIT OF MOBILE MONEY ACCOUNT OWNERSHIP



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The magnitudes of the gaps also provides an interesting perspective – in Bangladesh, whether a smallholder lives in an urban or a rural environment is relatively unimportant for predicting mobile money account ownership whereas in the other three countries, urban populations are significantly more likely to have an account than rural ones.

Driving usage of digital services is one of the key challenges facing financial service providers in many African and Asian countries today; this is particularly the case in rural contexts. Understanding what is driving the propensity of smallholder families to *actively engage with* digital services as the access frontier penetrates deeper into rural areas is therefore extremely valuable. This data suggests that level of education is a good predictor of active usage and that while smallholders who have completed secondary education have a high likelihood of usage, those educated to a lower level will need more incentives, support or use cases to engage in digital services. FSPs should also consider age very carefully in this context, as any assumptions that digital users will skew towards youth may exclude older users with higher potential to engage.

Basic enablers for digital financial services in smallholder households

The proliferation of digital financial services (DFS) depends in part on the regulatory environment, as well as demand-side enablers such as literacy, proof of identity, access to and knowledge of mobile phones, and access to internet. Thus, we analyzed the demographic and economic characteristics of members of smallholder households to identify which smallholder households might be most interested in using DFS and determine the support and information they need to do so.

Based on review of literature, expert opinions and data available in the CGAP national survey datasets, we identified the following variables as relevant to the potential uptake and use of DFS.

- Type of official (personal) identification owned
- Literacy
- Type of phone owned
- Access to internet
- Number of times the respondent sent or received money to/from family or friends in the past 30 days

- Ability to access weather, price, or agricultural information, track the transportation of inputs, or buy and sell agriculture products by mobile phone (based on household survey question M20: “Do you currently have any of the following abilities for your agricultural activities?”)

We used analyses such as graphical representation and frequency distributions to demonstrate characteristics of farmers based on these variables. Using the responses to these questions and related to these variables, a DFS readiness index was developed that assigned scores from 1 to 17 to each respondent based on their responses (see Table 32). Ward’s linkage method was used to segment the scores into two groups: 1) A group with relatively high readiness score (scores 7 and higher), and 2) a group with relatively low readiness score (scores 6 and below). The cut-offs are based on the cluster technique Ward’s linkage method. The high readiness group indicates relatively higher potential to use DFS and lower readiness group shows relatively low potential.



TABLE 32: VARIABLES USED IN DIGITAL READINESS INDEX

	Variables	3 Points	2 Points	1 Point	No Point
1	Holding official Identification: Government-issued ID/National ID, Passport, Driver’s license, Voters card, Ration card, Employee ID (For Government / Civil Servants), Military ID	Yes			No
2	Literacy Skills		Able to read whole sentences	Able to read only parts of sentences	Cannot read at all
3	Type of Phone owned	Smartphone	Feature phone with Internet facility	Basic phone	No Phone
4	Usage of internet or social media	Daily	Weekly	Monthly, More than Monthly	Never
5	Number of times respondent sent/ received the money in the past 30 days	More than 5 times	More than 2 to 4 times	At least 1 time	No
6	Ability to access weather information or market pricing information or farming information or track the transportation of inputs or buy and sell agriculture products on Mobile Phone	≥ 5 out of 7 abilities	≥ 2 and ≤ 4 out of 7 abilities	1 out of 7	0 abilities

We analyzed the characteristic profile of smallholder household members disaggregated by two DFS index groups – (i) high DFS index (ii) Low DFS index. This analysis helps to compare the characteristics across the two groups and the insights shall enable us to understand the reasons or barriers that affect a member’s readiness to access DFS. Table 33 shows average profile of members of smallholder households from the five countries in our sample disaggregated by their DFS Index scores. Across all countries, on an average, 98% of smallholder household members who show high readiness possess proof of their identification. This implies that the requirement for official documents to comply with the Know-Your-Customer (KYC) conditions are unlikely to create a barrier for members from smallholder households to access DFS. Also, a higher percentage of high readiness members of smallholder households

compared to low indexed members own mobile phones types which have internet capability, and use mobile phones, which are a key to access DFS. The analysis also highlights certain characteristics of high readiness members that may act as challenges for them to access DFS. Literacy is a challenge, given that among people over 15, living in smallholder households and demonstrating high readiness for DFS, less than half (on an average 54%) are considered literate. Further, although a higher percentage of high readiness members use internet often compared to low readiness members - the percentage is nevertheless low at 30%, on an average, across all countries. Overall, it can be said that high readiness members from smallholder households are highly likely to use DFS as they demonstrate the capacity, qualifications and willingness to use them.

TABLE 33: CHARACTERISTICS OF SMALLHOLDER HOUSEHOLD MEMBERS DISAGGREGATED BY DFS INDEX CATEGORY FROM THE FIVE SAMPLE COUNTRIES

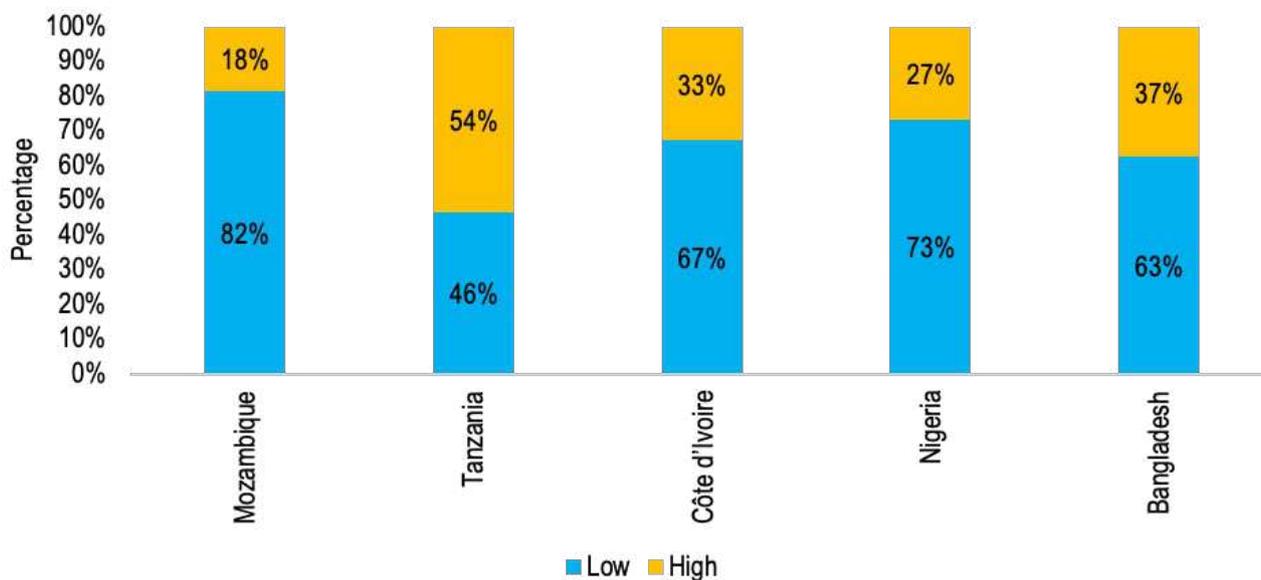
PROFILES	Mozambique DFS Index		Tanzania DFS Index		Côte d'Ivoire DFS Index		Nigeria DFS Index		Bangladesh DFS Index		Overall Average DFS Index	
	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
Possess Id Proof	98%	54%	99%	82%	100%	91%	98%	67%	97%	87%	98%	76%
Able to read whole sentences and part of the sentences	60%	22%	91%	47%	63%	11%	31%	11%	23%	8%	54%	20%
Type of phone - Smart/ Feature phone (with internet capability)	19%	1%	20%	2%	46%	6%	46%	6%	75%	3%	41%	4%
Usage of internet or social media	32%	2%	12%	0%	16%	0%	28%	1%	63%	2%	30%	1%
Average number of activities performable on a mobile phone [1]	1.72	0.35	1.89	0.37	0.47	0.12	1.43	0.29	1.66	0.81	1.43	0.39
Average number of times respondent sent or received money in the past 30 days	1.60	0.24	1.67	0.20	1.20	0.15	1.61	0.26	0.54	0.13	1.32	0.20

NOTE: [1] 1. ACCESS WEATHER INFORMATION, 2. ACCESS MARKET PRICING INFORMATION, 3. ACCESS FARMING INFORMATION, 4. TRACK THE TRANSPORTATION OF INPUTS AND CROPS, 5. BUY AND SELL AGRICULTURAL PRODUCTS, AND 6. CHARGE MY PHONE AT A CENTRAL LOCATION

54% members from smallholder households in Tanzania, 33% in Côte d'Ivoire and 37% in Bangladesh show high readiness towards DFS.

Figure 55 shows the percentage of smallholder household members who are in high and low readiness category by country. Respondents from Tanzania show the highest readiness towards DFS, followed by Bangladesh and Côte d'Ivoire.

FIGURE 55: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS IN HIGH AND LOW DFS READINESS CATEGORY BY COUNTRY

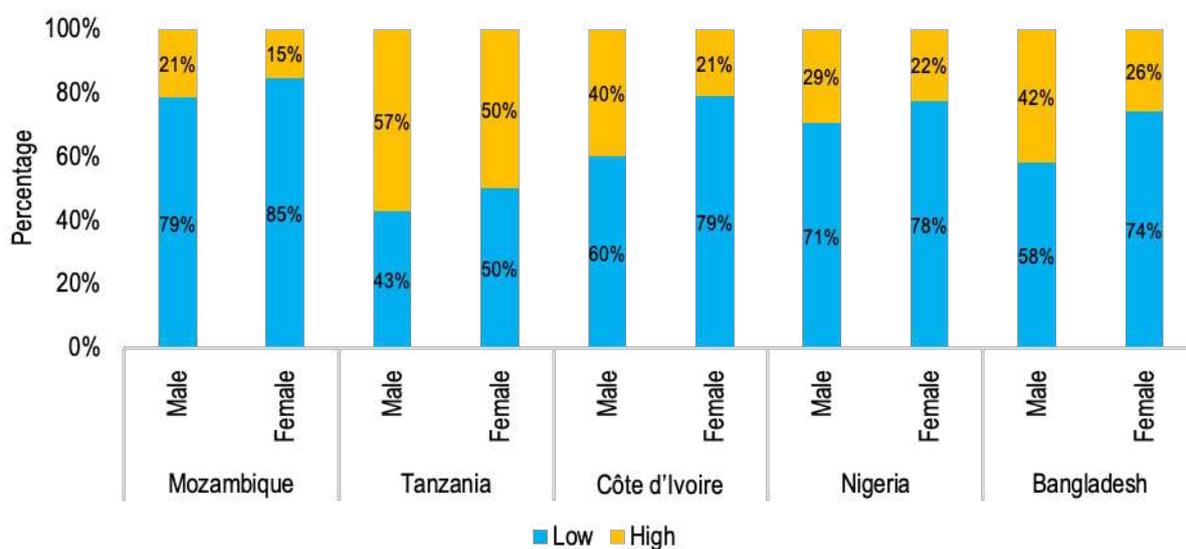


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Across all countries, men in smallholder households, show high readiness towards DFS than women. Gender disaggregated analysis depicts that in all countries a higher percentage of men show high readiness towards DFS

compared to female members of smallholder households. On average, 46% of men and 32% of women in Tanzania, Côte d'Ivoire and Bangladesh show high readiness towards DFS.

FIGURE 56: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS IN HIGH AND LOW DFS READINESS CATEGORY BY COUNTRY AND GENDER

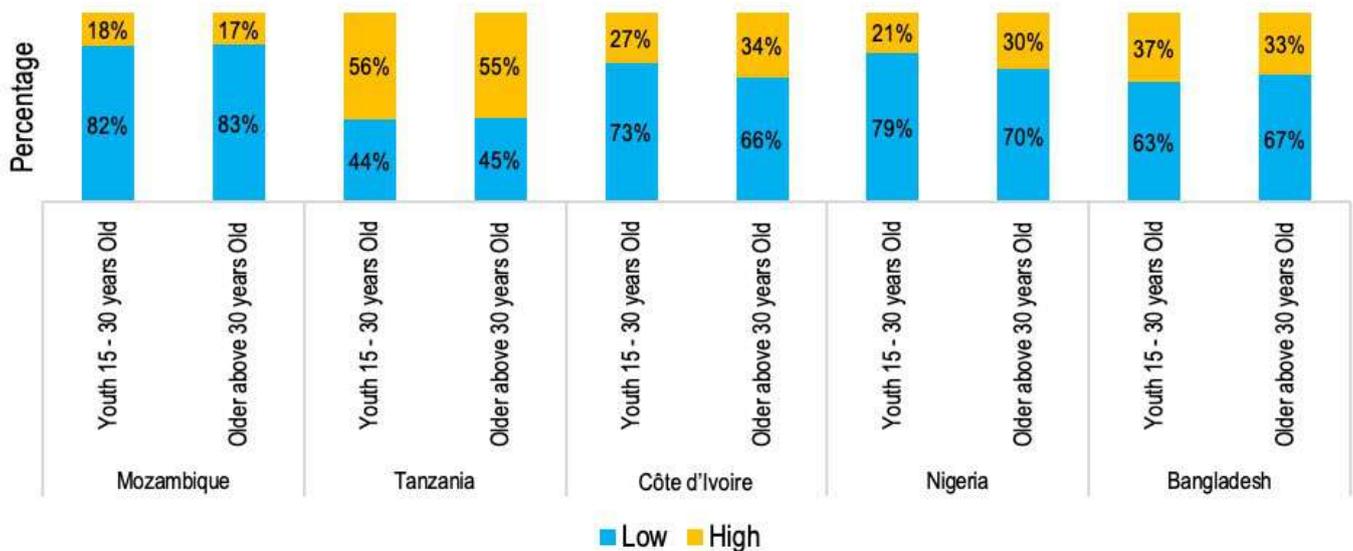


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Age wise analysis shows mixed results across the countries. In Bangladesh, a higher percentage of younger members of smallholder households show high readiness towards DFS compared to older members – i.e., 37% of youth in smallholder households show high readiness towards DFS compared to 33% of older members in smallholder households. On the other hand, in Côte d’Ivoire and Nigeria, older members

are much more ready than younger members to access DFS. Specifically, in these countries 3 out of 10 older members of smallholder households compared to 2 out of 10 younger members show high readiness towards DFS. However, in other counties - Tanzania, Mozambique – the difference in the percentage of young and older smallholder household members in high readiness group is minimal.

FIGURE 57: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS IN HIGH AND LOW DFS READINESS CATEGORY BY COUNTRY AND AGE GROUP

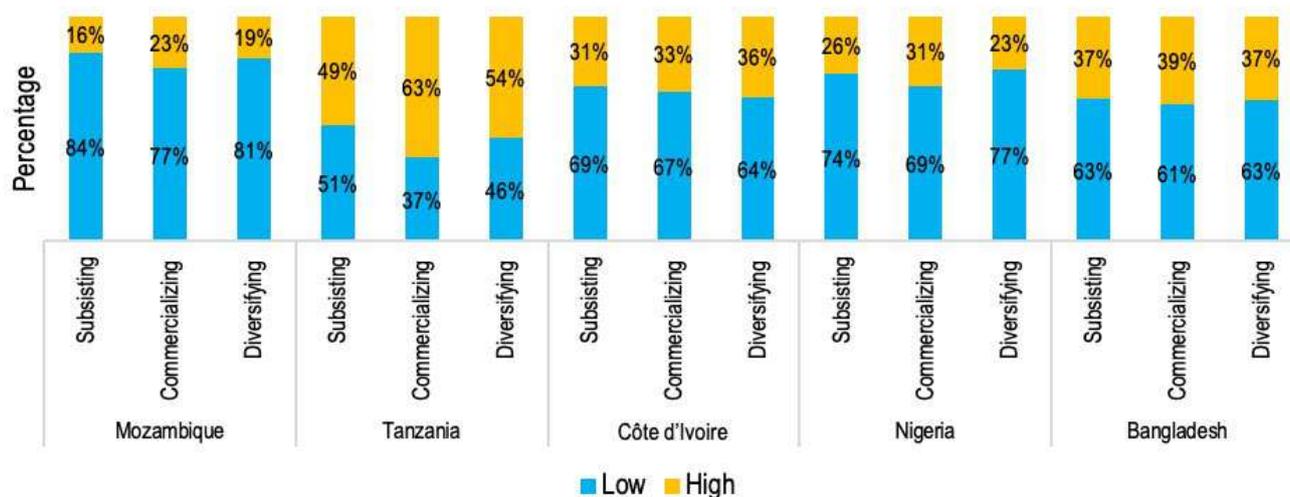


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Across all countries, Commercializing smallholder households show high readiness towards the DFS compared to the other two segments. Figure 58 shows the percentage of respondents who are in high and low readiness categories based on livelihood segmentation. As can be seen, in all countries, high readiness towards DFS is more prevalent in Commercializing smallholder households than in the other two segments except Côte d’Ivoire. In Côte d’Ivoire, Diversifying segment smallholder members are having high DFS index scores compared to other two segments. Further, in Mozambique and Nigeria, the percentage of Commercializing smallholder household members who show high readiness is low (across all segments) compared to other countries. On average, 45% of Commercializing smallholder households, 39% of Subsisting smallholder household members and 42% of

Diversifying smallholder household members in Tanzania, Côte d’Ivoire and Bangladesh show high readiness towards DFS. However, in Mozambique and Nigeria, on average, only 27% of Commercializing, 21% of Subsisting, and 21% of Diversifying smallholder household members show high readiness towards DFS.

FIGURE 58: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS IN HIGH AND LOW DFS READINESS CATEGORY BY COUNTRY AND SEGMENT



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

In Bangladesh, smallholder households in Rangpur and Khulna regions show high readiness towards DFS. We have also conducted location-based analysis to illustrate the various characteristics of smallholder household members mapped to their respective geographical locations. As an illustration, we show in **Table 34**, the location-based readiness of smallholder household members in Bangladesh across seven regions. It can be observed that among all regions, Khulna has the highest percentage of respondents who show high readiness (the corresponding population is 8.4 million smallholder household members). This

is followed by Rangpur where 38 percentage of respondents show high readiness (i.e., 9.9 million smallholder household members). Sylhet, the least densely population region among all regions, has 31 percentage of respondents who show high readiness almost similar to Rajshahi and Chittagong (32%), the most densely populated regions in Bangladesh. Stakeholders such as FSPs can focus on Khulna, Rangpur regions apart from Chittagong and Dhaka for promoting DFS in Bangladesh as these regions have higher percentage of respondents with high readiness towards DFS.

TABLE 34: POPULATION IN HIGH DFS READINESS GROUP IN BANGLADESH BY REGION (MILLIONS)

Region	Estimated region wise population above 15 years in smallholder households (in million)	Percentage of respondents in High Readiness Group	Number of persons in High Readiness Group in smallholder households (in million) [1]	Proportion of population with high DFS index to total population in region [2]
Barisal	3.5	24%	0.8	2%
Chittagong	16.5	32%	5.3	15%
Dhaka	19.3	30%	5.9	17%
Khulna	13.4	63%	8.4	24%
Rajshahi	11.9	32%	3.8	11%
Rangpur	26.2	38%	9.9	28%
Sylhet	2.3	31%	0.7	2%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

NOTE: NUMBERS ARE IN MILLIONS. [1] THE NUMBERS REPRESENT ESTIMATES OF POPULATION ABOVE 15 YEARS IN SMALLHOLDER HOUSEHOLDS IN HIGH READINESS GROUP. THIS IS BASED ON APPLYING THE PERCENTAGE OF RESPONDENTS IN HIGH READINESS GROUP TO THE TOTAL POPULATION ABOVE 15 YEARS IN SMALLHOLDER HOUSEHOLDS. [2] THIS IS OBTAINED BY DIVIDING THE ESTIMATES OF POPULATION ABOVE 15 YEARS IN SMALLHOLDER HOUSEHOLDS WHO ARE IN HIGH READINESS GROUP BY THE TOTAL POPULATION ABOVE 15 YEARS IN SMALLHOLDER HOUSEHOLDS

Table 35 shows the number of members from smallholder households within the high index value group, who use mobile money and those who do not use mobile money, disaggregated by country. It can be observed that in Bangladesh, smallholder households have roughly 93 million members above 15 years of age. Out of 93 million, 35 million are in high readiness group. Out of 35 million, 8.4 million are using mobile money and 26 million are not using mobile

money. These 26 million form the immediate potential target segment for FSPs, government and the donor agencies. Further, based on the insights from the analysis, these stakeholders can target the population with low readiness index with measures that may help improve their readiness and also take necessary steps to remove the barriers for these groups to access DFS.

TABLE 35: NUMBER OF SMALLHOLDER HOUSEHOLD MEMBERS THAT TAKE-UP MOBILE MONEY BY HIGH READINESS INDEX AND COUNTRY

COUNTRY	Estimated population above 15 years in smallholder households	Respondents in High Readiness Group	Population in High Readiness Group	Population that take-up mobile money and in high readiness index	Population that do not take-up mobile money but in high readiness index
	In millions	In percentage	In millions	In millions	In millions
Mozambique	12.6	18%	2	0.0	2
Tanzania	25.2	54%	13	9.8	4
Côte d'Ivoire	7.5	33%	2	1.4	1
Nigeria	66.0	27%	18	0.2	17
Bangladesh	93.0	37%	35	8.4	26

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.
NOTE: NUMBERS ARE IN MILLIONS AND REPRESENT MEMBERS ABOVE 15 YEARS IN SMALLHOLDER HOUSEHOLDS.

Based on this analysis of characteristics of smallholder household members with high readiness to use DFS, a number of observations are possible. In Nigeria, for example, 27% members of smallholder households are not using mobile money but have high readiness index scores (i.e., about 17 million smallholder household members are not using mobile money but have high readiness index scores). The main reasons that these members gave for not using mobile money were not knowing what mobile money was, not knowing how to open a mobile money account, and not having a point of service or agent close to where they live.

Similarly, in Tanzania, 15% of members of the smallholder households do not take-up mobile money but are in high readiness category (around 4 million smallholder household members are not using mobile money but have high readiness index scores). Out of these, 13% or 0.5 million members state, “they don’t

know how to open one” as the reason for not using mobile money. In addition, nearly 9% of the members in high readiness group but who do not use mobile money (around 0.3 million) responded that there is no point-of-service/agent close to where they live.

In Côte d'Ivoire, nearly 21% of members of the smallholder households who do not take-up mobile money but have high readiness index scores responded, “they don’t know how to open one” (around 0.2 million). About 12% of the members who do not use mobile money but are in high readiness group responded that there is no point-of-service/agent close to where they live. And in Bangladesh, 12% of members of the smallholder households that do not take-up mobile money but are in high readiness index group (around 3 million) state, “they don’t know how to open one”.

RESEARCH QUESTION 1.9³⁹

How do the access to and use of financial services relate to linkage strength of value chains? Can we explore the importance of connections to markets as a determinant of income, poverty, assets, livelihood strategies, digitization, etc.

To explore a smallholder household's link with value chains, we make use of the national survey data which includes a set of questions relating to this. More specifically, the multiple respondent questionnaire⁴⁰ has a module on agricultural practices, asking smallholders about where they usually sell their crops or livestock, to whom (public, retailer, co-operative, processor etc.), and whether they have a contract to sell their crops or not. These questions can help to infer about linkages to value chains for each individual smallholder household. For example, a household that sells crops directly to the public at the local village could be considered to have a weak linkage with value chains. On the other hand, a household that sells its produce to a wholesaler and has a formal contract to supply a certain amount on a regular basis could be considered as having a stronger linkage to value chains.

To quantify the linkage strength to value chains, we developed a scoring system across 5 selected questions. The answers to each of these 5 questions are scored, where a household gets more points if more responses indicate a stronger linkage to value chains. Note that the definition of value chain linkages that is described through the index is not set-up to measure any concrete probabilities of side-selling or compare the strength of one particular value chain compared to another. Rather the index segments smallholder households by more formal and less formal linkage types. Here the

A number of suggestions for FSPs, donor agencies, governments, mobile operators and relevant policymakers could flow from these observations. Proof of ID is the main determinant of DFS readiness; therefore, policies and initiatives that improve inclusiveness and accessibility of ID system are key to enabling DFS usage. This may entail efforts to set up single IDs as well as systems that incorporate (and officially recognize) alternative IDs especially if there are many people that may only have alternative IDs. It would also be important to undertake initiatives to improve access to mobile phones - with internet capability, in an affordable manner, and improve connectivity and stability of the mobile network.

In terms of regulatory issues, it appears important to have regulation that enables the use of agent networks by FSPs applying a risk-based approach that considers the different levels of risk that different types of agents are exposed to depending on the types of activities they carry out. This could help improve customer trust as well as number of access points. Risk-based regulation that promotes the expansion of a Cash In Cash Out (CICO) network that reaches out to smallholder households will be important. Risk-based customer due diligence regulation would also allow for simplified KYC requirements in the case of lower risk financial products.

Customer value is also a key consideration. Providers and other stakeholders could gather and analyze information on customer profiles, needs, barriers, aspirations in order to design, deliver, and inform delivery of products and services. They could also conduct customer awareness activities with targeted, practical messages that illustrate how DFS can address specific customer needs and barriers. Better customer information could also identify main DFS use cases for smallholder households and related customer, industry and regulatory barriers or obstacles to cover such use cases and guide the exploration of different approaches to overcome such barriers, including pilots or innovation facilitators (e.g., regulatory sandboxes).

³⁹ We have removed part of the question "What other features of agricultural activity are related to usage of formal and informal tools?", which on reflection did not seem a natural fit.

⁴⁰ The multiple respondent questionnaire was administered to all household member that contribute to household income and are above the age of 15.

underlying assumption is that the more formal a value chain linkage is, the higher the value-added for the smallholder farmer. Table 36 shows which questions were used and how the possible responses to each question were scored. Here responses that associate with a strong linkage to value chains, such as selling produce to a

wholesaler or trading company score high while responses that associate with weaker linkages, such as selling produce at the local village, score low.

TABLE 36: SCORING TABLE FOR VALUE CHAIN INDEX

Questions included in index	STRONG LINKAGE	MEDIUM LINKAGE	WEAK LINKAGE
	Responses that score 2 points	Responses that score 1 point	Responses that score 0 points
A15: Who do you normally purchase your agricultural/livestock inputs from?	- Middleman / trading company - Wholesaler - Processor	- Co-operative - Retailer - Government agency	- Don't know - I do not purchase any agricultural or livestock inputs - other
A18: Do your suppliers give you the option to pay them later?	-	- Pay later on credit	- Pay immediately
A27: Who do you sell your crops and livestock to?	- Wholesaler - Processor - Middleman / Trading company	- Co-operative - Retailer - Government agency	- Don't know - Other - Direct to the public
A28: Where do you normally sell your crops and livestock?	- At a farm to travelling merchant (or neighbor) ⁴¹ - Regional market	- Local market	- In village - Other - Don't know
A32: Do you have a contract to sell any of your crops?	Yes	-	- No - Don't know

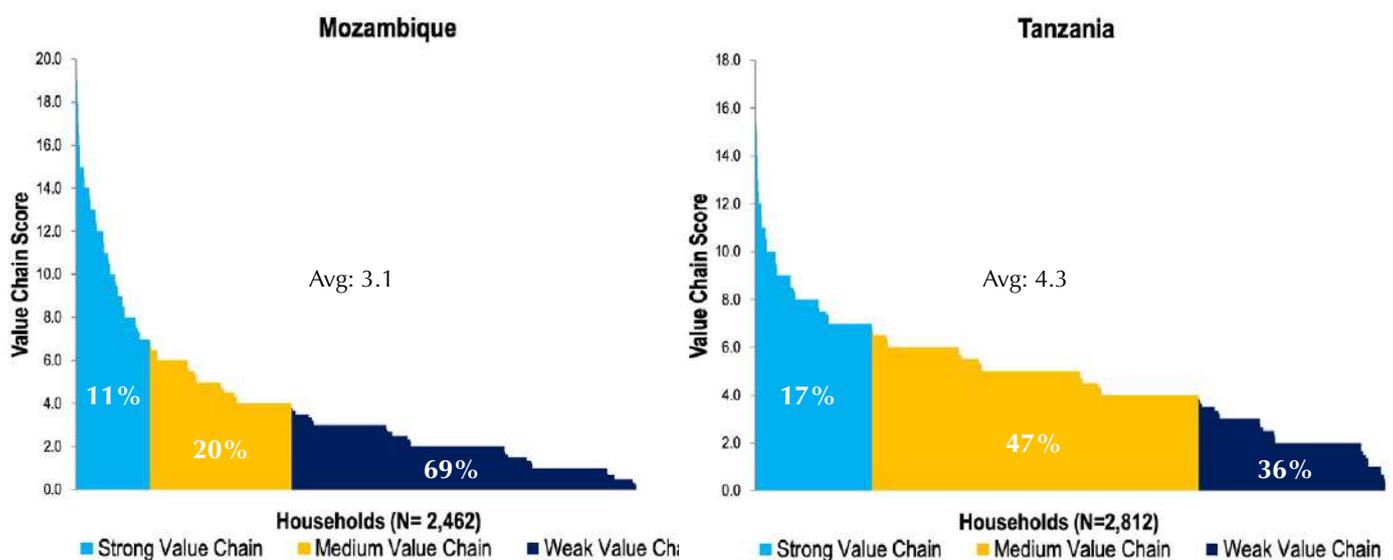
The average score across all questions of all household members is then calculated for each household to determine the household's individual value chain index. This index can then be used to rank households according to linkage strength. As was done for research question 3.4 and 3.10, the Wards clustering method⁴² is applied to divide the sample in groups of households that have either strong, medium or weak linkages to value chains. The same cut-off points for weaker and stronger linkages is used across countries. We are therefore using the same scale for each country to determine the amount of households that have strong, medium or weak linkages to value chains.

Figure 59 shows how smallholder households in Mozambique and Tanzania compare in terms of this value chain index. Annex 3 shows the distribution of scores for all countries in which national surveys were undertaken.

⁴¹ This response is framed in a way that it could either imply a strong linkage in the case where a farmer sells crops to a travelling merchant or a very weak linkage in the case where a farmer just sells to a neighbour. We suggest that the responses here should be reconsidered to allow for clearer segmenting.

⁴² <http://www.stat.cmu.edu/~cshalizi/350/lectures/08/lecture-08.pdf>;
<https://books.google.co.in/books?id=BgK9BAAAQBAJ&pg=PA21&dq=ward%27s+linkage+method&hl=en&sa=X-&ved=0ahUKewiwrro5NvVAhWHRo8KHfUeCFMQ6AEITzAG#v=onepage&q=ward's%20linkage%20method&f=false>;
http://people.stat.sc.edu/Hitchcock/compare_hier_fda.pdf

FIGURE 59: DISTRIBUTION OF HOUSEHOLDS BY AVERAGE VALUE CHAIN SCORE IN MOZAMBIQUE AND TANZANIA (NATIONAL SURVEYS)⁴³



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The two charts in Figure 59 rank smallholder households in Mozambique and Tanzania according to their average value chain score. Each vertical line on the horizontal axis stands for an individual household while the height of the line indicates the score on the vertical axis. Furthermore, households that score 7 points and higher are classified as having a strong value chain linkage, households scoring between 7 and 4 points are classified as medium and households scoring below 4 points are classified as having a weak linkage.

Here it can be observed that Mozambique has a steeper, but more uneven distribution of households compared to Tanzania. While there are some households scoring quite highly with more than 10 points in the Mozambique sample, the Tanzania sample overall has more households in the strong and medium category. With a lot more households scoring 0,⁴⁴ the average value chain score in Mozambique equals 3.1, while Tanzania scores higher with an average score across all households of 4.3. It can be learned from this analysis that while there is

a sub-set of households in Mozambique that has stronger linkages to value chains, households in Tanzania are on average better linked to markets. Annex 3 shows the percentage of smallholder households that fall in each category by country. Here it is important to note that since the CGAP surveys are nationally representative, smallholder household populations can be compared across countries using this analysis. The chart in Annex 3 shows that smallholder farmers in Bangladesh have on average the strongest linkage to value chains compared to other national survey countries. Going forward we will use this value chain score to define smallholder households as either having a strong, medium or weak linkage to value chains.

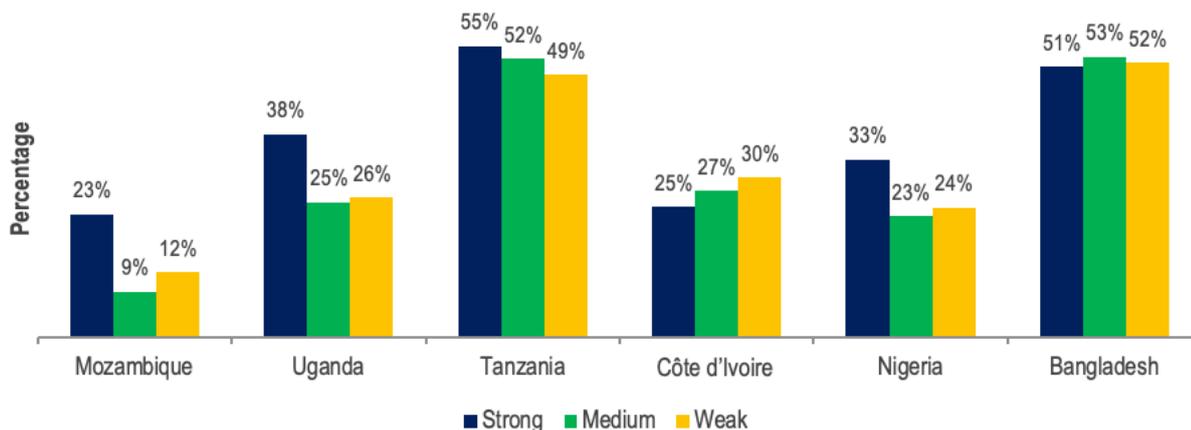
⁴³ Strong value chains households score 7 and higher, medium value chain households score between 7 and 4 and weak value chain households score less than 4 points.

⁴⁴ The empty area to the very right of the charts corresponds to households that scored 0.

Next, we will look at the use of formal financial services of these different types of smallholder households. Use of formal financial services is defined as having an account with a registered bank, an MFI, a cooperative, post office, a credit union or a mobile money provider. Depending on the country context and as suggested by

the national survey questionnaires, having an account with a VSLA is also considered as a formal financial service in Tanzania, Nigeria and Bangladesh. Figure 60 shows the percentage of strong, medium and weak value chain smallholder farmers that use formal financial services.

FIGURE 60: USE OF FORMAL FINANCIAL SERVICES BY SMALLHOLDERS WITH STRONG, MEDIUM AND WEAK VALUE CHAIN LINKAGES ACROSS COUNTRIES (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Figure 60 shows that in most countries a larger percentage of smallholder households who have a stronger linkage to value chains has access to and makes use of formal financial services. The financial inclusion gap between the different types of smallholders is most pronounced in Mozambique and Uganda, where smallholders who have a strong value chain linkage are more often use formal financial services compared to smallholders with weaker linkages. For Bangladesh, the use of formal financial products does not vary greatly between the different types of smallholder households while for Côte d'Ivoire, households that have a stronger linkage in fact use formal financial services less frequently. Overall, the analysis implies a positive correlation between linkage strength and usage of formal financial services.

Note that when looking at mobile money usage in particular, a similar, positive trend can be observed for Uganda and Tanzania: more

smallholder farmers that have stronger linkages to value chains tend to have a mobile money account (see Annex 3).

While any causality between usage of financial services and value chain links cannot be established,⁴⁵ we do find a sub-group of smallholder farmers that both has stronger value chain linkages and accesses and uses formal financial services. This presents an opportunity for FSPs in different ways. For one, the already existing link to formal services could be further expanded on with new products and services such as insurance or tailored credit terms that facilitate and stimulate inbound and outbound transactions along the value chain. FSPs may also use this opportunity to add on non-financial services such as business development services to support business growth and sustainability of the individual smallholder activities as well as strengthening of the value chain as a whole. More in-depth analysis could also look into

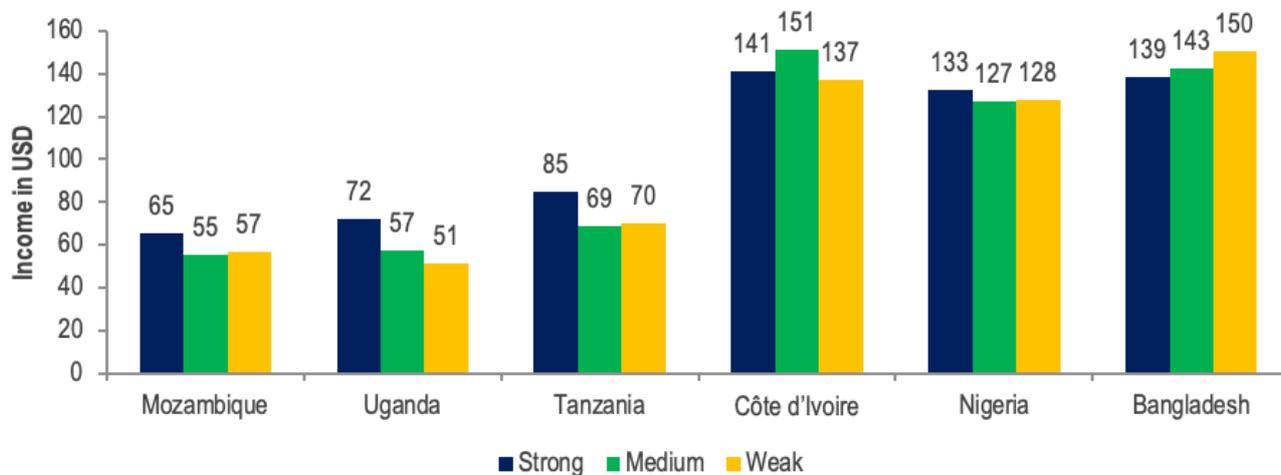
⁴⁵ See comments regarding deriving causality in research questions 1.1 and 1.3. Analysis including mean comparison tests and regression analysis as such does not allow to derive causality. To discuss causality, an experimental research design, such as a randomized control trial or quasi-experimental research methods would have to be applied.

exactly which role formal financial services can play in value chains and into how financial and non-financial services could reduce the barriers for smallholder farmers to participate in higher value-added value chains.

To further investigate the economic circumstances of smallholder households with stronger and weaker value chain linkages we plot the average income in USD for each group in Figure 61. The chart shows that for all countries

except Côte d'Ivoire and Bangladesh smallholder farmers with strong linkages to value chains also have a higher average monthly income than smallholders with weaker linkages. This is an interesting finding as such. While there are other factors influencing income, a strong link to value chains could be one pathway out of poverty for smallholder farmers. Here additional research could further single-out the effect of value chain linkages to income to quantify the effect.

FIGURE 61: AVERAGE MONTHLY INCOME (USD) OF SMALLHOLDER FARMERS WITH STRONG, MEDIUM AND WEAK LINKAGES TO VALUE CHAINS ACROSS COUNTRIES (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

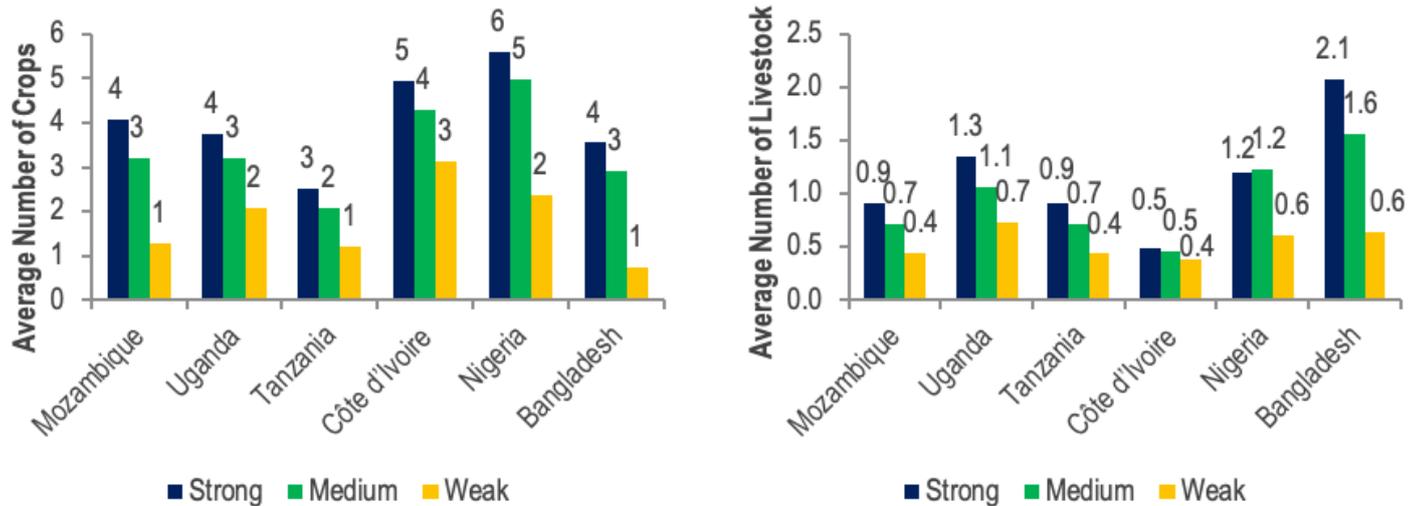
The following analysis looks at how smallholder farmers diversify in terms of crops and livestock sold. Figure 62 shows the average number of all crop types and livestock types sold by farmers with strong, medium and weak linkages to value chains. Here the average number does not refer to the amount of a crop or livestock sold, but to the number of different types of crops or livestock sold. For example, smallholders with strong linkages to value chains in Mozambique sell on average 4 different kinds of crops,⁴⁶ while those with weak linkages only sell on average 1 type of crop.



Photo: Allison Shelley / CGAP

⁴⁶ Note that the combination of crops sold can vary, i.e. one smallholder household might sell maize, beans, onions and potatoes while another might focus on cotton, cashew, millet and bananas.

FIGURE 62: AVERAGE NUMBER OF CROP TYPES AND LIVESTOCK SOLD BY SMALLHOLDER FARMERS WITH STRONG, MEDIUM AND WEAK LINKAGES TO VALUE CHAINS ACROSS COUNTRIES (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

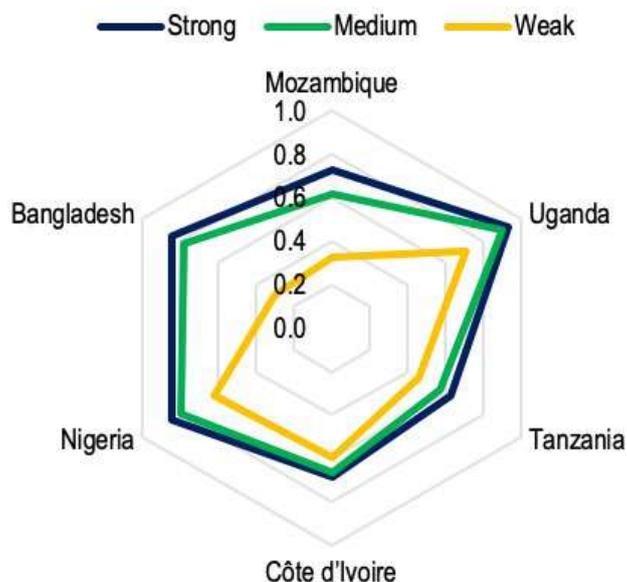
A consistent picture across all countries is found, where smallholders that have a strong linkage to value chains do on average sell more cash crop varieties or livestock types. This could be interpreted as a form of commercialization of farming business – where smallholders who produce a larger variety of cash crops are better linked to markets.

As an alternative proxy for commercialization, we use the ratio of crop varieties a smallholder sells on the market over the amount of crop varieties grown on the farm. This ratio takes larger values for smallholders who grow crops for commercial reasons and lower values for smallholder who grow crops for consumption. For example, for a farmer who grows bananas, tomatoes and maize but only sells maize on a market this ratio would equal 1/3 since the farmer only sells one out of three varieties that are grown and consumes the other 2. Such a farmer would be defined as less commercialized than a farmer who sells all three varieties on the market. Figure 63 maps the ratio of crops sold over crops grown by farmers who have strong, medium and weak linkages to value chains.

Here, the navy line connects the values of this ratio for smallholder farmers with strong value chain linkages across countries. It can be found that for all countries the ratio is very high (between 0.6 and 0.9) implying that smallholder farmers with strong or medium value chain linkages sell most of the crops that they grow. Values for smallholders with weak value chain linkages take smaller values, implying that these farmers consume more of the varieties they grow as opposed to selling them in a marketplace to generate income. This analysis further underpins that we have identified a sub-set of smallholder farmers which focus commercially on agricultural production, have stronger linkages to value chains and successfully do so as reflected in higher incomes (Figure 61).

This could be a useful finding for FSPs looking to increase their outreach to smaller value chain actors but are put off by the risks involved. This analysis could support the case to invest in smaller value chain actors whereby support to diversify crops can strengthen access to markets and linkages to stronger value chains which can in turn provide a more stable income.

FIGURE 63: COMMERCIALIZATION RATIO (CROPS SOLD OVER CROPS GROWN) BY SMALLHOLDER FARMERS WITH STRONG, MEDIUM AND WEAK LINKAGES TO VALUE CHAINS ACROSS COUNTRIES



Source: CGAP national surveys of smallholder households, 2016 and 2017.

RESEARCH QUESTION 1.10

How are the outcomes of access to and use of finance associated with the development stage of the financial industry in the country?

To begin answering this question, we develop a composite indicator to proxy the development stage of the financial industry in a country. This index is made up by combining data on a number of standard macro indicators of financial sector development, taken from the World Bank's Financial Development Indicators:

- Private sector credit as a % of GDP
- M2 as a % of GDP
- Interest rate spread
- Bank branches per 100,000 people
- ATMs per 100,000 people

The most recent data on these indicators for the six countries involved in the national surveys were pulled from the World Bank's Global Financial Development Report. The composite indicator is a non-weighted average of each of the five indicators for each country in relation to the highest and lowest value in that category.

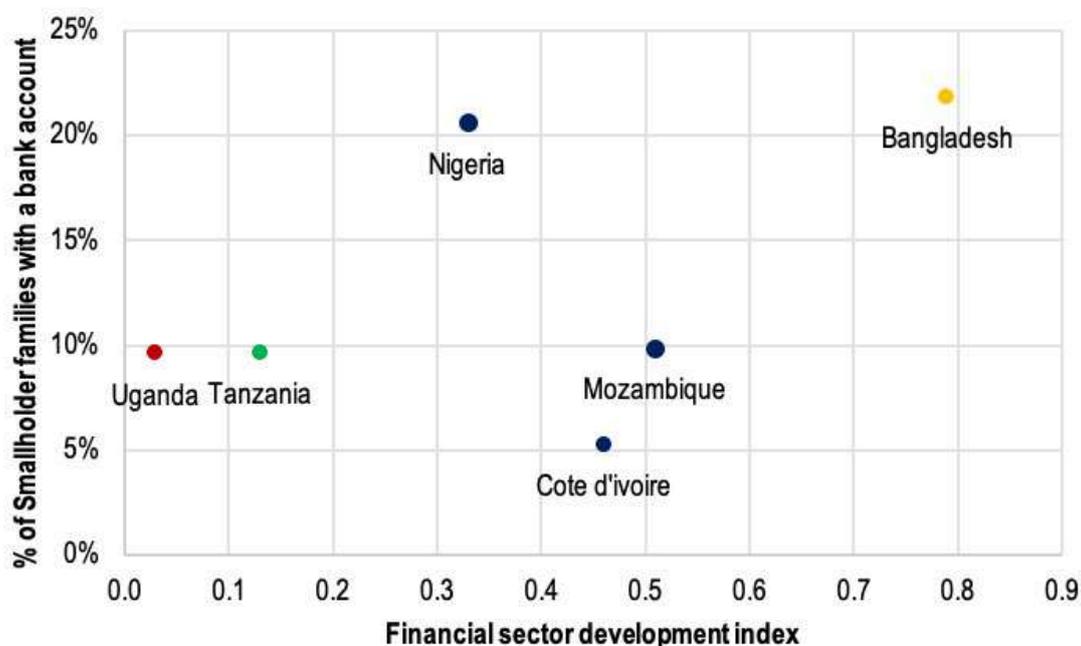
TABLE 37: COMPOSITE INDICATOR AS PROXY FOR THE DEVELOPMENT STAGE OF THE FINANCIAL INDUSTRY

	Mozambique	Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
M2/GDP (2014)	49%	22%	23%	37%	20%	63%
Private Sector Credit /GDP (2015)	35%	15%	15%	23%	14%	44%
Interest Rate Spread (2015)	6%	10%	6%	1%	8%	3%
Bank Branches per 100,000 people (2015)	4.14	2.98	2.48	4.83	4.94	8.37
No of ATMs per 100,000 people (2015)	10.30	4.55	6.04	6.86	16.08	6.79
Composite index	0.51	0.03	0.13	0.46	0.33	0.79

By plotting this index against the headline numbers on banked households from the national surveys, we are able to observe an approximate relationship between access to finance for smallholders and the development stage of the financial industry in the country. Note that this index is compiled specifically for

this analysis, and the numbers simply represent the relative level of financial sector development within the sample.

FIGURE 64: SMALLHOLDER FAMILIES WITH A BANK ACCOUNT



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

There is an observable positive correlation here. In Bangladesh, where private sector credit represents 44% of GDP and with the most number of ATMs per capita, smallholder financial inclusion is also highest. At the lower

end, though the relationship is not perfect, there does seem to be some correlation.

While this result has no statistical significance, and is not necessarily surprising, it does provide a reminder that the more traditional tools of financial sector development – getting credit markets working, reducing inefficiencies in the banking sector, expanding banking networks, building a yield curve – remain pertinent for expanding access to financial services in rural areas and that with our increasing focus on innovation and design at the core of the market, we shouldn't lose sight of vital macro- and meso-level work.

For the second part of the question, in order to gauge the *usage* of financial services, we created a subset of the respondents who we classed as financially included from the national surveys in the first part of this question. For these “banked” households we then analyzed the responses to the question *When you use an account for any financial activity, do you use any of the following?* Anyone responding positively to any of the following options, we considered to be a *user*.

1. Over the counter in a branch of the institution (yes/no)
2. ATM (yes/no)
3. Over the counter at a retail store / agent (yes/no)
4. Institution's website (yes/no)
5. Mobile app from the bank (yes/no)
6. A door-to-door agent or another person who is associated with this institution (yes/no)
7. Through a mobile wallet by transferring money from my account to my phone
8. Other (specify) _____

Table 38 shows the comparison of the level of usage of financial services against the composite index of financial sector development.⁴⁷

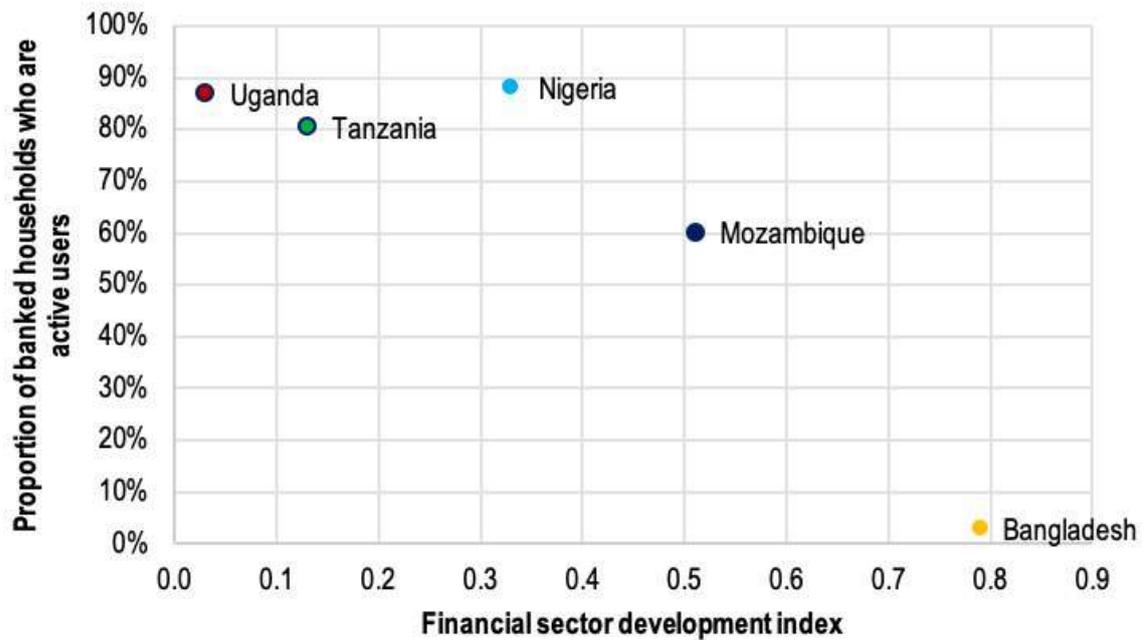
TABLE 38: COMPARISON OF THE LEVEL OF USAGE OF FINANCIAL SERVICES AND COMPOSITE INDEX OF FINANCIAL SECTOR DEVELOPMENT

	Mozambique	Uganda	Tanzania	Nigeria	Bangladesh
Proportion of smallholders with an account who are active users	60%	87%	81%	88%	3%
Composite index	0.51	0.03	0.13	0.33	0.79

Plotting these data provides an indicative, though not statistically robust, relationship between financial sector development and usage of financial services by smallholder households.

⁴⁷ This analysis is hampered by some data issues. First, there is no data on usage for Côte d'Ivoire. Secondly, there appears to have been a large number of non-responses to this question in Bangladesh; it is difficult to believe that only 3% of the financially included smallholder households in Bangladesh are actively using the accounts.

FIGURE 65: BANKED HOUSEHOLDS WHO ARE ACTIVE USERS



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

In contrast to the access graph, here we see evidence of a negative relationship between financial sector development and usage among smallholder households. Usage in the Bangladesh sample is extremely low while in the less developed financial sectors or Uganda and Tanzania, usage is very high.

This can likely be explained by the different structures of the financial systems in these countries. Bangladesh has a more traditional, bricks and mortar banking and microfinance sector. In Uganda and Tanzania by contrast, the greatest progress in financial inclusion has come more recently through mobile money penetration. It should also be said that a wide variety of factors feed into both of these variables and so conclusions should be treated with caution.

These results imply that the development stage of the financial industry is positively associated with financial access but negatively associated with usage. It may be the case that as a financial sector develops, a lot of effort goes into opening accounts but much less goes into driving the usage of these services. From the perspective of donors, governments and financial service providers, these results indicate that priorities may differ depending on whether the desired

outcome is greater access or usage. For building out access for smallholder households, working on fundamentals like expanding the money supply, growing branch network and other access points and reducing interest rates could be significant while to drive usage, factors outside of traditional indicators of financial depth (such as product design) would be more relevant.



RESEARCH QUESTION 1.11

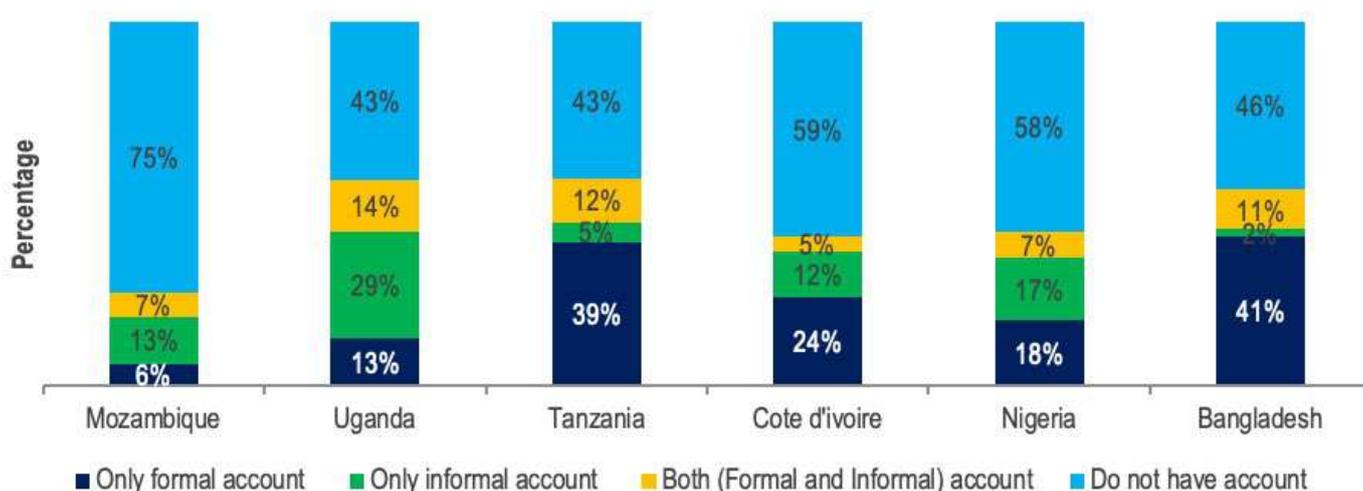
What are the key drivers behind the usage of informal financial tools? What can the data tell us about the relative role of cost, flexibility, availability and other factors influencing the decision to use informal financial tools?⁴⁸

To identify key drivers behind the usage of informal financial tools, a probit regression model is run on national survey data. A probit regression allows us to identify factors that increase or decrease the probability of a households using informal financial tools. As opposed to the multiple regression analysis done for research question 1.1 and 1.3, the probit model uses a binary dependent variable – in other words the variable of interest only takes two values: ‘Yes’ for those households that do

use informal financial services and ‘No’ for those that do not. Similar to regressions run in 1.1 and 1.3, the probit regression will use a set of demographic and socio-economic variables as potential factors that increase the likelihood of a household using informal financial services. These are listed in Annex 3 Table A3.7.

Depending on the country context,⁴⁹ informal financial services are defined as VSLAs, ROSCAs, ASCAs and other forms of informal savings and credit groups, savings collectors, shop keepers, money lenders, or money guards. Here it is important to note that some of the households that use informal financial services simultaneously make use of formal financial tools, such as accounts with registered banks, mobile money, MFIs, cooperatives or the post office.⁵⁰ In other words, it is important to note that formal and informal financial services are not mutually exclusive. Figure 66 shows the split in terms of financial tools for both groups in each country.

FIGURE 66: SMALLHOLDER HOUSEHOLDS BY DIFFERENT TYPES OF FINANCIAL MECHANISM AS PERCENTAGE OF TOTAL SAMPLE (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

⁴⁸ After a thorough review of the data the team concluded that reliable analysis of interest rates is not straightforward to do using smallholder diaries. The analysis will therefore only focus on the first half of the research question (What are the key drivers behind the usage of informal financial tools?).

⁴⁹ Note that the possible responses to use of informal financial services vary between the different national survey questionnaires.

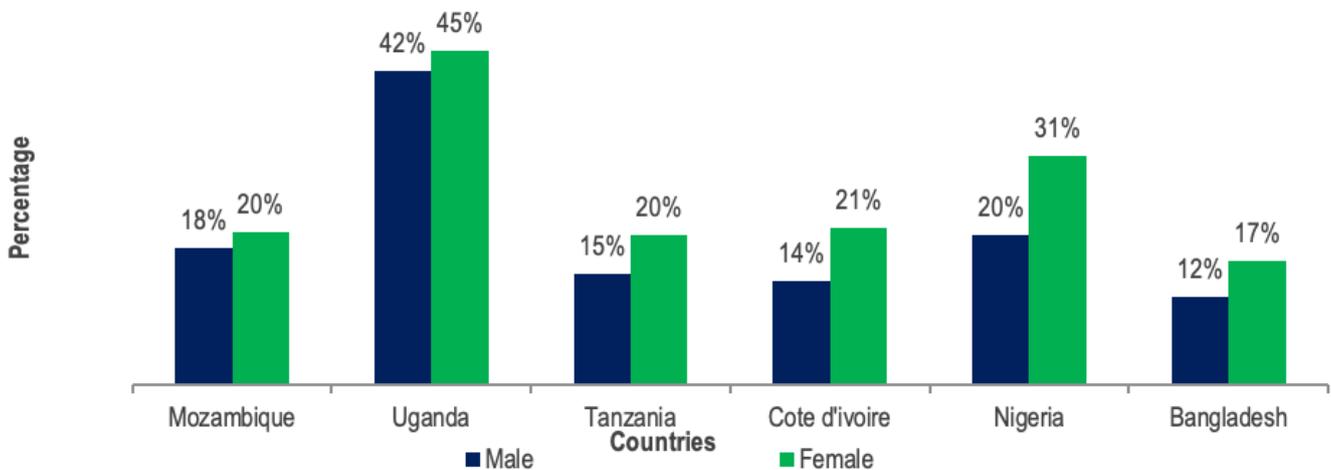
⁵⁰ The definition of formal financial services also varies between countries Please see the methodology section of the paper for an overview of which types of services were considered as informal for each country (Tables 7 and 8).

The probit regression output in Annex 3 Table A3.7 shows results for each of the six national survey target countries. Cells marked in yellow highlight the coefficients that are found to be statistically significant. The coefficients of the probit model are not straightforward to interpret as these are expressed in probabilities of a household using informal financial tools as a result of a 1 unit increase in any independent variable. Focusing on results for Mozambique, the 0.28 coefficient for having post-secondary education implies that if a smallholder

household does have post-secondary education (post-secondary education = 1), the probability of that household engaging in informal financial services is 28% higher than for a household that has no schooling (base category). Furthermore, still looking at Mozambique, a 1 USD increase in income increases the likelihood of a smallholder farmer using informal financial services by 0.1%.

Looking across all countries the following main trends can be observed.

FIGURE 67: PERCENTAGE OF FEMALE AND MALE SMALLHOLDER FARMERS THAT USE INFORMAL FINANCIAL SERVICES ACROSS COUNTRIES (NATIONAL SURVEYS)

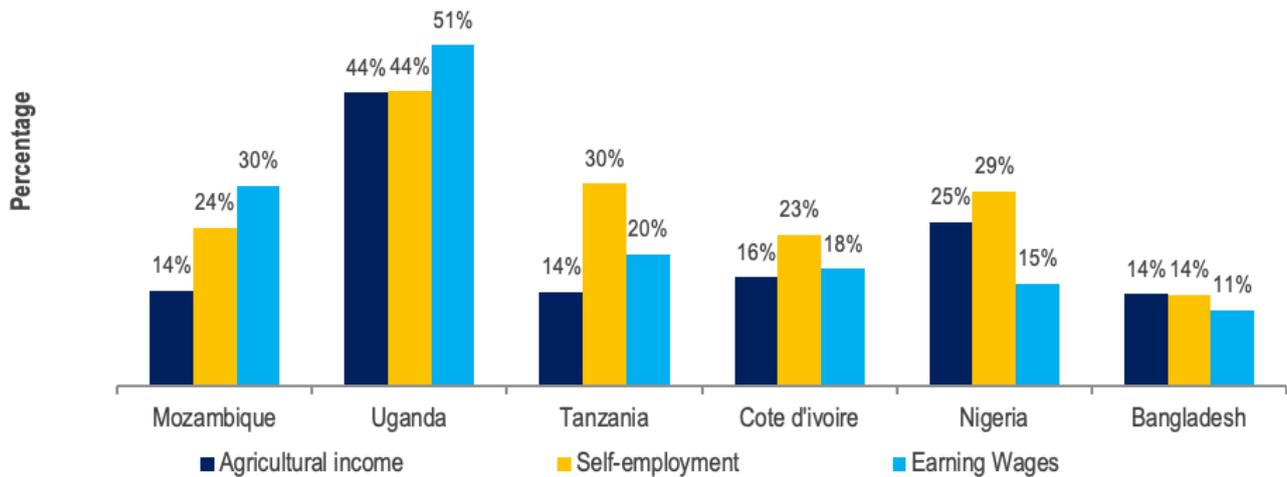


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Being a woman increases the likelihood of using informal financial services by 10.1% when compared to men in Uganda (Annex 3 Table A3.7). While the effect size is lower in other countries, all coefficients are statistically significant which suggests that gender plays a role in the usage of informal financial services. Figure 67 shows an overview of the percentage of males and females using informal financial services. Findings underline the effects found by the probit model: it can be observed that in all countries a higher percentage of females are using informal financial services. As was discussed in research questions 1.4 and 2.3, women play a big role in savings so the use of informal services seen in Figure 67 may relate to savings groups that are featured highly in the informal category. For FSPs this could show the potential of targeting products towards women – specifically in the informal sector.



FIGURE 68: PERCENTAGE OF SMALLHOLDER FARMERS THAT USE INFORMAL FINANCIAL SERVICES BY LARGEST SOURCE OF INCOME ACROSS COUNTRIES (NATIONAL SURVEYS)

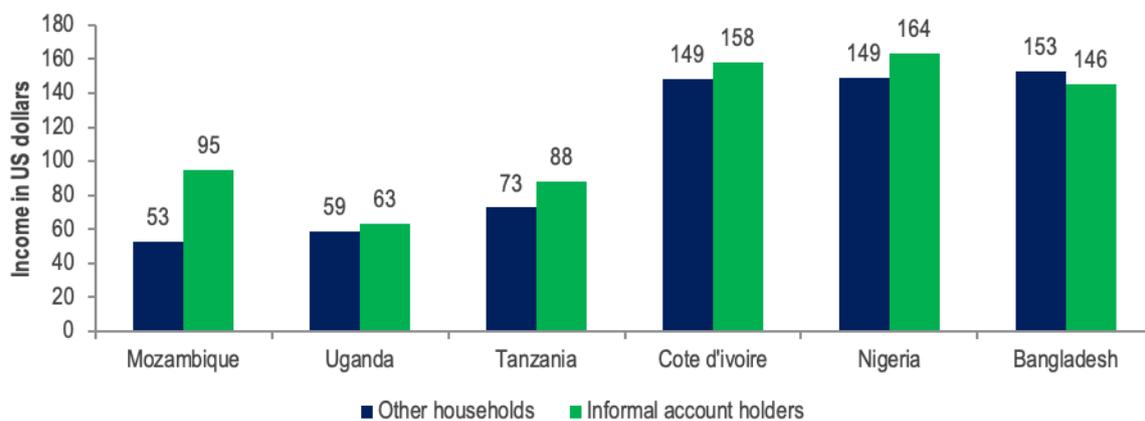


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Self-employed smallholder households in Tanzania are 10% more likely to use informal financial services than peers who mainly rely on agricultural income (Annex 3 Table A3.7). A similar trend can be found for other countries with statistically significant coefficients for Mozambique and Nigeria. Figure 68 shows the percentage of smallholder farmers who use informal financial services by largest source of income. Most of these households except in Mozambique and Uganda earn most of their income from their own business which confirm the findings from the probit regression in Annex 3 Table A3.7. In Mozambique and Uganda, most

of the households who use informal financial services mainly rely on earning wages. This finding is particularly interesting for FSPs as it can help inform how to tailor products to target different market segments. Here it is important to emphasize that, as per Figure 66, there are smallholders that only make use of formal services and are therefore not included in the comparison group. The demand of smallholders earning wages in Figure 68 might therefore already be met partly by formal products – which would explain the low use of informal services here.

FIGURE 69: AVERAGE INCOME (USD) OF SMALLHOLDER HOUSEHOLDS THAT DO AND DO NOT USE INFORMAL FINANCIAL PRODUCTS (NATIONAL SURVEYS)

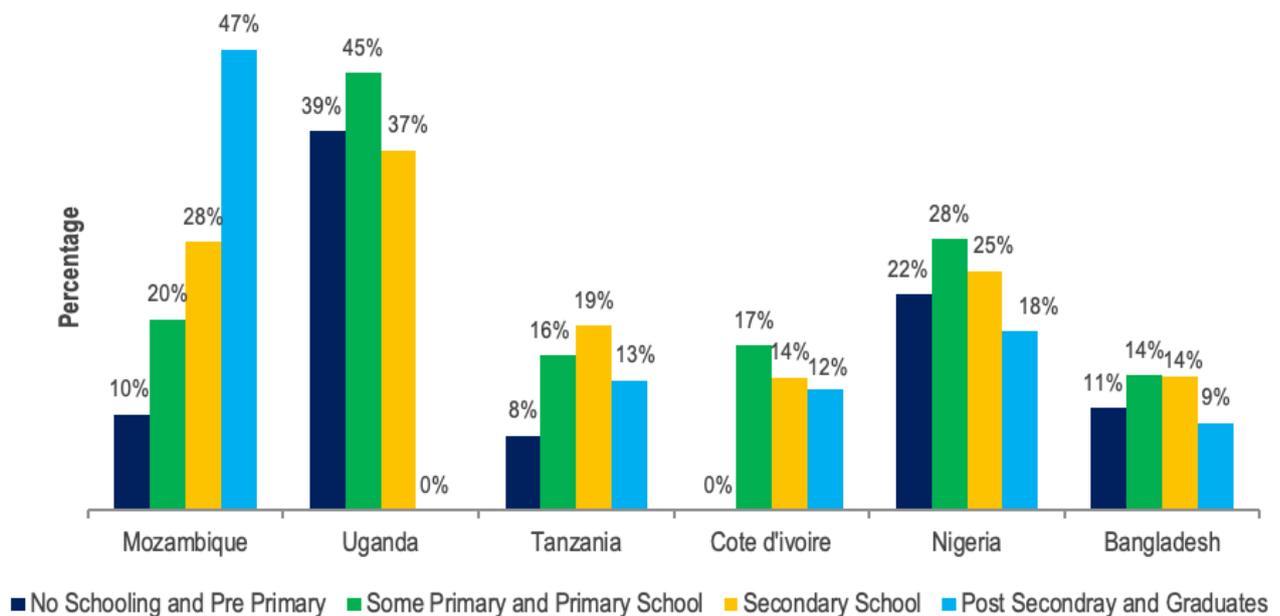


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The average monthly income of households does not have a large effect on the likelihood of using informal financial services. While the probit regression in Annex 3 Table A3.7 does find a statistically significant association between income and the use of informal financial services, this effect is not found to be large. Figure 69 compares the monthly income between the two groups of smallholder farmers. While some positive difference in terms of averages are found in Mozambique, Tanzania

and Nigeria, there are very few differences in terms of incomes for households in Uganda, Côte d'Ivoire and Bangladesh – where income seems to be very similar between households who use informal services and those who don't. This may also suggest that the ability to access informal financial services is not determined by income in these countries and, therefore, the relevance of the type of product offered may play a bigger role in the smallholders' decision.

FIGURE 70: PERCENTAGE OF HOUSEHOLDS THAT USE INFORMAL FINANCIAL PRODUCTS BY HIGHEST EDUCATION LEVEL ATTAINED (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The educational profile of households using informal financial services is mixed across countries. When looking at differences in education, the picture is mixed across countries – both in the probit regression as well as in terms of simple average differences. In terms of education there are countries like Mozambique and Tanzania where a higher level of education plays a larger role in determining whether a household is more likely to use informal financial services or not. In other countries like Uganda, Côte d'Ivoire, Bangladesh, and Nigeria, those with a lower level of education use informal financial services more often. This suggests that informal services are used by different profiles of smallholder farmers – likely for different purposes. As we mentioned before this may also be due to availability. In Mozambique, for

example, higher educated smallholders making more use of informal services might correlate with less availability of formal financial products in general. Therefore, the level of outreach of formal financial institutions in a country is likely to influence results shown.

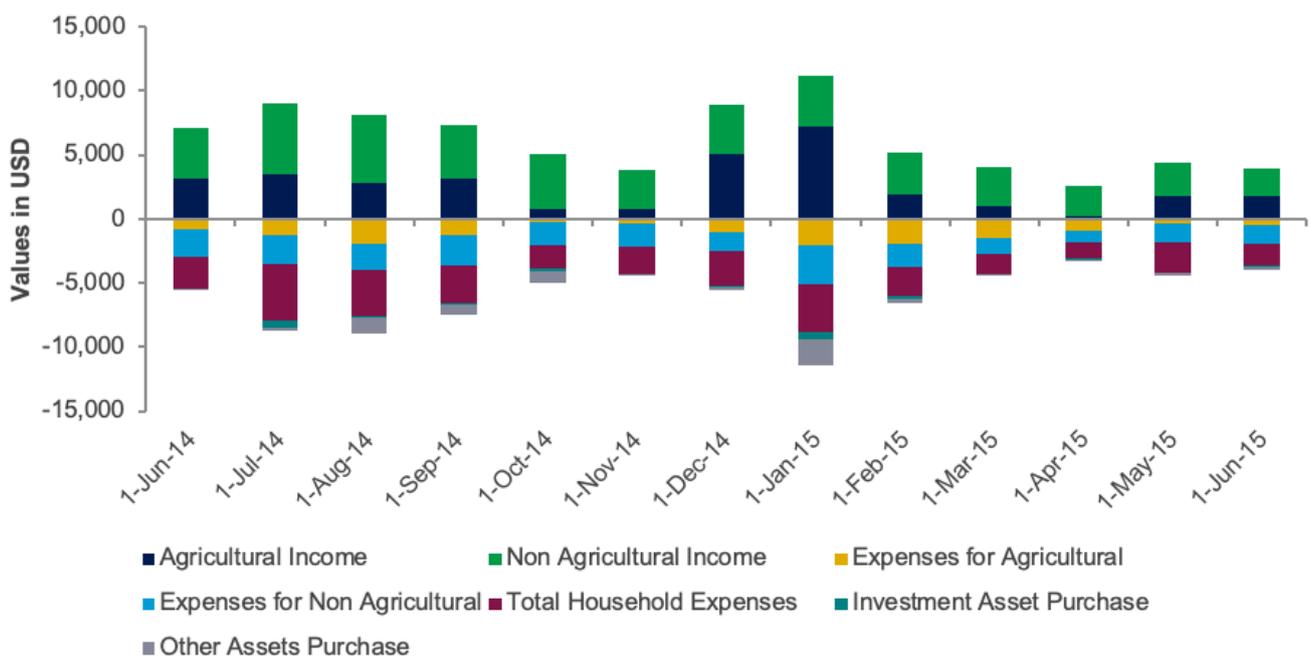
5.2 Smallholder management of income and expenditures

RESEARCH QUESTION 2.1

How does the composition of household income and expenditures vary across time? How are different income streams (e.g. agricultural sales, labor, remittances) and expenditure streams (e.g. education, health, non-agricultural investments, agricultural investments, general consumption) related and what are the covariance patterns between them?

The diaries data offers detailed insights into how income and expenditure patterns develop over time. Figure 71 shows monthly aggregates of income and expenditure broken down by type of transaction for Tanzania.⁵¹ The chart aggregates all cash and in-kind transactions across all interviewed households. Transactions in the positive quadrant correspond to revenues from income generating activities. Transactions in the negative quadrant correspond to expenditures, both for consumption and other household expenses, such as food, education and health expenses, as well as expenses associated with income generating activities, such as expenses for agricultural production or a family-owned small business.⁵² We have aggregated all non-agricultural income streams and all agricultural income streams from the sample for ease of comparison.

FIGURE 71: SMALLHOLDER DIARIES DATA ON INCOME AND EXPENSE TRANSACTIONS IN TANZANIA



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Figure 71 suggests correlations between income and expenditure transactions over time. We can observe from Figure 71 that revenues from agricultural production vary throughout the year with high revenues and expenses during

harvesting seasons, while income from non-agricultural activities varies less over time. A similar trend can be observed for non-agricultural income and associated expenses.

⁵¹ See Annex 1 for similar charts for Pakistan and Mozambique including analysis.

⁵² Include split of variables information.

Total household expenses, which includes food expenditures, and medical and education expenses, as well as expenditures on clothes and other consumption items, seem to contract with lower overall income levels and expand with higher income levels. This implies that, at least to some degree, households have to adapt their consumption according to the current month's income, indicating a potential demand for savings or loan products that allow to smooth consumption. Another interesting phenomenon is that expenses for physical assets seem to spike with increased incomes, suggesting investment behavior is linked to income – this will be further explored in research question 2.9.

To quantify these observed patterns, we conduct correlation analysis of agricultural and non-agricultural income streams on expenses for agricultural and non-agricultural activities, different household expenses, and expenditures on physical asset purchases.

As highlighted in Table 39, agricultural income is positively correlated with expenses for

agricultural activities for all three countries. While slightly less pronounced in Mozambique, we find correlation coefficients of close to 0.5 for Pakistan and Tanzania, implying a positive relationship between these two variables, which is found to be statistically significant in all cases.⁵³ This relationship supports the hypothesis that farmers invest more in agricultural activities – probably relating to harvesting and moving the produce to markets - around the time when agricultural income is high – owing to sale of harvested crops.

An even stronger positive correlation is observed between non-agricultural income and expenses for non-agricultural income-generating activities, such as self-employment (the right-hand column in Table 39).⁵⁴ Overall it can be concluded here that smallholders seem to re-invest the returns from agriculture back into agriculture. This could be interpreted as repaying short term loans around the harvesting season – an opportunity for FSPs to target input-related loan products around the agricultural cycle.

TABLE 39: CORRELATION COEFFICIENTS BETWEEN INCOME AND EXPENSES FOR INCOME-GENERATING ACTIVITIES

INCOME SOURCES	EXPENSES ASSOCIATED WITH INCOME GENERATION			
	Expenses for agricultural activities		Expenses for non-agricultural activities	
Mozambique				
Agricultural Income	0.37	*	0.09	*
Non-Agricultural Income	0.57	***	0.84	***
Tanzania				
Agricultural Income	0.48	***	0.26	***
Non-Agricultural Income	0.13	**	0.70	***
Pakistan				
Agricultural Income	0.49	***	0.21	***
Non-Agricultural Income	0.17	***	0.80	***

⁵³ Statistical significance is marked by stars.

⁵⁴ It is important to note here that since money is fungible, a direct relationship between income sources and expenditures cannot be established. Correlation patterns can however hint at how specific expenses and incomes coincide.

As a next step we analyze how different income streams correlate with household expenses (Table 40). In Pakistan and Tanzania, most correlation coefficients are lower than 0.20 or are even close to 0, implying a weak relationship between income and expenditures. In other words, food expenses in Pakistan are not so much affected by whether agricultural income is high or low. This could imply that households manage to smooth consumption of food across the year – enabling to consume similar amounts

of foods regardless of fluctuations in income. The picture for Mozambique is different with regards to food consumption. The correlation between income and food expenses is high and significant implying that when income is low, food consumption is low. This is an indication of households not managing to smooth consumption well. This could be interpreted as Mozambican households being more vulnerable to income fluctuations, while households in Pakistan manage best to smooth consumption.⁵⁵

TABLE 40: CORRELATION COEFFICIENTS BETWEEN INCOME AND HOUSEHOLD EXPENSES

VARIABLES	HOUSEHOLD EXPENSE CATEGORIES					
	Food Expenses	Clothes & Shoes Expenses	Education Expenses	Medical Expenses	Mobile phone credit expense	Smoking Alcohol Expenses
MOZAMBIQUE						
Agri Income	0.51 ***	-0.05	0.13	-0.22	-0.21	0.36 **
Non Agri Income	0.33 ***	0.39 **	0.32 ***	-0.02	0.45 ***	0.22 ***
TANZANIA						
Agri Income	0.21 ***	0.02	-0.12	0.69 ***	0.07	0.04
Non Agri Income	0.12 ***	-0.01	0.08	-0.04	0.13	-0.03
PAKISTAN						
Agri Income	0.02	0.02	0.16 ***	0.11 ***	0.26 ***	0.03
Non Agri Income	0.12 ***	0.07 **	0.14 ***	0.03	0.24 ***	0.10 **

LEVELS OF SIGNIFICANCE AT 1% (***), 5% (**) AND 10% (*).

In Table 41, correlations between income, productive asset purchases and other asset purchases are reported. Similar to what is found in Table 40, we find stronger correlations between income and asset purchases for Mozambique, and weaker correlations for Tanzania and Pakistan (weakest). In the case of Mozambique this could indicate a malfunctioning credit market where assets can only be acquired around the times bigger income streams come in. Pakistan on the other hand shows very low correlations. This could be interpreted as a sign for a better working credit market where smallholder farmers can take

out informal loans to finance asset purchases and repay these as income comes in. Research question 2.5 finds exactly this type of loan repayment trend for Pakistan and will add more analysis to this. We are also investigating smallholder farmers' behavior relating to physical asset purchases in research question 2.9.

⁵⁵ Income volatility will be further investigated in research question 2.7.

TABLE 41: CORRELATION COEFFICIENTS BETWEEN INCOME AND PHYSICAL ASSET PURCHASES

VARIABLES	ASSET PURCHASES			
	Productive assets ⁵⁶		Other assets ⁵⁷	
MOZAMBIQUE				
Agricultural Income	0.36	***	0.68	***
Non-Agricultural Income	0.11	***	0.36	***
TANZANIA				
Agricultural Income	0.03		0.12	**
Non-Agricultural Income	0.14	***	0.02	
PAKISTAN				
Agricultural Income	0.01		0.00	
Non-Agricultural Income	0.09	***	0.01	

To better understand the extent to which expenditures and income are related we run a multivariate regression analysis on total household expenditure. Here we have experimented with including different covariates before settling with a model using net agricultural income, net non-agricultural income

and household size as independent variables.⁵⁸ Table 42 below shows the regression output of our preferred model; it is important to note that we are using net agricultural (non-agricultural) income here as this reflects the disposable income after paying for production-related expenses.

TABLE 42: MULTIVARIATE REGRESSION ANALYSIS OF FACTORS AFFECTING HOUSEHOLD EXPENDITURE

VARIABLES	TOTAL EXPENSES					
	MOZAMBIQUE		TANZANIA		PAKISTAN	
	Coefficient	P value	Coefficient	P value	Coefficient	P value
Net agricultural income	0.72	***	0.66	***	0.42	***
Net non-agriculture income	0.68	***	0.85	***	0.48	***
Household Size	-5.87		1.46		59.19	**
Intercept	48.9	*	-2.1		608.1	***
Number of observations	79		88		94	
R-squared	90.5%		79.4%		39.4%	

1) Significance: *10% significant, ** 5% significant, *** 1% significant.

⁵⁶ Productive assets are defined as: purchase of farmland, tractor, farming tool, crop storage, chicken, cow, buffalos, goats, sheep, and other livestock.

⁵⁷ Other assets are defined as: purchase of building materials, land plot, blankets, furniture, utensils, electronic items, motorcycle, bicycle, jewellery or valuables.

⁵⁸ Multiple regression analysis is a commonly used technique to estimate the dependence or relationship of one variable on one or many other variables.

In Tanzania, we find that a one dollar increase in net agricultural income leads to a 0.66 unit increase in household expenditures. Results for net non-agricultural income are slightly higher (0.85 unit increase). Both coefficients are statistically significant at the 1% level. While Mozambique has similar results, in Pakistan a one dollar increase in income leads to much lower increases in household expenses (between 0.42 and 0.48 units). The relatively low R-squared (relative to Tanzania and Mozambique) for Pakistan, indicates that there might be other factors, that are not in the current model that could explain variations in expenditures. For Mozambique, we observe a very high r-squared, which signals that the variation in expenditures is mainly explained by variations in income. Again, this could be interpreted as mal-functioning consumption smoothing, where consumption is low when income is low.

RESEARCH QUESTION 2.2

For households switching from informal to more formal financial services over the year, what are the key drivers behind these decisions?

The analysis for this research question is making use of smallholder diaries data. As opposed to national surveys which is a one-off survey, financial diaries are following-up on the same respondents every two weeks for a full year. This allows insights into which kind of financial services were used at different points in time. To distinguish informal and formal financial services, the same categorization of financial transactions is used as was already described under research question 1.2. Annex 3 Table A3.9 shows the categorization of financial transactions by formal and informal services for reference.

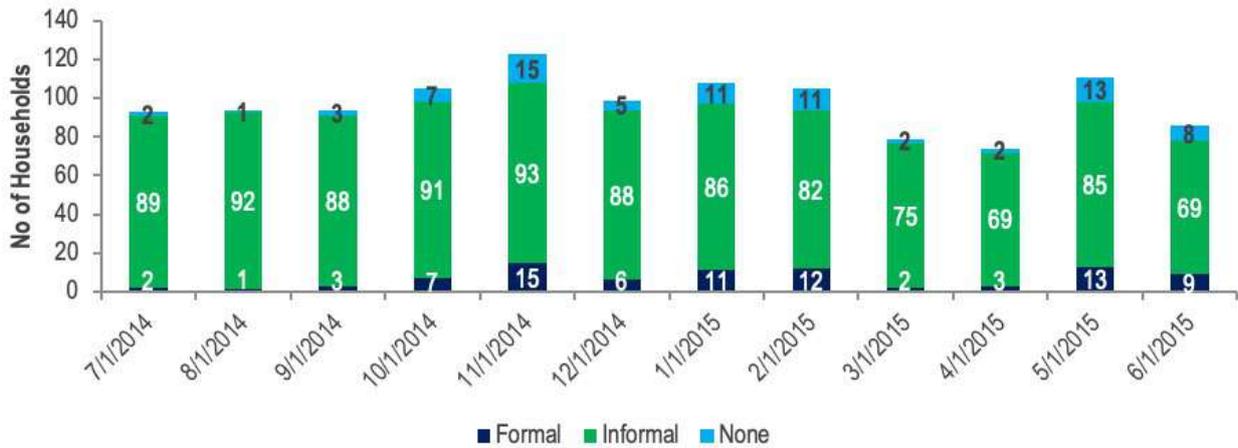
While the research question focuses on households who are using only informal financial services initially but are then transitioning into using more formal financial services over the year, it is important to note the following caveat. Diaries data show, amongst others, the value of financial transactions and when they are made. The date of when a formal financial account was opened, however, cannot be determined with certainty. It can therefore not be established whether a household is enrolling for formal financial services throughout the year or whether the household was already enrolled in formal services before. For example, a household that makes its first formal transaction late in the year might use an account that was opened before the data collection period started. It would therefore be wrong to argue that this household is formally financially included from the moment a first formal transaction is recorded in the financial diaries – and to as a result define this as a ‘transition point’. Lastly, there are only very few households who do use formal financial services. To differentiate between those and argue for a transition into using these services is difficult to argue for based on their user profile. Therefore, an analysis of which smallholder household transitions into using formal services is not doable – it can only be differentiated between households that are accessing formal or informal financial services.

The analysis therefore focuses more on when formal and informal transactions are made throughout the year. Figure 72 shows the number of households that use formal, informal or no⁵⁹ financial services for each month of the year.⁶⁰

⁵⁹ Un-banked households are keeping money at home.

⁶⁰ See methodology section for how formal and informal financial services are defined for smallholder diaries.

FIGURE 72: NUMBER OF HOUSEHOLDS WITH FORMAL, INFORMAL AND NO FINANCIAL TRANSACTIONS OVER TIME IN PAKISTAN⁶¹ (SMALLHOLDER DIARIES DATA)

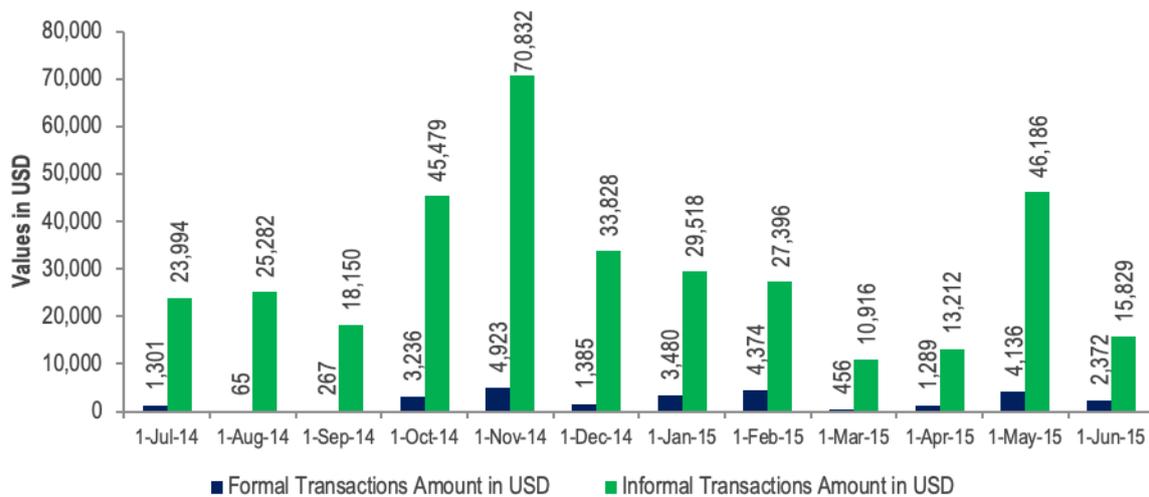


SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

It can be observed from Figure 72 that most households are using informal financial services throughout the year. There is however a subgroup of households using formal services around November and January/February time as well as around May. There are also households who cease to use both formal and informal financial services around the same months.

This points towards times during the year for some households where a) additional financing needs are filled by using formal services and b) that there are times for some households where households need less financing. To further investigate these seasonal patterns, Figure 73 shows the total value of informal and formal financial transactions in Pakistan over time.

FIGURE 73: TOTAL VALUE OF FORMAL AND INFORMAL FINANCIAL TRANSACTIONS IN USD FOR PAKISTAN (SMALLHOLDER DIARIES DATA)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

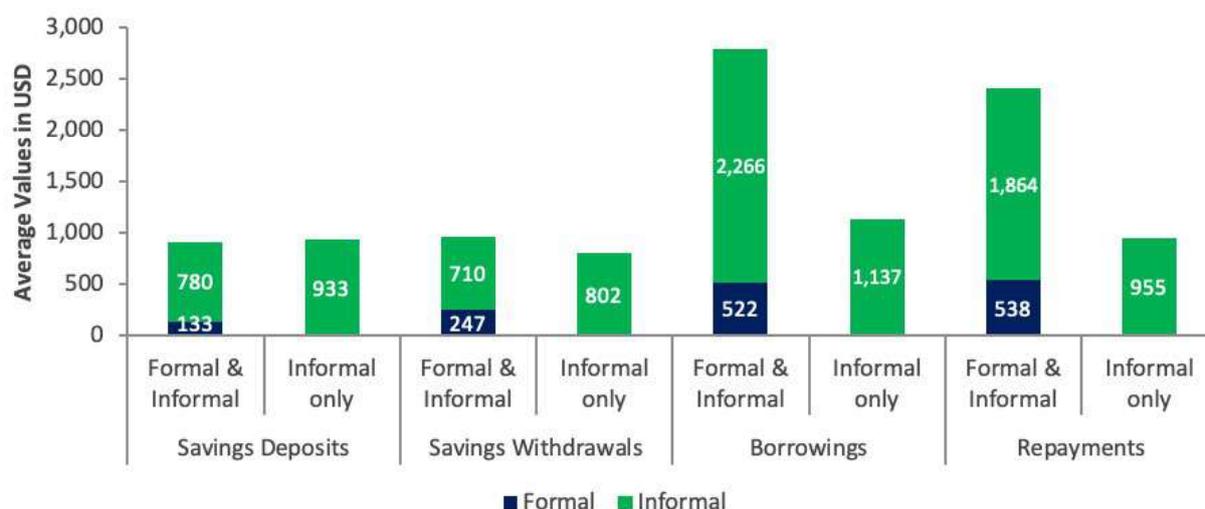
⁶¹ Note that Arthi are not specifically defined in the diaries as a separate variable. Transactions with Arthi would fall under informal borrowings or savings (*friends and family or agent credit*).

Figure 73 shows that the value of financial transactions varies strongly over time. Furthermore, it can be observed that formal and informal transactions roughly follow a similar trend with peaks in November and May. Here seasonal patterns seem to follow the agricultural harvesting cycle in Pakistan: October/November marks the harvesting time of the Kharif season which is overlapping with planting time for the Rabi season. The high transaction amounts around the harvesting season could be interpreted as a result of the Smallholder-Arthi relationship. Here additional financing needs arise which are likely to be serviced by the Arthi in the form of short-term loans. Harvesting time for the Rabi season then is in May where we can see another peak in financial transactions again indicating financing needs which are serviced through both informal and formal channels.

Similar patterns can be observed for the Tanzania sample (Annex 3 Figure A3.17). For the Mozambique sample only a very small amount of formal financial transactions is observed which does not lend itself to a trend analysis as described above (Annex 3 Figure A3.18).

Further analysis sheds light on how formal financial products are used alongside informal financial products. Figure 74 shows the average transaction values of savings and borrowings for households who are accessing formal services and for households who are only accessing informal services. Note that the group accessing formal services also makes use of informal services. In the chart below we show both formal and informal transactions for that group.

FIGURE 74: AVERAGE SAVINGS AND BORROWING TRANSACTIONS BY HOUSEHOLDS THAT ARE USING FORMAL VS INFORMAL FINANCIAL PRODUCTS IN PAKISTAN

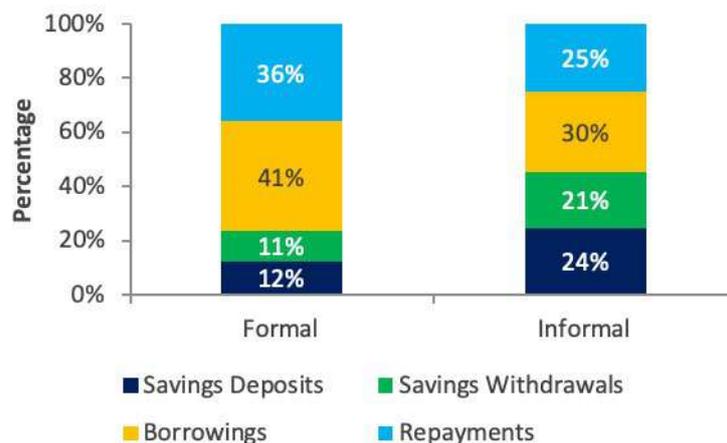


SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

It can be seen in Figure 74 above that for households who access formal financial services, the actual share of formal financial transactions over all financial transactions made is relatively small. It can also be observed that whether a household has access to formal services or not does not seem to impact much on the amount of savings made. On the other hand, it can be seen that households with access to formal services borrow more on average.

This can also be seen in Figure 75 which shows the share of savings and borrowing transactions for both formal and informal financial services. The formal group has a larger share of borrowings (41%) in their financial portfolio. The informal group uses borrowings less frequently – savings withdrawals seem to replace the function of borrowings: savings withdrawals and deposits are used twice as often in the informal group compared to smallholder who access formal services.

FIGURE 75: PERCENTAGE SHARE OF SAVINGS AND BORROWINGS TRANSACTION VOLUMES BY FORMAL AND INFORMAL THE PAKISTAN SAMPLE (SMALLHOLDER DIARIES DATA)

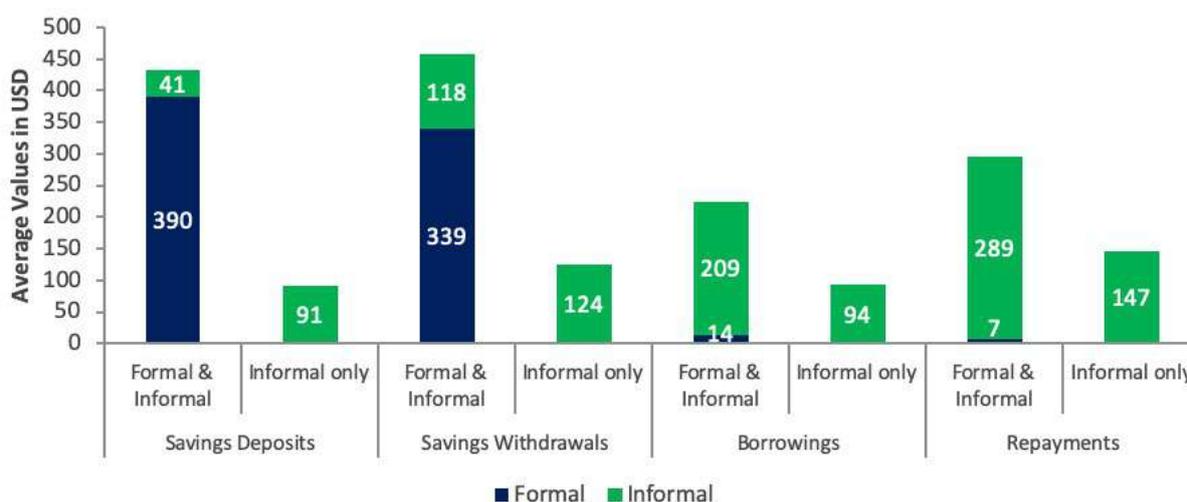


SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Interestingly a very different picture can be observed for the Tanzania sample. Figure 76 shows savings and borrowing transactions for households that do have access to formal financial services (defined as ‘formal’ below) and for those households that only access informal services (equivalent to Figure 74). As opposed to the Pakistan sample it can be seen

that in Tanzania, savings transactions are mostly replaced by formal services for those households that do have access to a formal savings account. Savings are also much larger on average for households accessing formal services. On the other hand, contrary to the Pakistan sample, there is very little usage of formal credit in Tanzania.

FIGURE 76: AVERAGE SAVINGS AND BORROWING TRANSACTIONS BY HOUSEHOLDS THAT ARE USING FORMAL VS INFORMAL FINANCIAL PRODUCTS IN TANZANIA



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Here very interesting lessons can be drawn regarding the dynamics of how formal financial products penetrate the market in different country contexts. Further analysis is however necessary to better understand how formal financial products replace or complement informal financial products. Research question

1.11, 3.5 and 3.8 suggest further insights into the drivers of informal product usage, profiles of different product users and incomes of users which impact product usage.

RESEARCH QUESTION 2.3

What is the role of women in managing the flow of funds in smallholder households and how does this vary between country datasets?

Data from the smallholder diaries provides

deeper insights in the role of women in household fund management across Pakistan, Mozambique and Tanzania,⁶² providing complementary analysis to the research findings under question 1.4. The sample of smallholder diary participants in each country consisted of approximately 50% women (half of the total household population in the sample), though a slightly higher percentage of women (59%) participated in Tanzania as presented in Table 43.

TABLE 43: SMALLHOLDER DIARIES SAMPLE SIZE BY GENDER

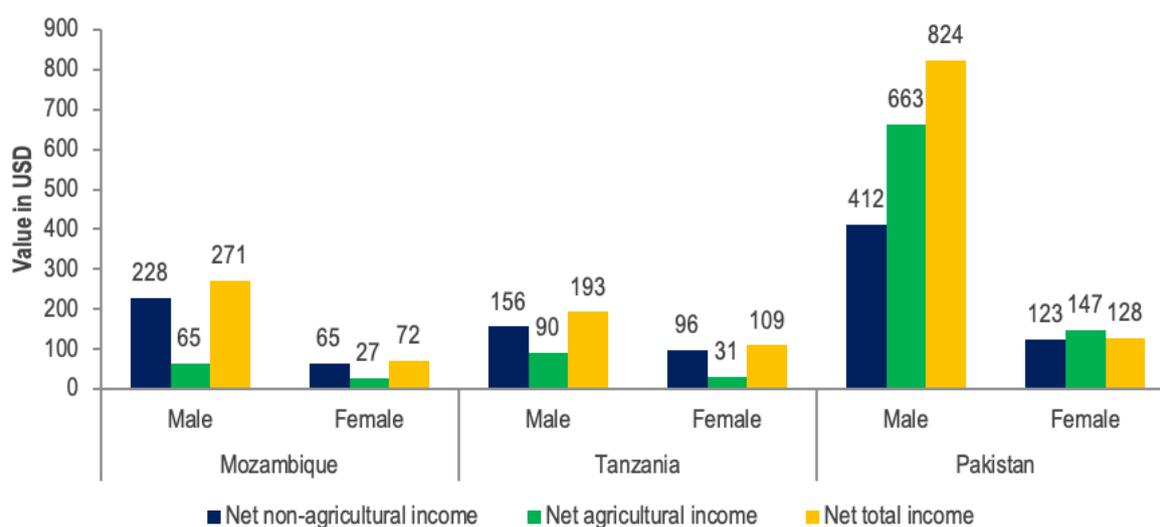
GENDER	MOZAMBIQUE	PAKISTAN	TANZANIA
Male	155	296	94
Female	154	290	137

SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Income. In order to give a bit of context for this analysis, the average net total income by gender across all 3 countries is presented in Figure 77.

From this it is clear that men earn more income than women in smallholder households.

FIGURE 77: AVERAGE VALUE OF AGRICULTURAL INCOME BY COUNTRY



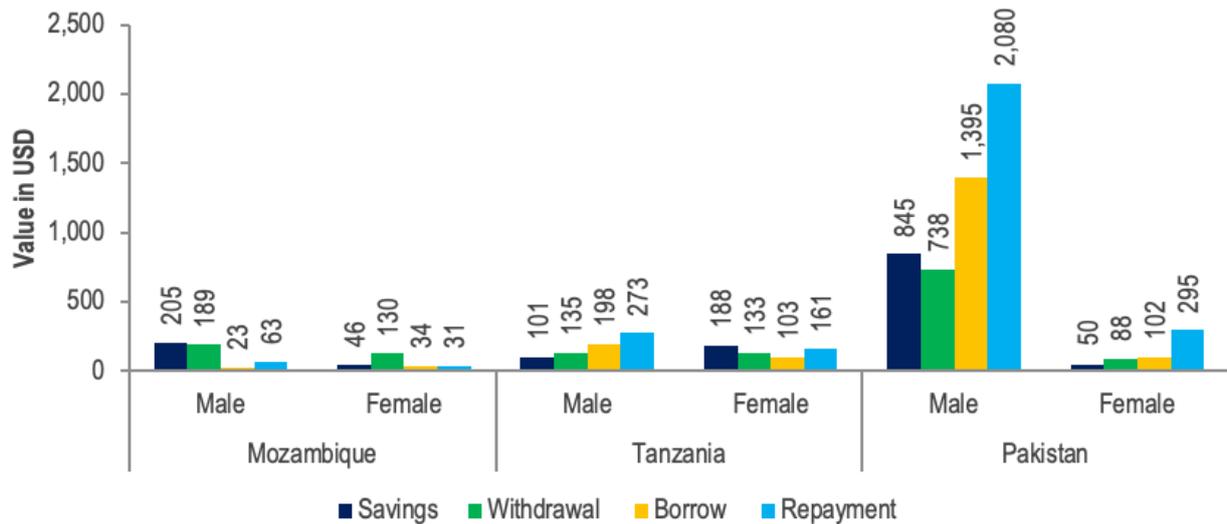
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Transactions: Saving, withdrawals, borrowing, repayments. As per Figure 78, in all 3 countries, men tend to make higher value transactions than women. The only exceptions to this is in Tanzania where women have a higher value of

savings compared to men, and in Mozambique women borrow a higher amount than men.

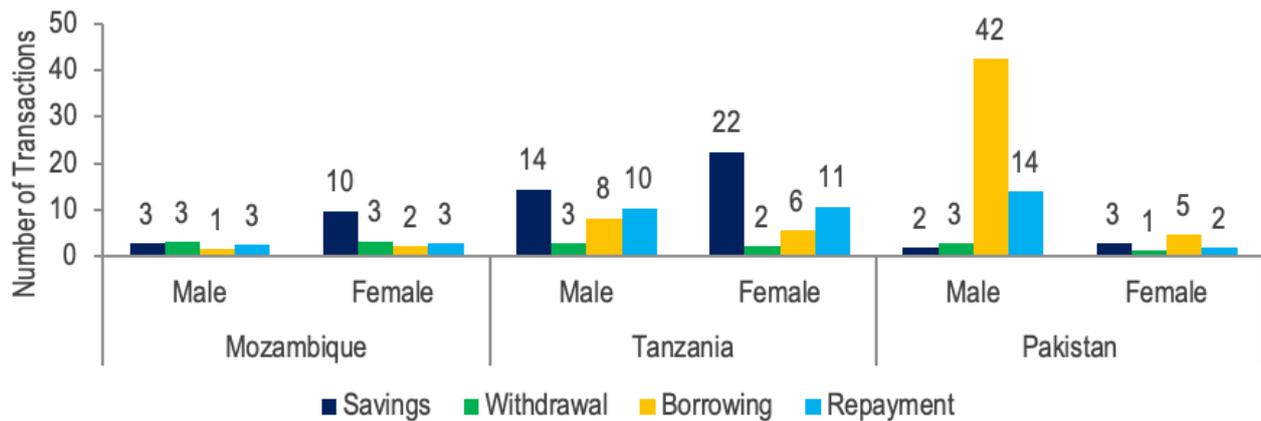
⁶² The sample includes 93 HH in Mozambique, 88 HH in Tanzania, and 94 HH in Pakistan. Households include all HH members, including those under 15 (however the number of people in this category is low in the dataset. The dataset is not able to separate those who generate ag inputs for HH consumption.

FIGURE 78: AVERAGE VALUE OF SAVINGS, WITHDRAWALS, BORROWINGS AND REPAYMENTS BY COUNTRY



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE 79: AVERAGE NUMBER OF TRANSACTIONS BY GENDER OVER 12 MONTHS



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Looking into the number of transactions made by gender (Figure 79), it is interesting to see that in Mozambique, the number of savings transactions made by women which is three times higher than men. Comparing this with the analysis by value, we can conclude that women are making more frequent but smaller savings transactions than men.

Similarly, in Tanzania, we see that women make more and higher value saving transactions than men. This may suggest that women have more control when it comes to savings in the household. At the same time, the borrowing behavior of men and women in Tanzania is similar in terms of value and number of transactions. However, men repay a higher

value of loans compared to women, which may be because women are saving instead or could be related to income generation. In Pakistan, it is evident that men dominate all financial transactions conducting a significantly higher number and value of transactions than women.

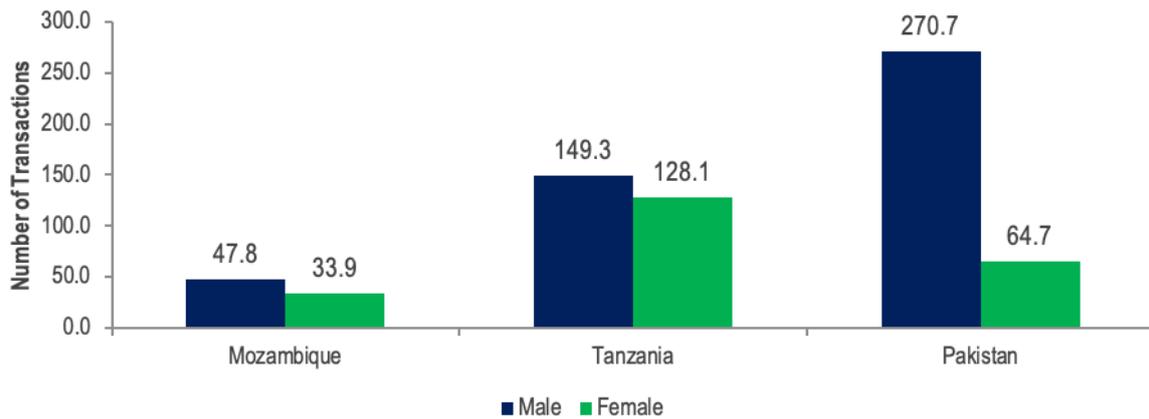
Overall, for FSPs looking to target women, it seems that women in Tanzania demonstrates high demand for savings and are also active in borrowing and repayments. In Mozambique, women are active borrowers, but given that there seems to be a low level of transactions across both genders, it may highlight an opportunity to scale up outreach overall to smallholder households. In Pakistan, women are underserved in all transaction areas and could presents an

opportunity for FSPs, but more research would be required in order to determine the specific barriers and demands. More analysis into the specific financial tools used by gender can also be found in Q1.4 and Q3.5.

Transactions: Expenses. Looking at expenditure by gender, we see that men dominate in terms of number (Figure 80) and value (Figure 81) of these

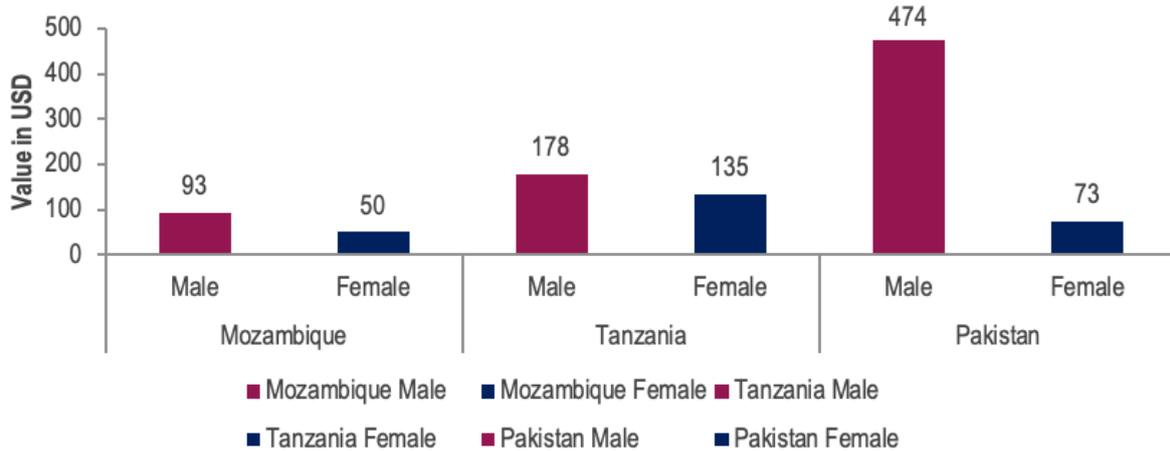
transactions across all countries. The largest gap in expenses by gender is in Pakistan, where men are making 4 times more expense transactions at 6 times the value of women's transactions. This isn't to say that women should not be considered for payment related transaction services, as in Mozambique and Tanzania, we still see women being quite active.

FIGURE 80: AVERAGE NUMBER OF EXPENDITURE TRANSACTIONS BY GENDER



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE 81: AVERAGE VALUE OF EXPENDITURE TRANSACTIONS BY GENDER



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

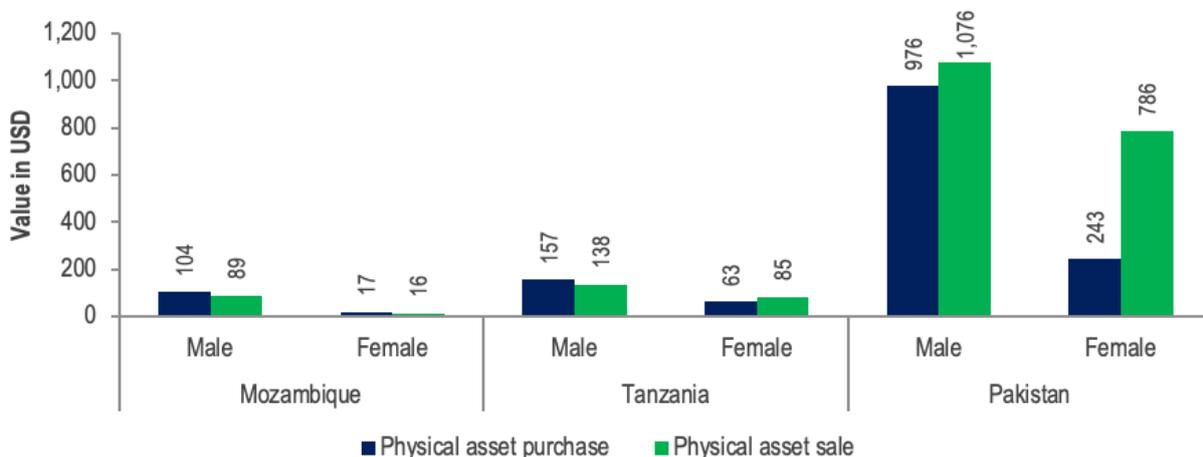
Transactions: asset purchase and sales. In term of asset purchase and sales (Figures 82 and 83) we again see that men tend to dominate the higher value and higher number of transactions, whereas women tend to make fewer purchases at a significantly lower value to those of men. The same pattern is reflected in the sales of assets,

where men conduct more sales transactions and at a higher value than those conducted by women.

The only difference is in Pakistan, where women actually make slightly more purchase transactions than men but still at a significantly lower value (USD 243) than men (USD 976). In Pakistan and Tanzania, women specifically

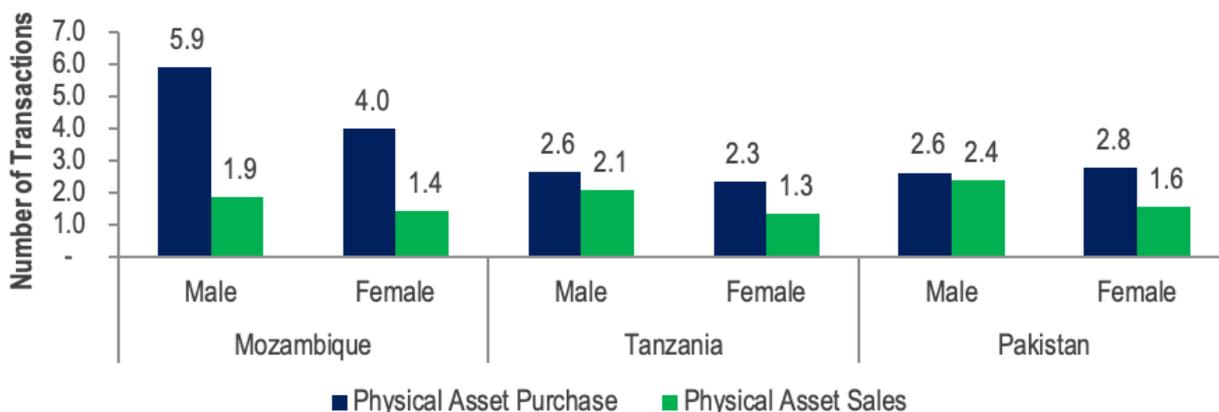
are selling assets at a higher value compared to the value of assets they have purchased. This could suggest that this is as a form of income generating activity for women.

FIGURE 82: AVERAGE VALUE OF PHYSICAL ASSET PURCHASE AND SALE



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE 83: AVERAGE NUMBER OF PHYSICAL ASSET PURCHASE AND SALE



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Transactions: Types of assets per country.

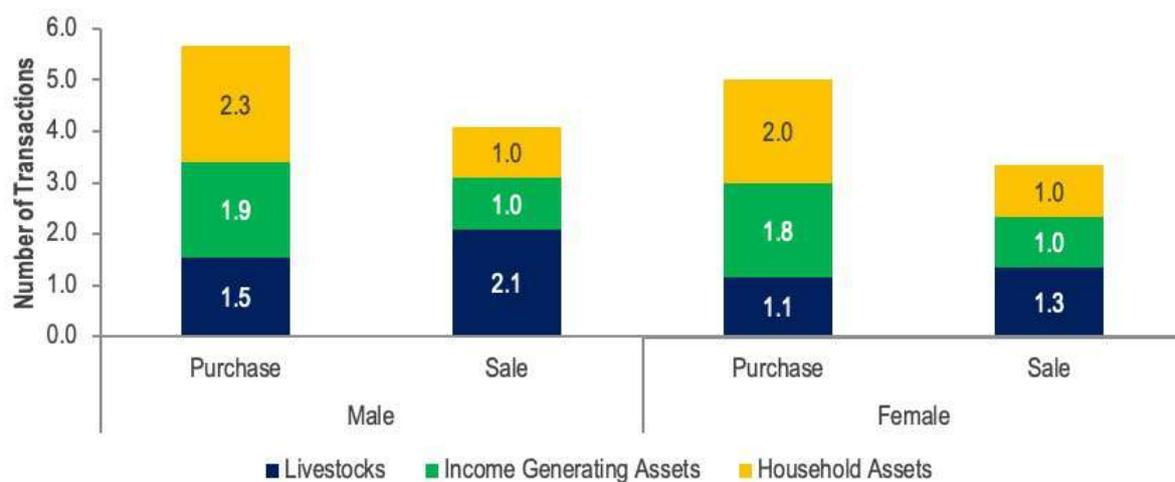
In order to get a deeper insight into asset purchasing and sales by women, asset purchase and sales is disaggregated into three categories for easy understanding 1) Livestock assets, 2) Income generating assets and 3) Household assets. Since we are calculating average number of transactions, we have considered all household numbers for calculation.

Across all 3 countries, women conduct more household purchases than any other category, whereas the number of livestock purchases is the lowest of all 3. However, the highest level of asset sales is from livestock. As the number of livestock sales is higher than purchased in Tanzania and Pakistan, we could assume that the livestock has reproduced or additional livestock has been gifted or women are supporting their husbands to sell livestock.

Tanzania. Despite conducting fewer and lower value transactions than men overall, women in Tanzania play an active role in financial management. When looking more in depth at the average number of assets purchase and sold by type (Figure 84), men make slightly more household and livestock asset purchases than

women and sell more livestock. This might indicate that men are more likely to manage livestock though it could also indicate that women are unable to access greater value loans for purchasing livestock and therefore an opportunity for FSPs to explore further.

FIGURE 84: ANNUAL AVERAGE NUMBER OF TRANSACTIONS BY TYPE OF ASSET PURCHASE AND SALE, AND GENDER - TANZANIA



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Mozambique. In Mozambique, men make more asset purchase transactions across all categories (Figure 85). Men also dominate livestock asset sales. As in Tanzania, this could suggest that men dominate in the area of livestock

management. But also, because they earn more income, they may be more able to invest in livestock. It might be interesting for FSPs to explore offering small loans to women to support investment in livestock.

FIGURE 85: ANNUAL AVERAGE NUMBER OF TRANSACTIONS BY TYPE OF ASSET PURCHASE AND SALE, AND GENDER- MOZAMBIQUE



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Pakistan. Women in Pakistan make lower value asset sales but slightly more asset purchase transactions than men. Breaking down the assets into the 3 categories below (Figure 86), we see that women in Pakistan conduct more household and other income generating asset purchases than men. This shows that women do have some

control over specific asset management areas but are less likely to be engaged in high value asset management, namely livestock. With their relatively lower income to men, these women would perhaps need access to loans to be able to purchase livestock which FSPs should consider as an opportunity.

FIGURE 86: ANNUAL AVERAGE NUMBER OF TRANSACTIONS BY TYPE OF ASSET PURCHASE AND SALE, AND GENDER - PAKISTAN



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

The implications of this analysis for financial service providers are considerable and the findings imply that there is significant scope for product development that focuses on transactional banking for women to allow the effective management of day to day household expenditure. What the analysis does not show is whether the constraints faced in accessing products such as loans are from the demand side (i.e. women do not want/need to/are prevented from accessing these products) or from the supply side (i.e. these products are either not available or not marketed to them). Tanzania and Mozambique data shows the importance of women in savings generation which is often a precursor to accessing more advanced financial products and demonstrates a certain basic level of financial literacy. The role of women in Pakistan is more limited to general household transactions but it is interesting that women are taking loans and further analysis could explore the reasons behind this and potential for growth.

RESEARCH QUESTION 2.4

How does income relate to behavior around expenditure, savings and borrowing? And what are the effects of income volatility on livelihood outcomes?

The smallholder diaries data provides valuable time series to help us analyze the dynamics of how income relates to expenditure, savings, withdraws, borrowing and repayments over the course of an annual cycle.

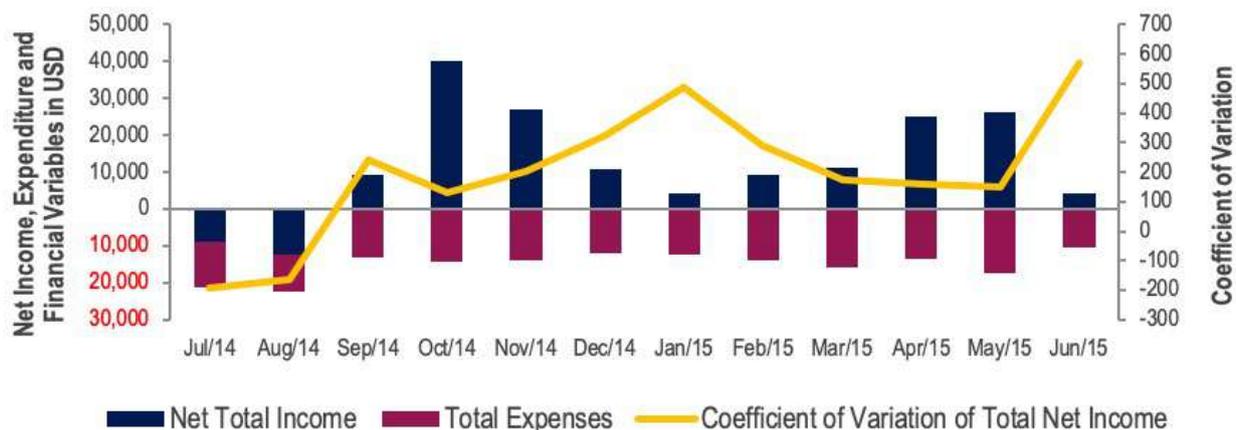
Using smallholder diaries data, monthly net total income, savings, expenditure, borrowing, and repayments for each country by month are calculated. The coefficient of variation⁶³ is also calculated for each month in order to

⁶³ The coefficient of variation measures the variability of a series of numbers independently of the unit of measurement used for these numbers. In order to do so, the coefficient of variation eliminates the unit of measurement of the standard deviation of a series of numbers by dividing it by the mean of these numbers." Coefficient of Variation=SD / Mean * 100. See also <https://www.utdallas.edu/~herve/abdi-cv2010-pretty.pdf>.

quantify the volatility of income (impact of income volatility is covered in more detail in research question 7.2.7). Figures 87, 88, and 89 present comparisons of smallholder households' net total income with total deposits, total withdrawals, total expenses, total borrowings and total repayment across Pakistan, Tanzania and Mozambique, respectively.

The graphs below are compiled using the following methodology: we start by mapping monthly income and expenditures (navy and maroon bars) on to a measure that we have developed for the volatility of net income that we call the coefficient of variation, shown in the yellow line.

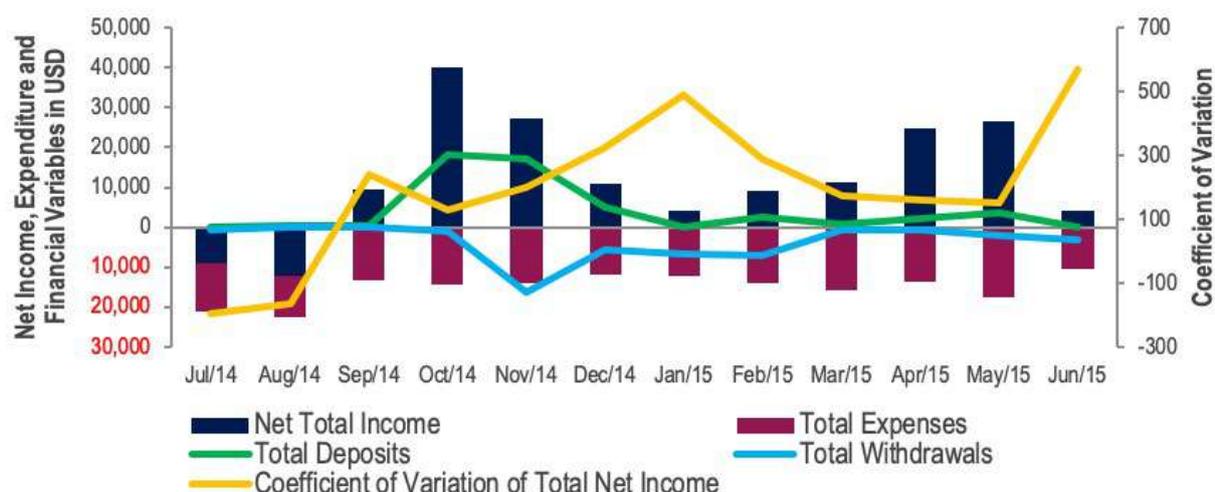
FIGURE 87A: INCOME AND COEFFICIENT OF VARIATION RELATE TO BEHAVIOR AROUND EXPENDITURE, SAVINGS, BORROWING AND REPAYMENT (PAKISTAN)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

We then add in lines for total withdrawals (blue) and total deposits (green).

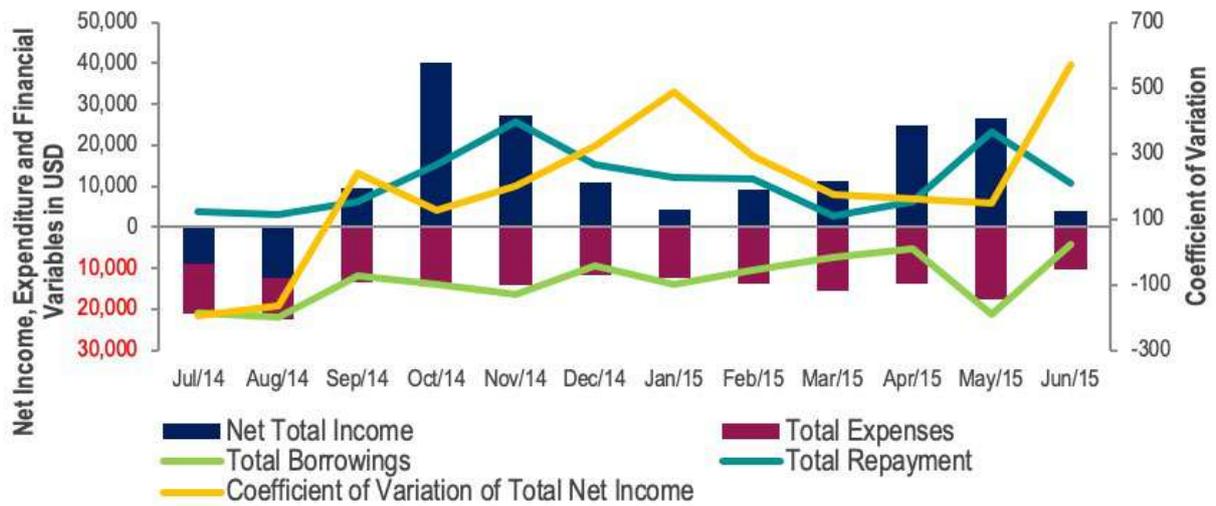
FIGURE 87B: INCOME AND COEFFICIENT OF VARIATION RELATE TO BEHAVIOR AROUND EXPENDITURE, SAVINGS, BORROWING AND REPAYMENT (PAKISTAN)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

... and borrowings (lime green) and repayment (teal)

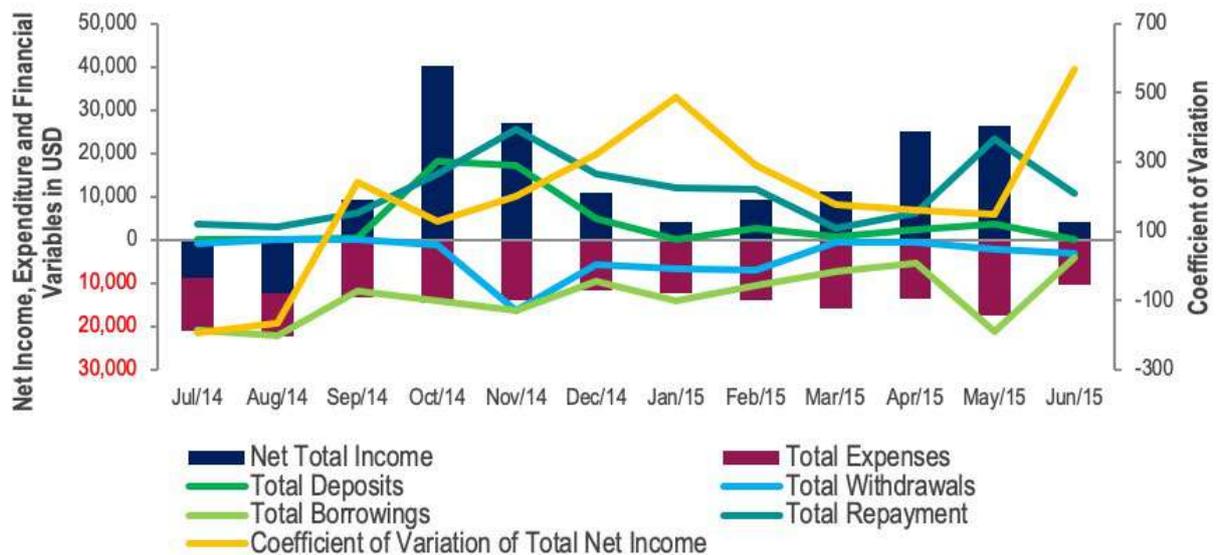
FIGURE 87C: INCOME AND COEFFICIENT OF VARIATION RELATE TO BEHAVIOR AROUND EXPENDITURE, SAVINGS, BORROWING AND REPAYMENT (PAKISTAN)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

...and put of all this together to give an image of how income and expenses relate to savings and borrowing, as well as to the volatility of income.

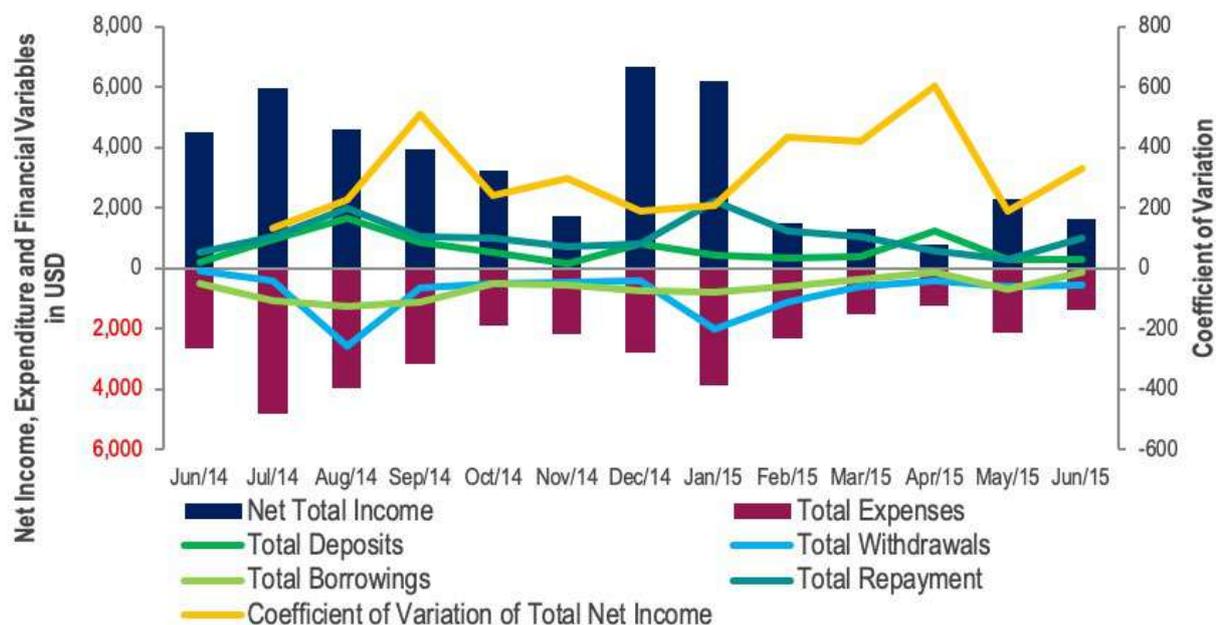
FIGURE 87D: INCOME AND COEFFICIENT OF VARIATION RELATE TO BEHAVIOR AROUND EXPENDITURE, SAVINGS, BORROWING AND REPAYMENT (PAKISTAN)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

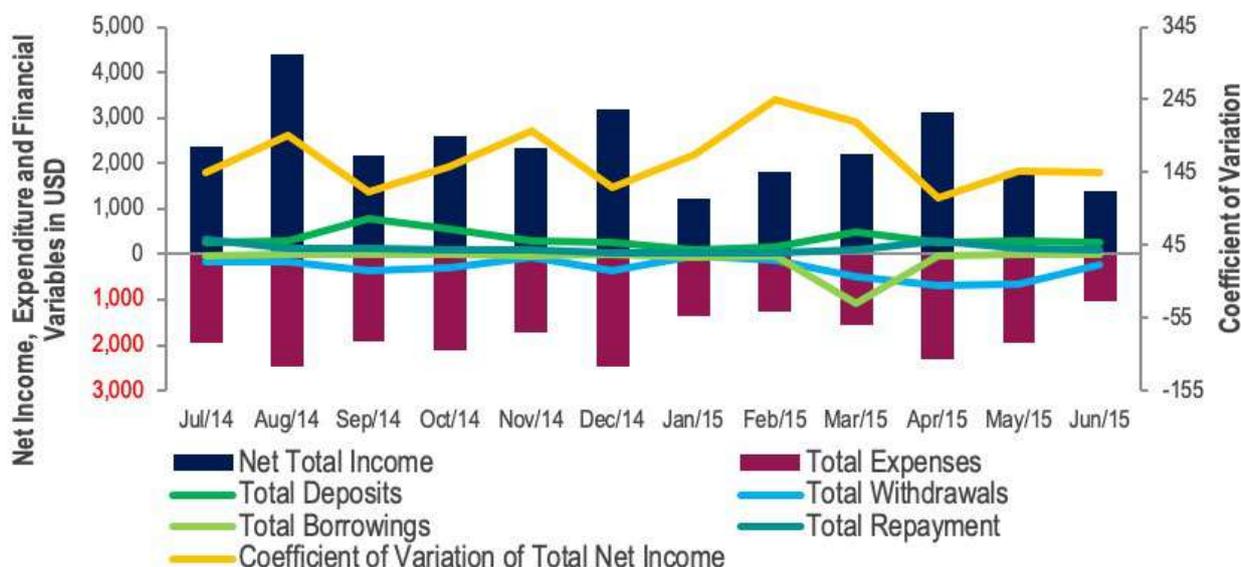
Below are the outputs of replicating this analysis for Tanzania and Mozambique.

FIGURE 88: INCOME AND COEFFICIENT OF VARIATION RELATE TO BEHAVIOR AROUND EXPENDITURE, SAVINGS, BORROWING AND REPAYMENT (TANZANIA)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE 89: INCOME AND COEFFICIENT OF VARIATION RELATE TO BEHAVIOR AROUND EXPENDITURE, SAVINGS, BORROWING AND REPAYMENT (MOZAMBIQUE)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

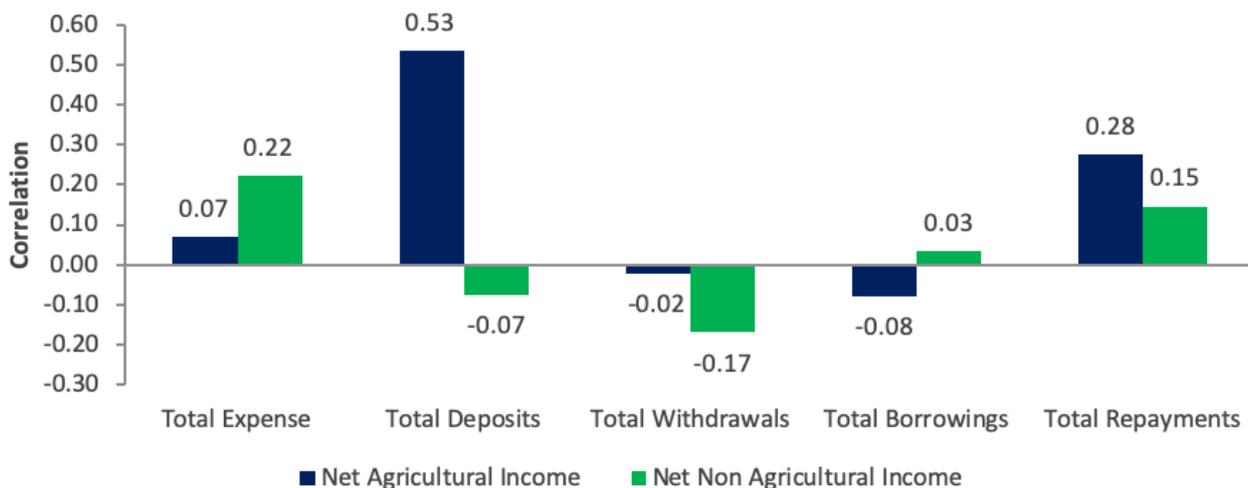
By unpacking the figures presented above, it can be observed that all three countries show significant volatilities in net total income (as would be expected from their reliance on agricultural production). In all three countries, whenever the net income increases, total

expenses increase, though expenses remain flatter than incomes implying some degree of consumption smoothing. In Pakistan and Tanzania, whenever income increases, repayment increases and borrowing decreases slightly. However, this is not observed in

Mozambique. We also see that repayment of loans tends to spike in the month of or the month following harvest, implying that people are borrowing against the expected value of their yield (this is particularly true in Pakistan, where the smallholders work in close relationships with aartis).

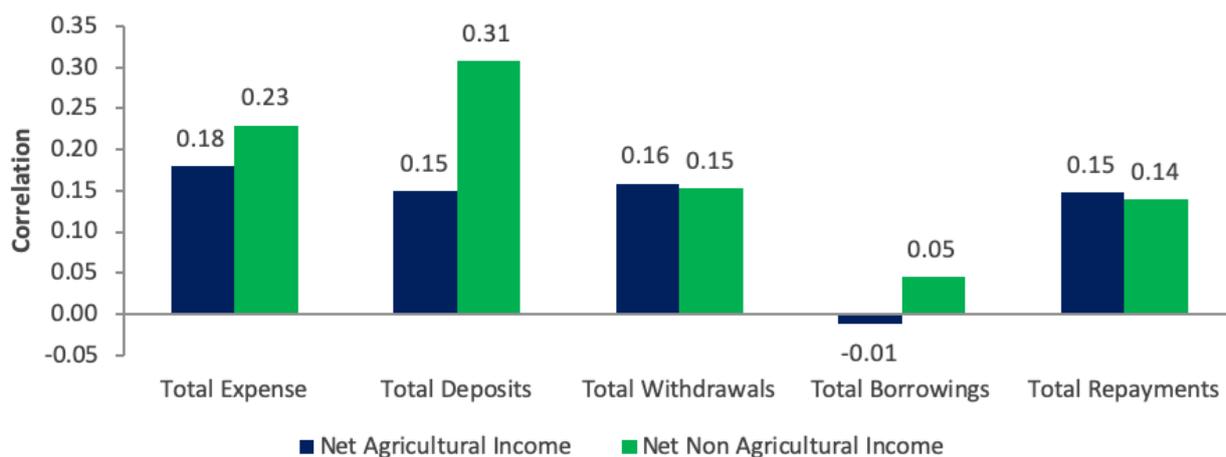
Using the diaries data, we estimate the correlation⁶⁴ between agricultural income and other financial indicators such as total deposits, total withdrawals, total expenses, total borrowings and total repayment across the three countries. Figures 90, 91, and 92 compare correlation between agricultural and non-agricultural income with other financial indicators.

FIGURE 90: CORRELATION BETWEEN AGRICULTURAL AND NON-AGRICULTURAL INCOME WITH OTHER FINANCIAL INDICATORS (PAKISTAN)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

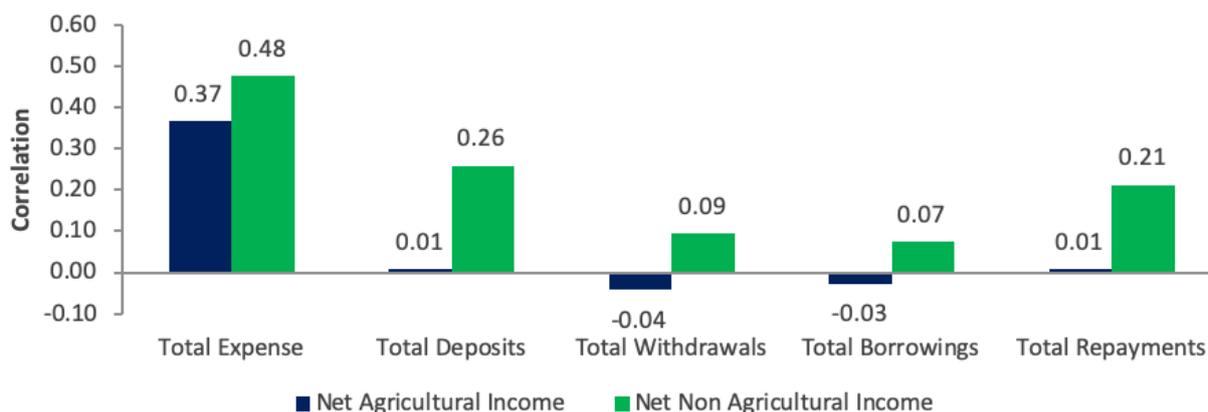
FIGURE 91: CORRELATION BETWEEN AGRICULTURAL AND NON-AGRICULTURAL INCOME WITH OTHER FINANCIAL INDICATORS (TANZANIA)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

⁶⁴ Correlation is a statistical technique used to estimate the extent to which two variables move together over time. It is a mathematical formula that is applied on the values those variables take and arrives at a number that falls between +1 and -1.

FIGURE 92: CORRELATION BETWEEN AGRICULTURAL AND NON-AGRICULTURAL INCOME WITH OTHER FINANCIAL INDICATORS (MOZAMBIQUE)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

In Pakistan, it is observed that there is a positive and statistically significant correlation between agricultural income and total expenses, total deposits, and total repayments. This tells us that when agricultural net income increases, total expenses, total deposits, and total repayments are also increase. However, a negative relationship is observed between agricultural income and withdrawals and borrowings. Agricultural income plays a more significant role in Pakistan than non-agricultural income.

In Tanzania, there is a positive and statistically significant correlation between agricultural/non-agricultural income and total expenses, total deposits, total withdrawals and total repayments. If income increases, total expenses, total deposits, total withdrawals and total repayments also increase. It is noted that income and borrowing move in opposite directions, but this is not statistically significant. Both agricultural and non-agricultural income play a significant role in influencing expenses, total deposits, total withdrawals and total repayments, implying that these are households with mixed livelihood strategies

In Mozambique there is a positive and statistically significant correlation between non-agricultural income and total expenses, total deposits, total withdrawals and total repayments. Therefore, for this sample it appears that non-agricultural income plays a more significant role than agricultural income in determining most financial behaviors.

This analysis can be valuable for financial institutions looking to model the demand for financial services over the course of the year. While we know that rural and agricultural households tend to have unstable incomes and expenditures, that instability is often predictable. This means that if you have some data points, by using historical analysis and correlation analysis, other aspects of demand may be predictable. For example, in the Pakistan data, knowledge of the bi-annual harvest cycle for rice can provide a good estimate for monthly income as well as borrowing requirements, which can help to predict likely expenditures. Building a liquidity profile in this way is a good first step for financial institutions looking to build products for these markets.



Photo: Ayesha Vellani / CGAP

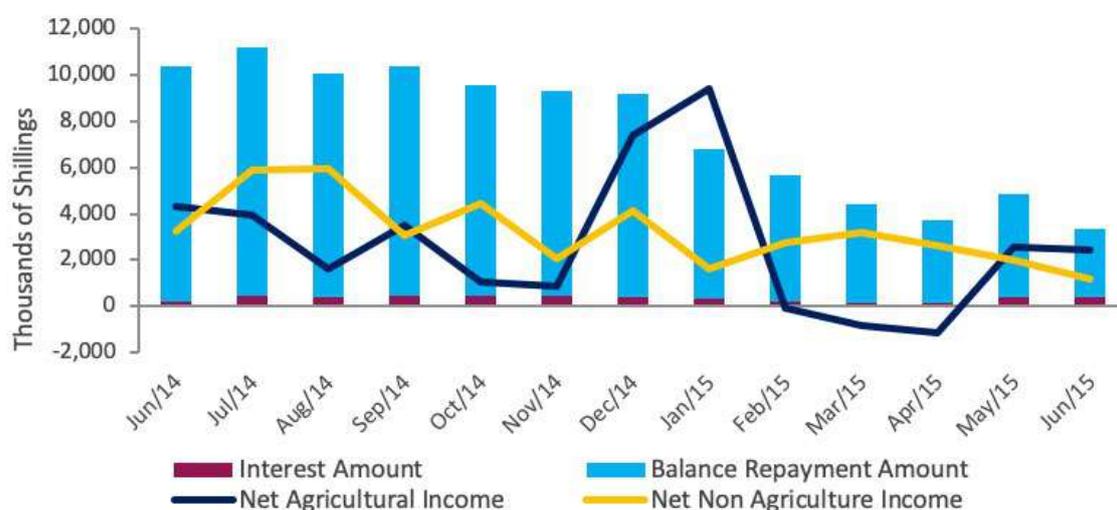
RESEARCH QUESTION 2.5

For smallholders using credit, what types of income contribute to loan repayment? What can the data tell us about the role and relative importance of agricultural cash flows and non-agricultural cash flows in loan repayment?

The diaries data allow us to examine the relationship between loan repayment and different sources of cash flow using a number of approaches.

A graphical representation of the time series showing outstanding loan repayment balances against agricultural and non-agricultural incomes is a good place to start to understand these relationships.

FIGURE 93: OUTSTANDING LOAN BALANCES AND INCOME STREAMS OVER TIME



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

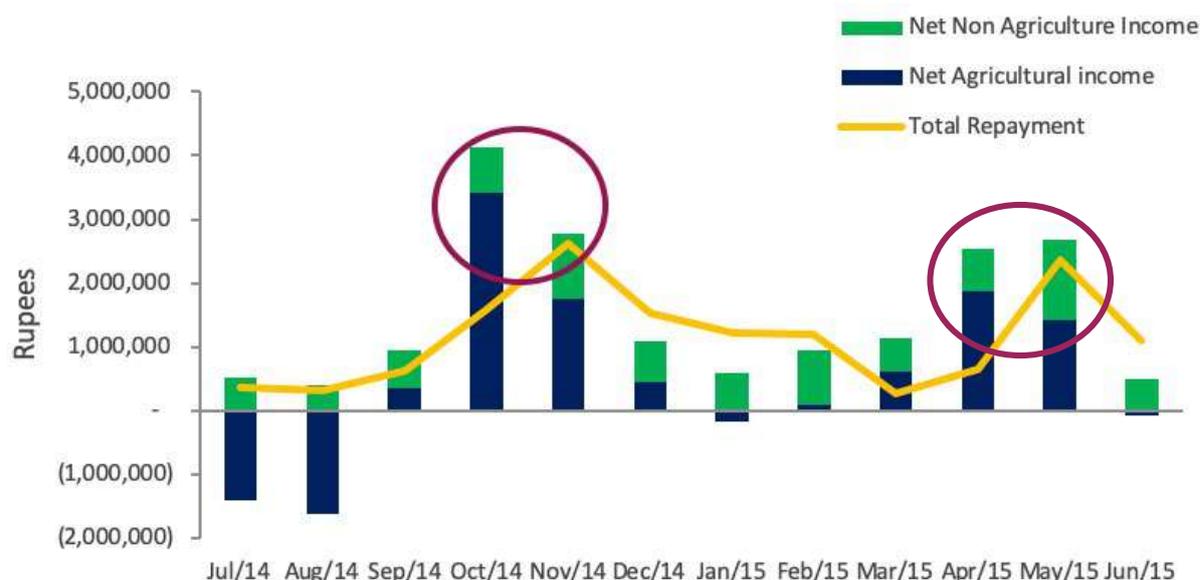
By aggregating the data from the Tanzania sample, we are able to clearly see that in December and January, when income spikes, outstanding loan balances start to fall steadily to the end of the year. This is despite the fact that there is not much variation in non-agricultural income during this period. In fact, the months with the highest non-agricultural income (July and August 2014) coincide with consistently highest levels of outstanding debt. We can infer from this that in the Tanzanian sample, agricultural cashflow and not non-agricultural cashflow is driving the repayment of loans, particularly as loan collection by lenders is most active during harvest/sales season.



Photo: CGAP

Using a similar approach in Pakistan, we can see a similar trend.

FIGURE 94: INCOME STREAMS AND REPAYMENT PATTERNS IN PAKISTAN



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Here as we track the net agricultural and non-agricultural incomes across the annual cycle, it is clear that there is little variability in net non-agricultural income. However, there is significant variation in both net agricultural income and in repayments per month. Furthermore, we see that both instances of a spike in repayments are preceded, in the previous month, by a spike in agricultural income (circled). These increased agricultural cashflows relate to the harvest periods for the two rice crops and strongly

indicate that loan repayments may be related not only to current month's income but also to lagged agricultural income.

Using statistical techniques, we find support for this hypothesis. Table 44 shows the correlation patterns between income (agricultural and non-agricultural) and repayments made in the current month and the following two months ("lead" months).

TABLE 44: CORRELATIONS BETWEEN REPAYMENTS AND DIFFERENT INCOME STREAMS

Variables	Current Repayment	Lead 1 Repayment	Lead 2 Repayment
MOZAMBIQUE			
Net Agricultural Income	0.01	(0.00)	(0.02)
Net Non-Agricultural Income	0.21 ***	0.07 **	0.12 ***
TANZANIA			
Net Agricultural Income	0.15 ***	0.06 *	0.01
Net Non-Agricultural Income	0.14 ***	0.06 *	0.02
PAKISTAN			
Net Agricultural Income			
Net Non-Agricultural Income	0.28 ***	0.20 ***	0.01

SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

The data show that in Tanzania and Pakistan, current repayment is correlated with both agricultural and non-agricultural income with a very high degree of significance: as people earn more, they pay back more. The absolute value of the coefficients on agricultural income are also higher – by a little in Tanzania and by a lot in Pakistan. This implies that agricultural income is more closely linked to repayments than non-agricultural income.

In the Pakistan data, we also see significant correlation between incomes and repayments in the following month. Again, both income sources are significant but the coefficient on agricultural income is higher. This supports the observations from the previous graph that loan repayments are related not just to this month's incomes but also last month's incomes.

Finally, regression analysis reinforces the conclusion that agricultural income is more significant than non-agricultural income in driving loan repayments (Table 45).

TABLE 45: MULTIVARIATE REGRESSION ANALYSIS EXPLAINING LOAN REPAYMENTS

Repayment	Pakistan		Tanzania	
	Coefficient	P value	Coefficient	P value
Age	1,016.0	0.14	-162.0	0.93
Gender				
Female	-44,983.7	0.07	-97,634.3	0.03
Male	0.0		0.0	
Education				
Educated	37,757.2	0.06	33,279.1	0.57
Un-Educated	0.0		0.0	
Net agricultural income	0.62	0.00	0.55	0.00
Net non-agriculture income	0.59	0.00	0.07	0.06
Intercept	-1,653.4	0.96	187,147.3	0.09
Number of observations	127		102	
R-squared	39.3%		18.5%	

SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Low p-values of the coefficients for both types of income in Pakistan show that both are statistically significant factors in contributing to loan repayment. The similarity of coefficients implies that in the Pakistan data they have similar power in predicting repayment. In Tanzania however it is very clear that agricultural income, to a larger amount and with a higher degree of confidence, is the dominant income source in determining loan repayments (highlighted in grey).

The income drivers of loan repayments are extremely important information for FSPs. In advanced financial systems, mortgages are given primarily based on the data a borrower is able to provide on current and future incomes. The

analysis here is valuable for FSPs looking to lend to smallholder segments as it should feed directly into product design. If repayments are primarily driven by agricultural income, then lending based on agricultural cycles (that allow for bullet repayment at harvest time) makes sense. The significance of lagged data also suggests that building some flexibility into loan products, that allow for slightly delayed repayment without penalty, could add a lot of value to the product for the farmer. The key message for FSPs is that loan products need to be designed to link to expected cashflows from the investment, both in terms of expected value of the cashflows and also the timing of those cashflows.

RESEARCH QUESTION 2.6

What can we learn about the nature and severity of shocks to cash flows and what is the role of risk mitigation tools?

Alongside the smallholder diaries, a major events dataset was compiled for the households that documents specific events, such as marriage, loss of land, or major accidents, and when they actually occurred. This dataset can be merged with the smallholder diaries data through a unique household ID – which is present in both datasets and refers to the same households as in the financial diaries data. Events listed in

this dataset can be defined as shocks to cash flows since they have a financial impact on smallholder households' lives. Similarly, the *crop tracker data set*, which records harvest, sale, consumption, and loss of each crop over time, can also be merged with the financial diaries using the household ID. This allows specifically to look into unexpected crop losses of smallholder farmers throughout the year – which also constitute shocks to cash flows.

Table 46 shows the different types of events and how these are classified by either unexpected or expected events or agricultural shocks. Note that *crops destroyed or failed*, and *crop loss* are events that are identified in the crop tracker while other events come from the *major events* data set.

TABLE 46: CLASSIFICATION OF SHOCKS TO CASH FLOWS BY EITHER EXPECTED OR UNEXPECTED EVENTS OR AGRICULTURAL SHOCKS

Expected Events	Unexpected Events (Non-agricultural)	Unexpected Agricultural shocks
Assets Taken to Repay	Expected Income Not Come	Crops Destroyed ⁶⁵
Got Married	Got Divorced	Crop Loss ⁶⁶
Had a Child	Separated	Livestock Died
Hosted Party Celebration	Death in Family or Close Friend	
	Lost Home or Land	
	Admitted to Hospital	
	Hospital for Someone's Treatment	
	Theft	
	Disaster	
	Major Accident	

Merging the major events data and the crop tracker data with the financial diaries data then allows to determine what kind of shocks occur for each individual household and when. To answer this research question, we identify the months in which specific shocks happen and look at how a given household 'reacts' to these shocks in terms of borrowings, savings withdrawals, expenses or physical asset sales. To

do so, average transaction values of the months around the shock are compared to average transaction values in months when there are no shocks. This analysis is conducted for each individual household in the smallholder diaries data in Mozambique, Tanzania, and Pakistan.

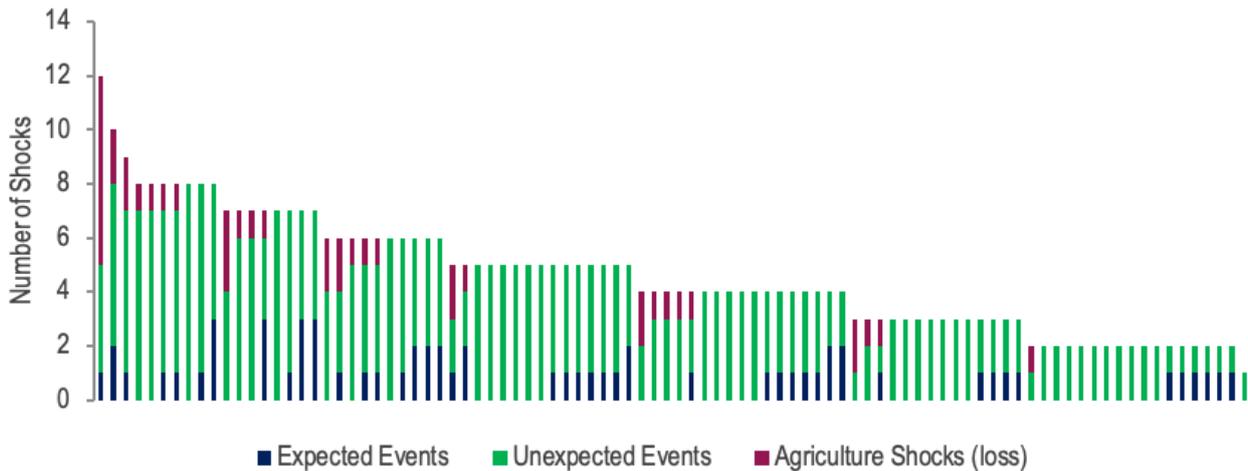
⁶⁵ Source: Crop tracker.

⁶⁶ Source: Crop tracker.

Figure 95 shows the number of different types of events for each household in Pakistan summed over the year. Note that each bar here represents a household. It can be seen that most events fall under the unexpected category. Furthermore, the portfolio of events varies for each household

showing some households that only suffer from up-to 2 shocks per year and others having to deal with 8-12 shocks. See Annex 3 Figures A3.19 and A3.20 for similar figures from Mozambique and Tanzania.

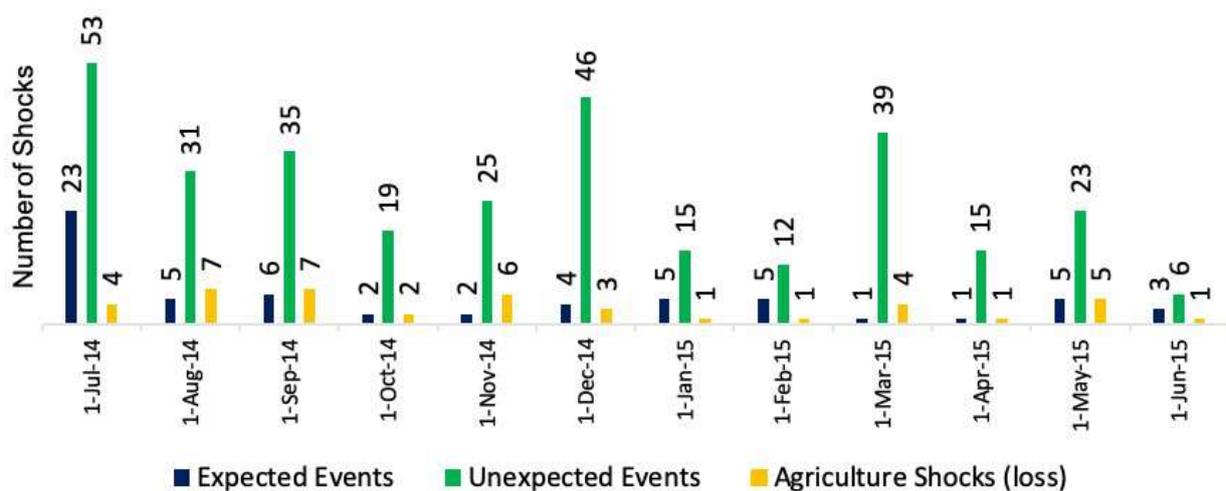
FIGURE 95: NUMBER OF EXPECTED, UNEXPECTED AND AGRICULTURAL SHOCKS SUMMED OVER THE YEAR BY INDIVIDUAL HOUSEHOLDS IN PAKISTAN (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Figure 96 shows when specific events are happening throughout the year – summarizing all events across households for each month.

FIGURE 96: NUMBER OF EXPECTED, UNEXPECTED AND AGRICULTURAL SHOCKS SUMMED OVER ALL HOUSEHOLDS FOR EACH MONTH IN PAKISTAN (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

As a next step, we compare average borrowings, savings withdrawals, total expenses and physical asset sales in those months when there were shocks with months where there were no shocks. More specifically, for expected events the analysis will take the average of transactions of **the current and the previous month**⁶⁷ of when the events occur and compare this to average transaction values of the remaining months in the dataset for the household. This is done to include transactions that are made in anticipation of, for example, a wedding or a cultural celebration. For both unexpected events and agricultural shocks, the analysis will compare average transactions of **the current and the following month** of when the event occurs with average transactions of the remaining months. This is done to analyze transactions of smallholders after the unexpected event has occurred.

This analysis allows us to quantify the impact of shocks on smallholder's finance and hence the additional demand for loan or savings products around the time a shock happens. The number of shocks per households combined with an estimate of the additional demand for finance can be very useful for FSPs when designing short-term loan or insurance products that could service this demand. Here the

differences between savings withdrawals, borrowings, expenses and asset sales could be used to estimate how much additional funding a smallholder household needs to balance shocks throughout the year. This can help to come-up with an estimate of the market size for financial products that could service this additional demand.

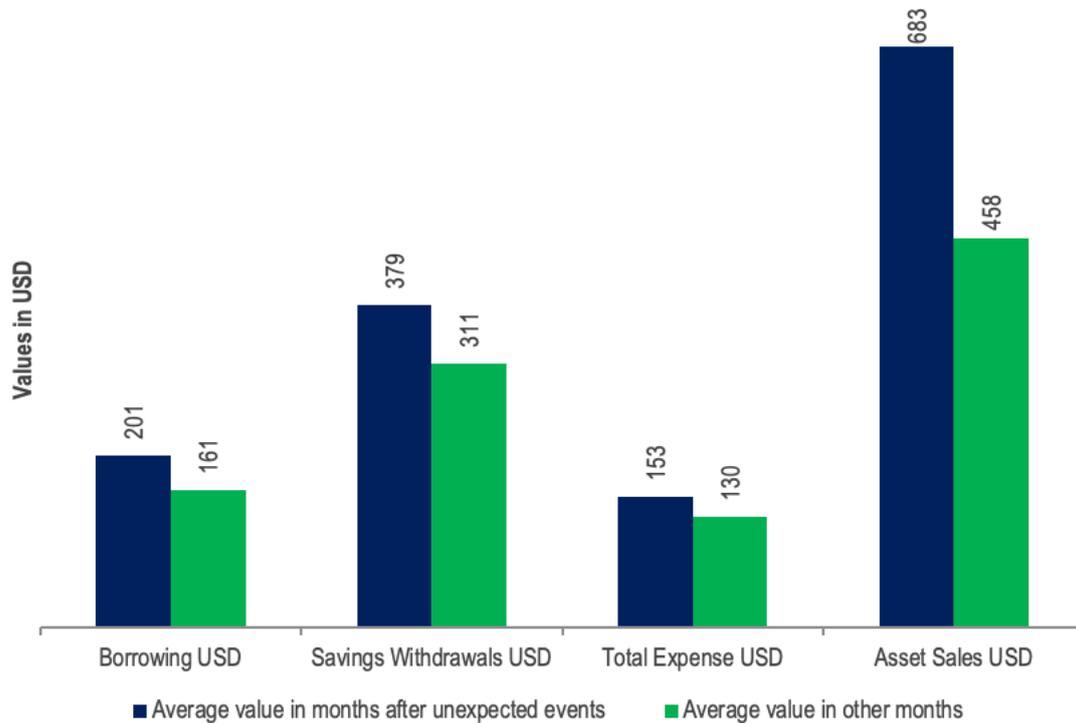
Expected events. For the Pakistan sample the analysis has shown slightly higher average borrowings, savings and expenses in the two months leading-up to the expected event as can be seen in Annex 3 Figures A3.21, A3.22, and A3.23. The positive and statistically significant difference in expenses likely relates to financing celebratory events. Hence while the impact on financing mechanisms such as borrowings, savings withdrawals or asset sales is small, a significant increase in expenses is observed. For Mozambique and Tanzania only, few expected events can be found in the data (Annex 4 Figures in Annex 3 Figures A3.19 and A3.20. Average transactions might be biased either by seasonality or by outliers. Results shown in Annex 3 Figures A3.21, A3.22, and A3.23 should therefore be interpreted with this caveat in mind.



⁶⁷ We are only including 2 months here due to the limited number of months available for the analysis. For each household we want to compare 'affected' months with 'unaffected' months. Since multiple shocks are happening throughout the year for each household defining too many months for each shock does not leave enough 'unaffected' months for comparison. For example: if for a specific household one expected shock happens in January, another in March and a third in May we would define December, January, February, March, April, May as 'affected' and compare averages from these months with the 'unaffected' remaining months of the year. Here we are facing a trade-off where adding additional leads/lags reduces the number of months we can use as comparison.

Unexpected Events

FIGURE 97: COMPARISON OF AVERAGE TRANSACTION SIZES IN MONTHS BEFORE AND AFTER UNEXPECTED EVENTS IN PAKISTAN (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

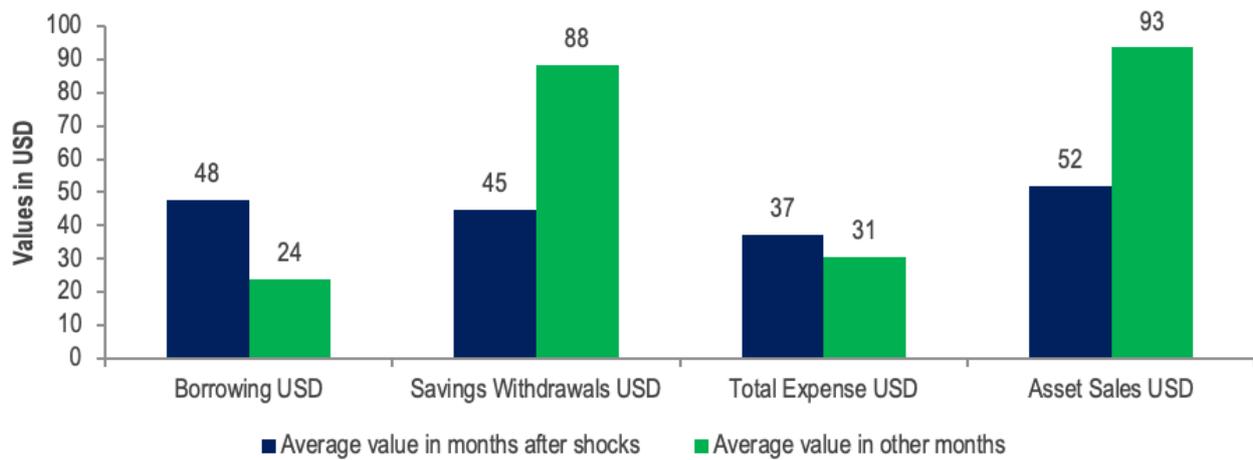
Figure 97 shows how average borrowings, savings withdrawals, total expenses and asset sales in the months after an unexpected event has happened compare to the rest of the year. Note that the navy bars show the average transaction values of borrowings, savings withdrawals, total expenses and asset sales one month after the event has occurred and green bars show average transaction values for these variables in the months where there were no shocks. These include all months without shocks in the calendar year of data collection – regardless of whether these are before or after the shock. The analysis shows a significant increase in asset sales after the event, which implies the financing gap is largely supported through additional asset sales. While some of the additional costs are financed by additional savings withdrawals (24.8% higher compared to rest of year) and borrowings (21.8% higher compared to rest of year), asset sales in months after the shock are 49% higher compared to the rest of the year. The trend of smallholder farmers liquidating physical assets in response to

unexpected events points towards a supply gap of financial products that could be serviced with either insurance or short-term loan products. A similar trend is observed in the Mozambique sample which of all three country samples has lowest access to financial products.⁶⁸



⁶⁸ No equivalent results were found for Tanzania.

FIGURE 98: COMPARISON OF AVERAGE TRANSACTION VALUES IN MONTHS AFTER AN AGRICULTURAL SHOCK WITH OTHER MONTHS IN TANZANIA (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Our analysis of agricultural shocks in Mozambique or Pakistan does not indicate any change in additional borrowings or savings withdrawals due to these shocks. For Tanzania however we find statistically significant larger borrowings following agricultural shocks, hinting at additional financing needs that households face due to either crop losses or loss of livestock (Figure 98). At the same time asset sales are much lower the months following an agricultural shock in Tanzania. Here an agricultural shock in the form of loss in livestock – a physical asset that is frequently sold⁶⁹ – could mean that smallholder farmers who depend on selling livestock suffer from a significant income drop.

RESEARCH QUESTION 2.7

How does income volatility relate to other variables, such as poverty level, crop choices and diversification, and other aspects of livelihood strategies?

Using smallholder diaries data, it is possible to compare how income varies over time for each individual household and to compare households with higher and lower income volatility in terms of other variables such as different income sources (agricultural income versus other incomes), expenses, asset purchases, borrowings and savings. This can shed light on causes of income volatility as well as on how income volatility impacts on smallholder's lives.⁷⁰ Looking across countries can then also inform specific challenges of smallholders in Tanzania, Mozambique and Pakistan.

Using smallholder diaries data, a measure for the income volatility of each smallholder household

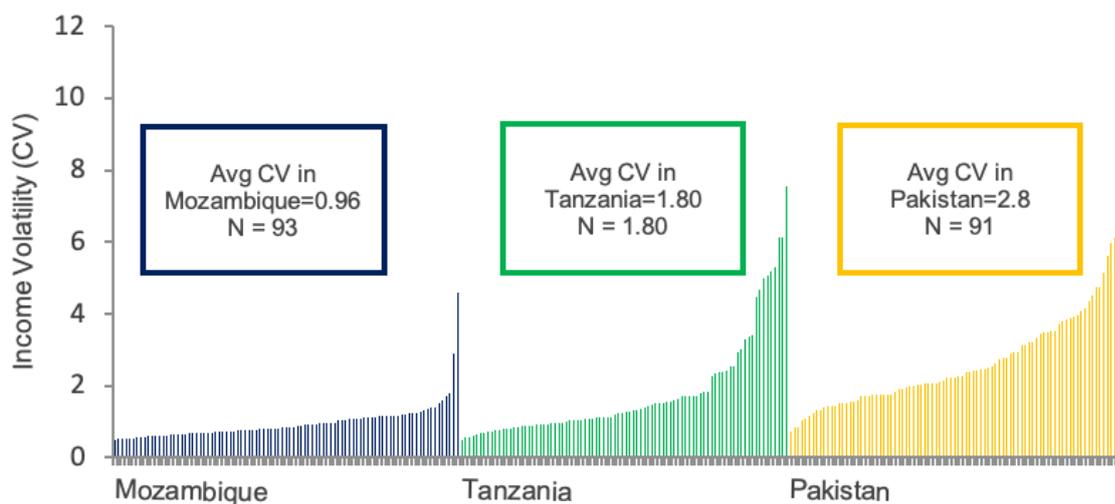
⁶⁹ See research question 2.9.

⁷⁰ The diaries do not provide a straightforward estimate of poverty level since information on overall assets owned is not available, and only transaction flows. The best estimate for poverty is therefore the relative size of income transactions compared to the overall distribution.

is calculated. The *coefficient of variation*⁷¹ (CV) is used, which takes the standard deviation of each households' income distribution over time and divides this by the average net income of each household. Households have higher income volatility when the coefficient takes greater values. For lower values, households have lower income volatility, thus implying income flows

are more similar and consistent throughout the year. The CV was then normalized to allow the comparison of the results across the three countries and different samples. Figure 99 compares smallholder households by their CV, our measure for income volatility, across Mozambique, Tanzania and Pakistan.

FIGURE 99: INCOME VOLATILITY OF SAMPLE SMALLHOLDER HOUSEHOLDS IN MOZAMBIQUE, TANZANIA, AND PAKISTAN (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

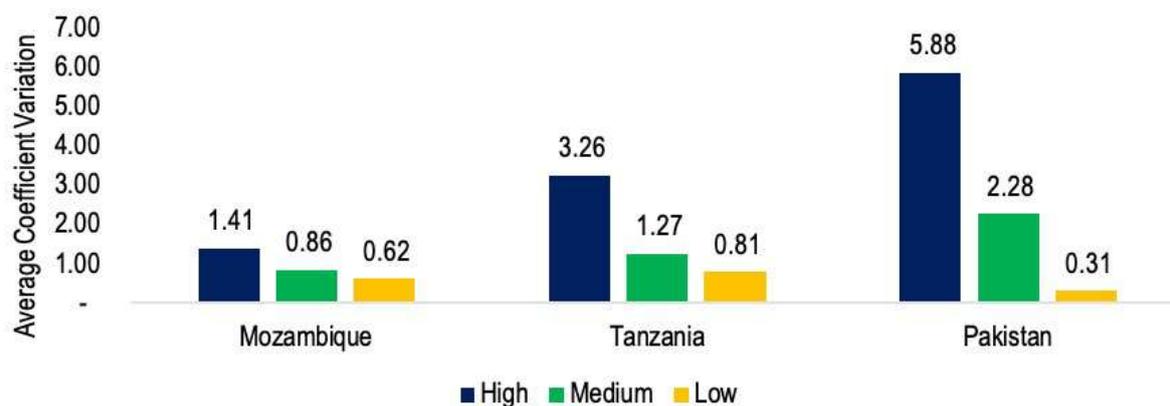
In Figure 99, each bar on the horizontal axis corresponds to a smallholder household while the height of the bar corresponds to the measure for income volatility for the respective household. From the distributions for each country it can be observed that Mozambique has on average much lower income volatilities (which corresponds with the sample's income which was much lower overall) whereas we can see higher values for Tanzania and Pakistan. Furthermore, it can be observed that there is variation within the 3 samples of households in terms of income volatility. In other words, in each country there are more and less volatile households. This allows for grouping households into low, medium and high-income volatility for each country. To segment each sample into

three groups the Wards clustering methods was used.⁷² Figure 100 shows households by average size of income volatility when grouped by size of income volatility.

⁷¹ The coefficient of variation measures the variability of a series of numbers independently of the unit of measurement used for these numbers. In order to do so, the coefficient of variation eliminates the unit of measurement of the standard deviation of a series of numbers by dividing it by the mean of these numbers." Coefficient of Variation=SD / Mean * 100. See also <https://www.utdallas.edu/~herve/abdi-cv2010-pretty.pdf>.

⁷² Please refer to the methodology section for an explanation of the Ward's linkage clustering method.

FIGURE 100: SMALLHOLDER FARMERS GROUPED BY HIGH, MEDIUM AND LOW-INCOME VOLATILITY (CV) (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

The high, medium and low volatility groups can then be compared according to average total net income, agricultural income, other income sources, asset purchases and sales, and savings and borrowings. For this we took the average transaction value of, for example, all expenses for each volatility group and compared average transaction sizes. We applied a mean comparison test that allows to compare average transaction sizes⁷³ to highlight where there are statistically significant differences.

A comprehensive analysis which compares all different transaction types across the three groups for each country is presented in Annex 3 Tables A3.11, A3.12, and A3.13. We have used this analysis to identify statistically significant differences between high, medium and low-income volatility households. Here we highlight the main findings.

A general finding across all three countries is that total annual income is consistent across the three groups of smallholders with different levels of income volatility. In Annex 3 Figure A3.26, we plot income levels of households and income volatility for all countries. As such no clear linear relationship can be observed. Trends

in agricultural income and other income sources are however worth highlighting.

Figure 101 shows how different transaction types of high, medium and low-income volatility households compare in Tanzania. Each bar corresponds to a group of smallholders that falls into either the high, medium or low-income volatility group. The height of the bar then shows the average value of either net total income, net agricultural income, other income, borrowings or repayments for that specific group.

It can be observed in Figure 101 that smallholders in the group with high income volatility have high incomes from agriculture and lower incomes from other income sources.⁷⁴ This trend is very strongly pronounced: households with high income volatility have a net income of on average USD341 per year coming from agriculture while only USD124 come from other sources. In other words, 73% of the income of households with high volatility comes from agriculture. Households with low income volatility focus on other income sources such as regular employment, casual employment or self-employment. For these households the picture is much different with only about 18% (USD83)

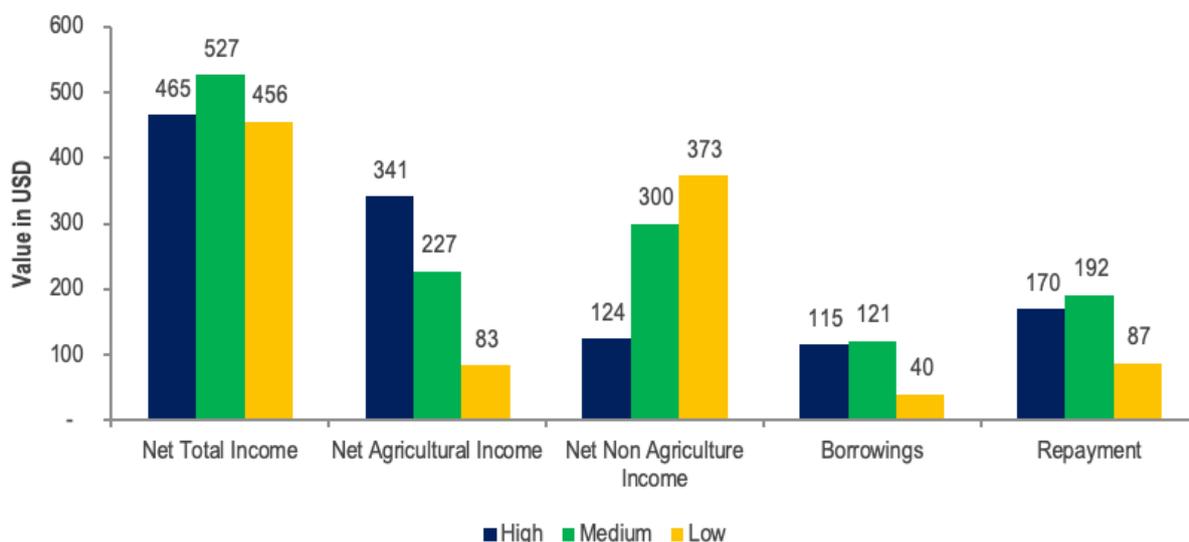
⁷³ The Tukey's multiple comparison test was applied. This is one of several tests that can be used to determine which means amongst a set of means differ from the rest. When we have more than two groups, it is inappropriate to simply compare each pair using a t-test because of the problem of multiple testing. The correct way to do the analysis is to use a one-way analysis of variance (ANOVA) to evaluate whether there is any evidence that the means of the populations differ. If the ANOVA leads to a conclusion that there is evidence that the group means differ, we might then be interested in investigating which of the means are different. This is where the Tukey multiple comparison test is used. The test compares the difference between each pair of means with appropriate adjustment for the multiple testing.

⁷⁴ Please see the methodology section of this paper for a definition of different income sources in smallholder diaries.

of the net income coming from agriculture. At the same time, it can be observed that there is no variation in total average net income levels

for smallholder households across these three groups. High volatility households earn roughly as much as low volatility households.

FIGURE 101: TANZANIAN SMALLHOLDER FARMERS' AVERAGE INCOME, BORROWING AND SAVINGS TRANSACTION GROUPED BY HIGH, MEDIUM AND LOW-INCOME VOLATILITY (CV) (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Furthermore, smallholders with high or medium income volatility borrow significantly more than smallholders with low income volatility. Larger borrowings are accompanied by even larger average repayments of loans for households with more volatile income streams (see the very right of Figure 101). Note that we show equivalent charts for Mozambique and Pakistan in Annex 3 Figure A3.27.

We analyzed trends across all three countries based on the data shown in Annex 3 Figures A3.11, A3.12, and A3.13 and can identify the following high-level findings regarding income volatility:

1. Smallholders that focus more on agriculture have higher income volatility. This pattern is very similar in Tanzania and Mozambique. In Pakistan, net agricultural income across high, medium and low volatility households is similar. Low volatility households diversify their income however much more with other income streams such as self-employment or waged labor.
2. Net total income is not significantly affected by income volatility. A similar pattern is observed for both Pakistan and Mozambique.
3. In Tanzania and Pakistan, more money is borrowed by smallholders with higher income volatility. This could relate either to financing agricultural production or to smooth consumption at times where income is low.
4. Again, in Tanzania and Pakistan, Repayments are proportionally higher for smallholders with higher income volatility which hints at sustainable loan financing. A similar pattern is found for the Pakistan sample.

RESEARCH QUESTION 2.9

How are households investing in physical assets? Which assets complement income generation, which assets are ‘locking in liquidity’ and are therefore a form of savings and which assets are for household usage?

Insights from the smallholder diaries

The financial diaries of smallholder households not only tell us about the flows of income and expenditures of the sample populations, they also allow us to track the accumulation and

depreciation of assets. This gives an indication of how smallholders store the value of their investments in physical income-generating and household assets.

The livelihood strategies employed by the smallholder households involve large and small investments in a range of assets. These assets vary on a spectrum of liquidity – some assets are illiquid and lock household finances into the asset (e.g. land), while others are highly saleable and act more like cash savings (e.g. poultry). Assets also vary on a spectrum of income generation – from pure commercial farming equipment (for which the sole purpose of the investment is to increase income) to household furniture and utensils (which have no clear income-generating role). In order to study these investments and sales, we categorized the assets along these two axes.

TABLE 47: EXAMPLES OF ASSET TYPES

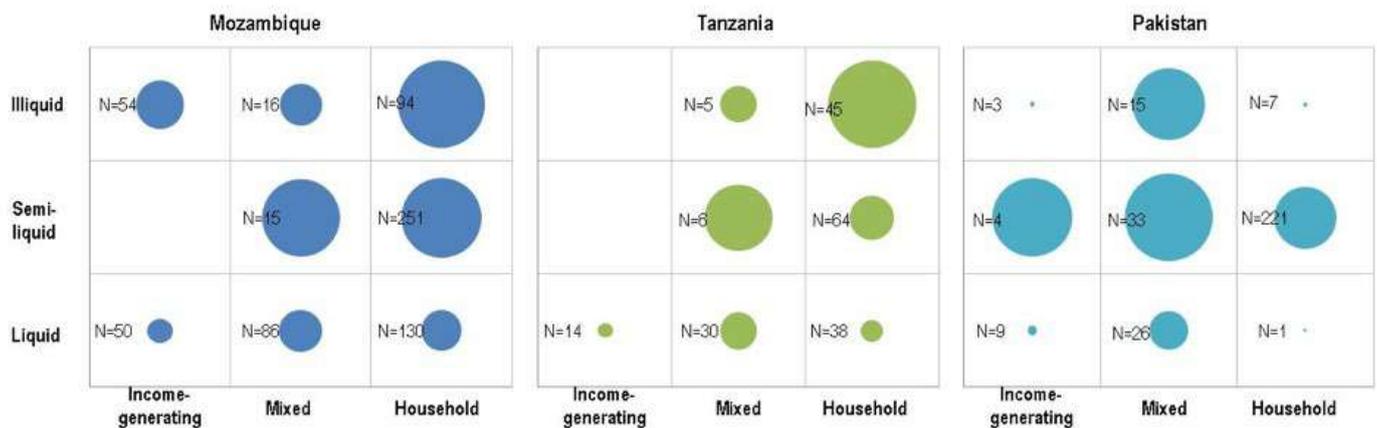
	Income-generating	Mixed-use	Household
Illiquid	Fixed crop storage	Land, water pump	Building materials
Semi-liquid	Large farming machinery	Cattle, motorcycle, bicycle	Jewelry, furniture
Liquid	Farming tools	Poultry, goats, sheep	Cooking utensils

This is not an exact science – for example jewelry and furniture are can both be considered to be household assets (not income-generating) and both are semi-liquid (could be sold relatively quickly in an emergency) however the role that they play in a household’s financial accounting is very different (jewelry, particularly in South Asian societies, can often be a valuable long term savings product with additional signaling properties).

The following graphs depict how the smallholder families are investing in different asset classes. The size of the bubble in each case represents the relative size of investments over the course of the year.



FIGURE 102: ILLIQUID, SEMI-LIQUID AND LIQUID INVESTMENT VOLUMES IN MOZAMBIQUE, TANZANIA AND PAKISTAN (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.
NOTE: "N" IS "TOTAL NUMBER OF TRANSACTIONS"; TIME PERIOD: JUNE 2014 TO JULY 2015

In Mozambique and Tanzania, the data show a tendency of smallholders to invest in household and mixed-use assets, and in particular those that are relatively illiquid. In both countries, much of the investment made by smallholder families is in building materials, electronics (including cell phones), furniture and other household items like blankets. In both countries, motorcycles accounted for 18% of average asset investment. The emphasis on household and mixed-use assets, as opposed to those that are needed to generate income, supports a finding from a 2012 report by the FinMark Trust in Mozambique,⁷⁵ that in rural areas the most common means of coping with an unanticipated event was to liquidate in-kind savings and sell assets.

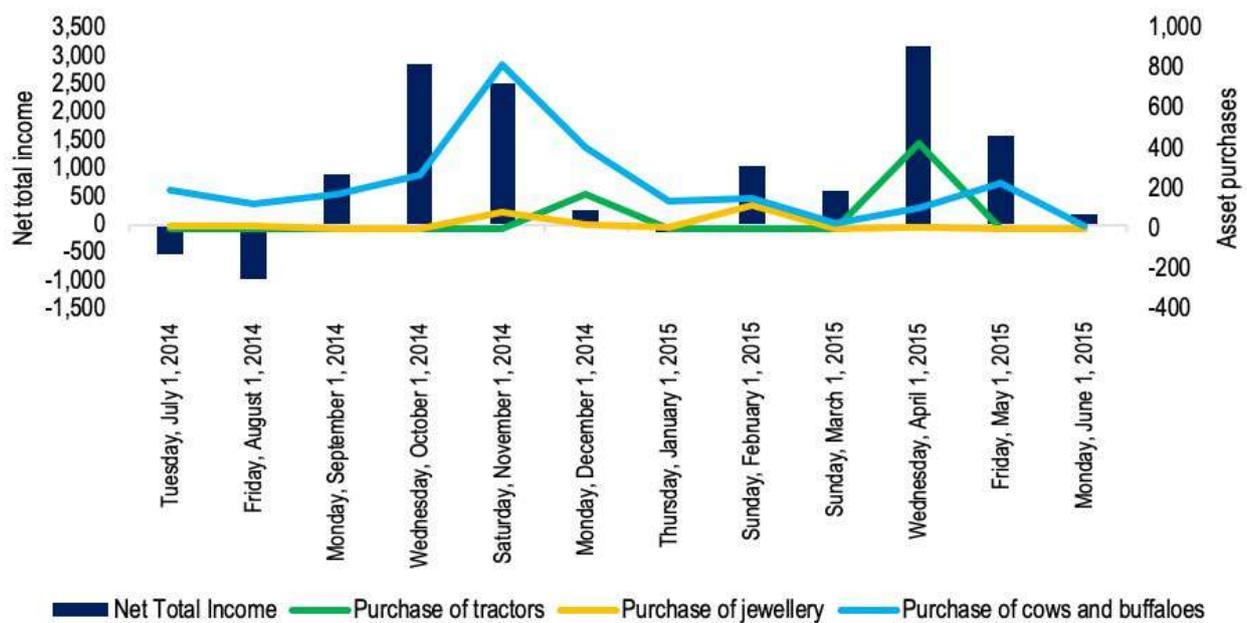
In Pakistan, however the asset investment picture looks very different. These are wealthier households with different livelihood strategies and very active financial lives – total spend on assets in the Pakistan sample was \$95,000, as was total income from selling assets. While there was a negligible net change in asset ownership, there was much activity within the population. Investments tended to be more liquid, with high turnover of assets.

There was much more investment in income-generating assets, in particular tractors and larger livestock (which together contributed over half of total investment). The dynamics of these investments can be seen in the graph below, in which we have isolated purchases of three major asset classes – tractors, jewelry and cows and buffaloes – to see how they respond to income changes.



⁷⁵ http://fsdmoc.com/wp-content/uploads/2016/12/Report_Finscope-Mozambique_MSME_2012.pdf

FIGURE 103: ASSET PURCHASES AND INCOME IN PAKISTAN (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

It is clear that for the first four months of the cycle, asset purchases remain extremely low as families wait for the harvest. We can then see how at points of greatest liquidity (after the two harvests) families increase expenditure on tractors, in time for the next planting season. Purchases of larger livestock spike after the Kharif season harvest (which is also the larger harvest) implying that cattle is being used here as a savings product to manage excess liquidity. Jewelry however is purchased incrementally over the year, at a smaller scale – it could be that families are buying jewelry whenever they have a small amount of excess liquidity, or that they are buying and selling jewelry in order to manage short term fluctuations in income.

This is useful for as FSP as, in designing a savings product that fits in with the livelihood strategies of smallholder families, a good starting point is to understand the dynamics of their existing savings and investment instruments. For example, it appears that jewelry is an asset that is commonly used as a store of value, often sold or used as collateral to meet short term cash flow needs. A semi-flexible savings account that was tied to a short-term line of credit could replicate these dynamics. In a context like that of the Pakistan sample, products that help families manage excess liquidity and link directly to investments for the next harvest cycle could have high potential. Any financial institution working in

asset financing can also use this structure of analysis to estimate likelihood of repayment, both from generated income and from the potential to sell the asset.



Photo: Allison Shelley / CGAP

Insights from the national surveys: asset purchasing readiness

This analysis explores the applications of the “pay as you go” or “PAYGo” business that allows excluded rural households to acquire assets they need in order to generate income, such as motorcycles, water pumps, bio digesters, and other forms of mechanization. Productive assets financed through such a model could help smallholder households generate additional revenue as well as improve overall quality of life.

To better understand the potential of such a model, we analyzed the demographic and economic characteristics of members from smallholder households in order to identify the smallholder household members, who might be interested in purchasing such assets. To do so, an Asset Purchasing Readiness (APR) Index was developed that aimed at identifying smallholder households who are most likely to and have the capacity to purchase assets. The analysis indicates the behavior of respondents towards improving their ability to generate income.

Based on expert opinions and data available in the CGAP national survey datasets, we identified 18 variables,⁷⁶ each of which were used to develop the APR Index. **Table 48** briefly describes these variables. By using the responses to these questions, we created the APR Index that assigned scores from 1 to 32 to each respondent based on their responses. Based on the distribution of the scores, three groups emerged:

- Group with high readiness score (scores above 20)
- Group with medium readiness score (score between 15 and 19), and
- Group with low readiness score (score below 15) were created

The high readiness group indicates the highest potential to purchase assets across the three groups.

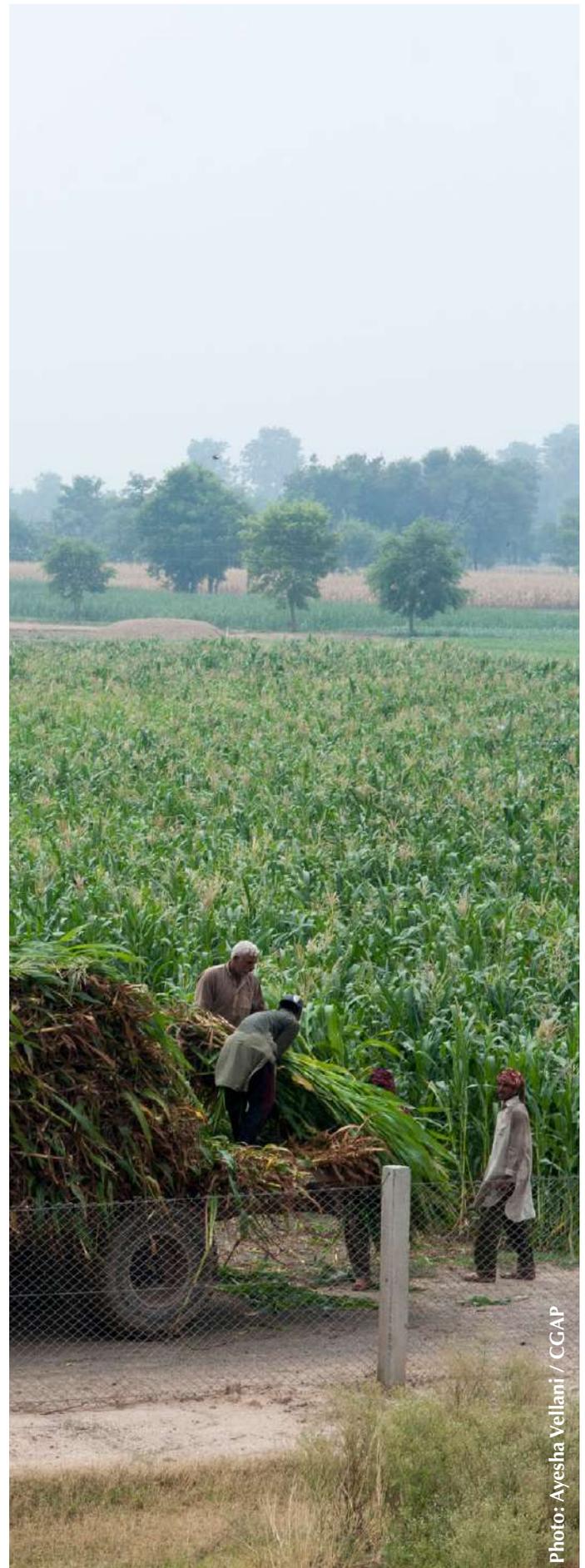


Photo: Ayesha Vellani / CGAP

⁷⁶ Based on conversations with relevant experts, we shortlisted about 30 questions. Further, we conducted a frequency analysis of these questions and then shortlisted 18 questions.

TABLE 48: VARIABLES USED FOR ASSETS READINESS INDEX

Question Number	No of Score Variables	Variables	3 Points	2 Points	1 Point	Dataset Source
D21	1	What is your household's average monthly income across all sources of money that your household receives? We recognize this may vary from month to month, so please just provide an average.	High Income	Medium Income	Low Income	Head of HH
D20	2	Please look at this card and tell me which answer best reflects your family's current financial situation.	We can afford to buy certain expensive goods such as a TV set or a refrigerator	We have enough money for food and clothes and can save a bit, but not enough to buy expensive goods such as a TV set or a refrigerator.	We have enough money for food and clothes only	Head of HH
		Asset Score ⁷⁷	> 6	> 3 & ≤ 6	≤ 3	
D27	3	What toilet arrangement does the household use in its residence?		Toilet connected to a septic tank	Latrine of any kind	Head of HH
D28	4	Does the household own a gas cooker, stove (electric, gas table, or kerosene), or microwave?	Electricity, generator, or solar panel	LPG, oil / paraffin / kerosene, or candles	Firewood, or batteries	Head of HH
D30	5	Does the household own a TV set or Radio etc.?		Yes	No	Head of HH
D32	6	Does the household own a motorbike or a car or other vehicle?		Yes	No	Head of HH
A18	7	Do your suppliers give you the option to pay them later (with credit) or do you have to pay them immediately?		Pay later	Pay immediately	Multiple Respondent
A22	8	Which of the following statements best describe your water situation?		I always have enough water available and If I had more water, I would be able to grow my agricultural activities faster.	I have intermittent water supply, but this does not affect my agricultural activities	Multiple Respondent

⁷⁷ Asset Score is calculated using the following four variables - whether the responding household has toilet facility or not; their usage of electricity, generator, LPG, batteries etc.; whether it owns a TV, radio etc.; whether it owns a motorbike or car or any other vehicle in the house. Based on responses to these 4 questions, a sub score was calculated. If sub score of all questions is greater than six, asset score is three, if sub score of all questions is greater than 3 and less than or equal to 6, then asset score is 2. And if sub score of all questions is less than or equal to 3, then asset score is 1.

Question Number	No of Score Variables	Variables	3 Points	2 Points	1 Point	Dataset Source
F62	9	[Literacy] Can you read any part of these sentences to me?		Able to read whole sentences	Able to read only parts of sentences	Multiple Respondent
F63	10	Do you have any of the following types of an official identification? (Government-issued ID/National ID, East African Passport, International Passport, Driver's license, Voters card, Employee ID, Military ID, Birth Certificate, etc.)		Yes		Multiple Respondent
H14	11	How often do you make each of the following expenses? - Investment in business, farm or future, e.g., buying livestock, land, seeds, equipment and machinery, etc.	At least once a week, At least once a month	A few times a year, According to the harvest	Once a year	Multiple Respondent
H14	12	How often do you make each of the following expenses? - Make a large purchase, such as TV, car or bicycle, house, etc.				
13	13	Segmentation ⁷⁸	Commercializing Smallholder Households	Subsisting Smallholder Households	Diversifying Smallholder Households	Multiple Respondent
A48	14	A48. Do you currently keep money aside for any of the following agricultural needs? [1] Equipment [2] For future investment opportunities [3] Transportation [4] Agriculture machinery (e.g. tractor, thresher, etc.)	Say yes to 3 to 4 questions out of 4	Say yes to 2 questions out of 4	Say yes to 1 question out of 4	Single Respondent
A59	15	Do you currently have livestock that are investments?	Yes			Single Respondent
M19	16	How important is [the ability to access financial services on a mobile phone] to your household's agricultural activities – very important, somewhat important, or not important?		Very important	Somewhat important	Single Respondent
H17	17	In your opinion, how important is it for your household to save for [a future purchase]?		Very Important	Somewhat Important	Single Respondent
H30	18	Please, tell me how often does the following apply to you? I pay my bills on time.	Always or most of the time	Sometimes	Rarely	Single Respondent

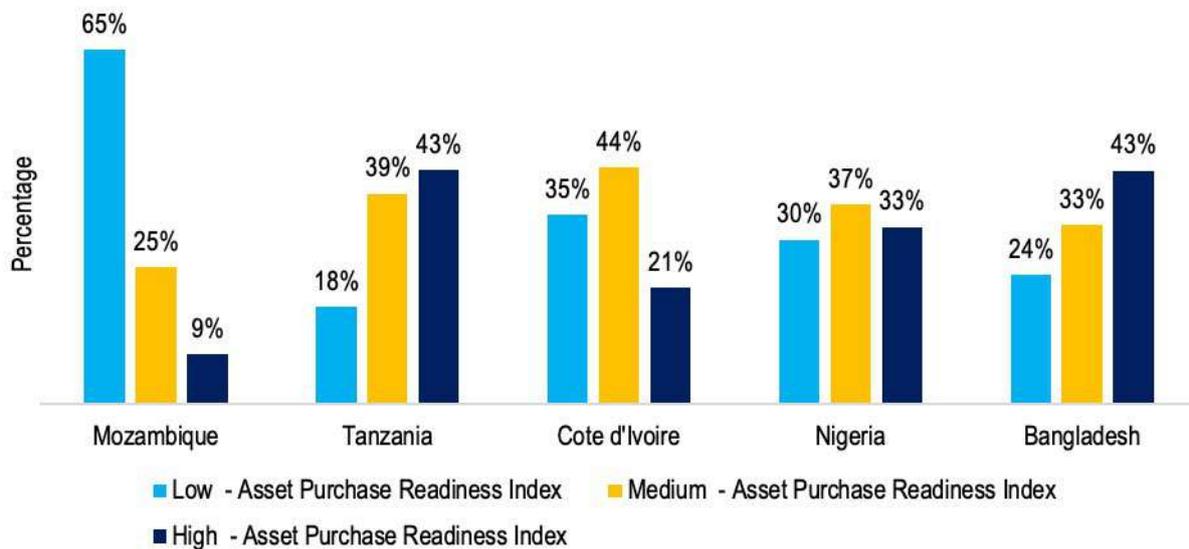
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

⁷⁸ Used livelihood segmentation (Commercializing, Subsisting and Diversifying farmers) and not the overlapping variables in the asset index calculation.

Across all countries, Tanzania shows the highest Asset Purchase Readiness, while Mozambique shows the least. As can be seen in the **Figure 104**, 4 out of 10 members of smallholder households in Tanzania, 4 out of 10

in Bangladesh, 3 out of 10 in Nigeria and 2 out of 10 in Cote d'Ivoire, show high APR Index. But only 1 out of 10 smallholder household members in Mozambique show high readiness to purchase assets.⁷⁹

FIGURE 104: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS DISAGGREGATED BY ASSET PURCHASE READINESS INDEX



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.
 SAMPLE SIZE: MOZAMBIQUE: 2,209; TANZANIA: 2,795; CÔTE D'IVOIRE: 2,949; NIGERIA: 2,773; BANGLADESH: 3,095

Across all countries, men in smallholder households, show high Asset Purchase Readiness compared to women. Looking at the gender profile of the respondents across the different categories of the asset readiness of members from smallholder households, we observe that in all the countries in the sample, more men show high readiness towards asset purchase compared to women. Some of the key variables that drive this trend are the relatively higher score of the men compared to women with regards to possession of official ID, livelihood opportunities, financial behavior related to saving money for future purpose, ownership of assets and income.

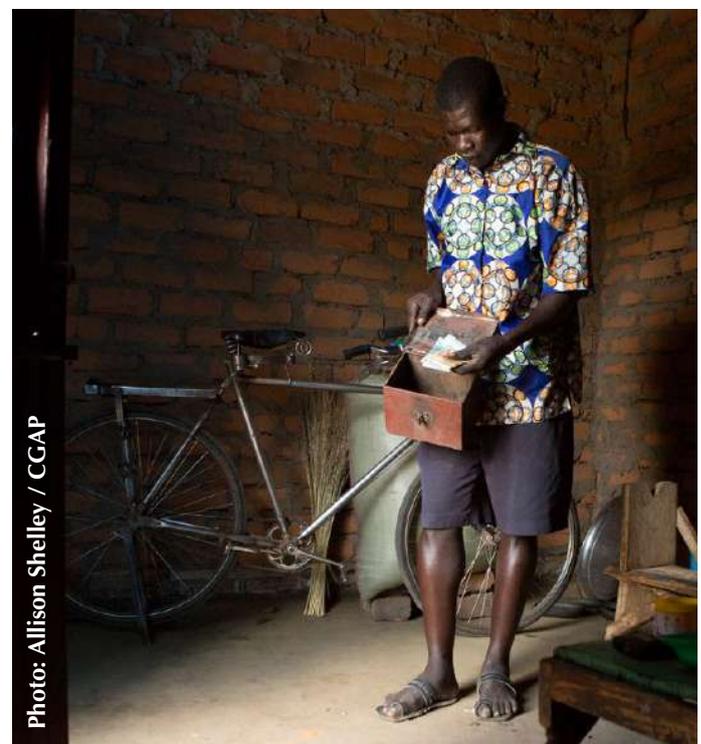
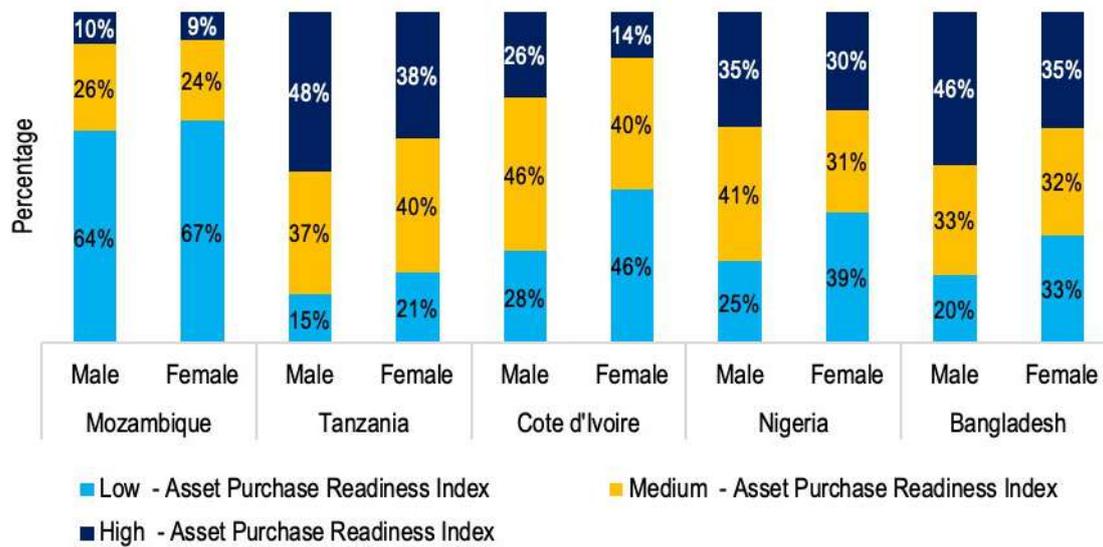


Photo: Allison Shelley / CGAP

⁷⁹ This research theme does not cover Uganda as the Asset Index is calculated by combining the household, single dataset and multiple datasets, while this was not possible for the Uganda dataset as it did not have the ID variable.

FIGURE 105: PERCENTAGE OF ASSET PURCHASE READINESS INDEX RESPONDENTS DISAGGREGATED BY GENDER



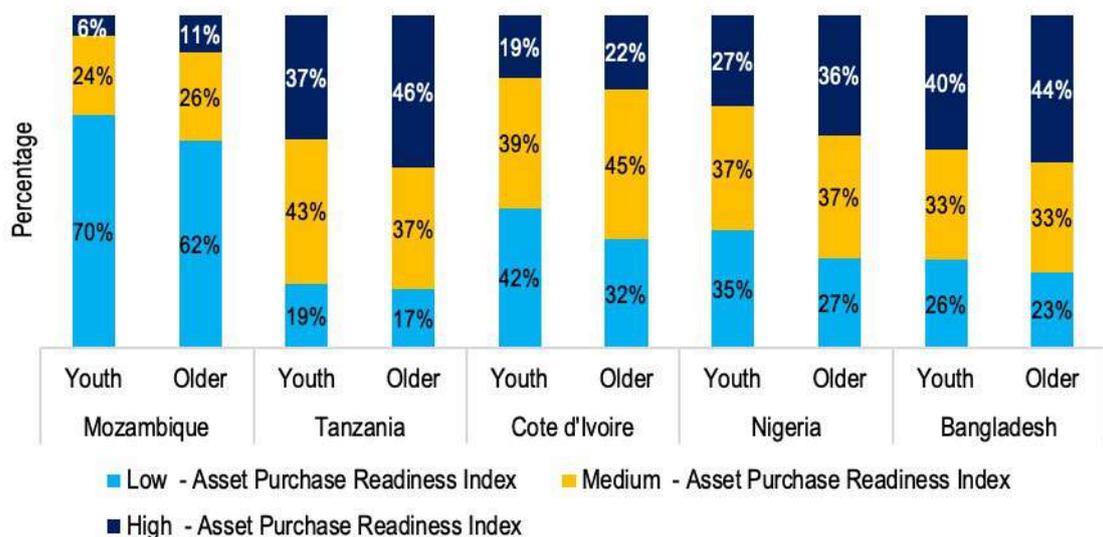
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Across all countries, older members of smallholder households, show high Asset Purchase Readiness compared to the youth.

In Tanzania, 5 out of 10 older members of smallholder households, show high readiness towards asset purchase. In Bangladesh, 4 out

of 10 respondents irrespective of age show high readiness towards asset purchase. Some of the key variables that drive this trend are the relatively higher score of the older members compared to youth with regard to investment, financial behavior and income generation.

FIGURE 106: PERCENTAGE OF ASSET PURCHASE READINESS INDEX RESPONDENTS DISAGGREGATED BY AGE GROUP



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

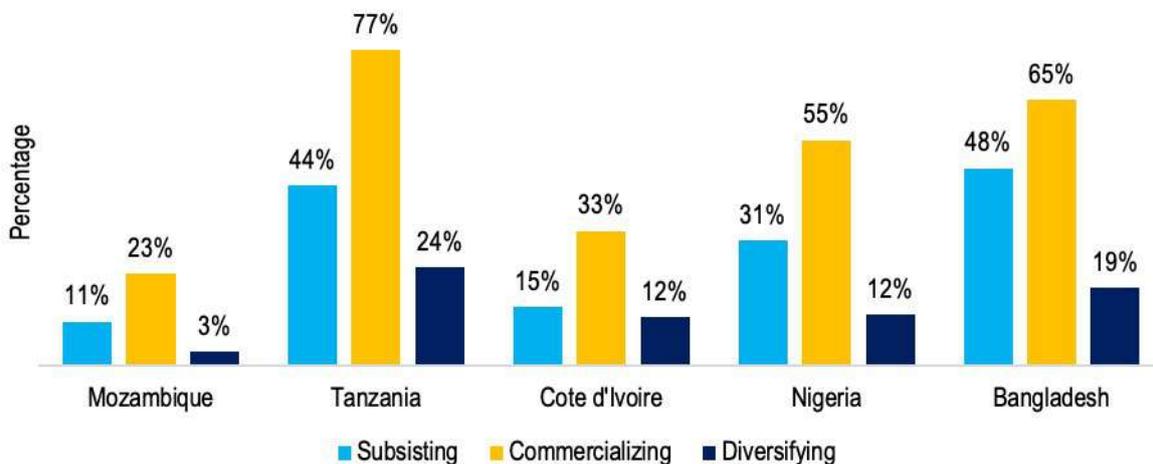
Across all countries, Commercializing smallholder households show high readiness towards asset purchase. We also looked at how segmentation of the smallholder household members on the basis of their livelihood profile corresponds with the APRI index. Figure 107

shows the respondents who have high readiness to purchase assets disaggregated by segments. Members of smallholder households who belong to the Commercializing segment account for most members in each of the countries who show high Asset Purchase Readiness. In

Tanzania, 77% of members of Commercializing smallholder households show high readiness to purchase assets – highest across all countries. The least number of respondents who show high

readiness is observed in case of Diversifying members of smallholder households in Mozambique.

FIGURE 107: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS WITH HIGH ASSET PURCHASE READINESS INDEX DISAGGREGATED BY SEGMENT

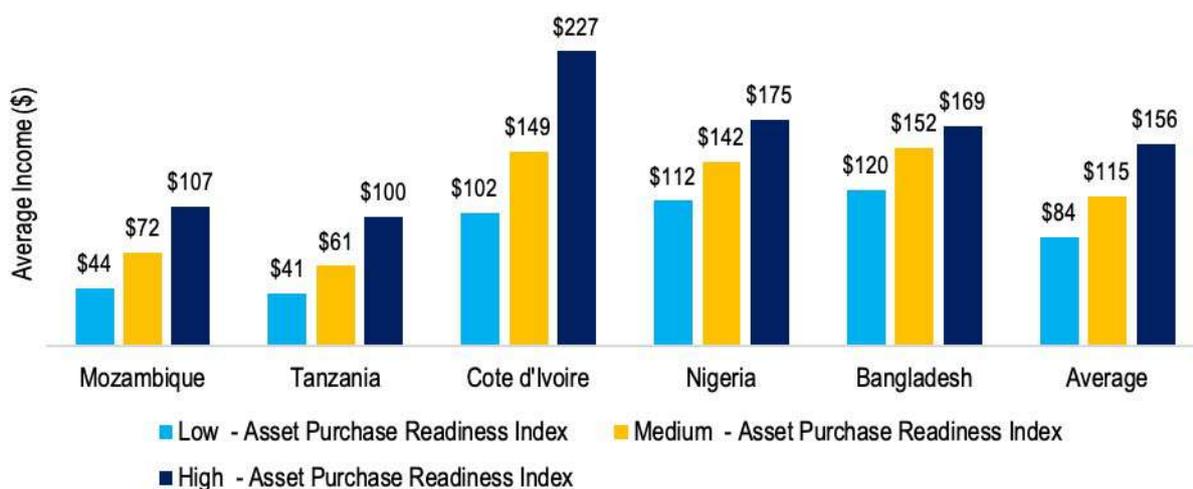


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Across all countries, high readiness members earn high income compared to low and medium readiness members. We also looked at the income profile of members across different readiness index profiles to understand the variation between income and the respondent's readiness to purchase assets. As expected, in all countries, the respondents who show high readiness towards asset purchase also report

highest average monthly incomes. Respondents who show lowest readiness to purchase assets belong to lowest average monthly income categories. For instance, in Tanzania, on an average, respondents with high readiness to purchase assets report a monthly income of \$100, while respondents with low readiness report a monthly income of \$41.

FIGURE 108: SMALLHOLDER HOUSEHOLDS AVERAGE MONTHLY INCOME BY ASSET PURCHASE READINESS INDEX

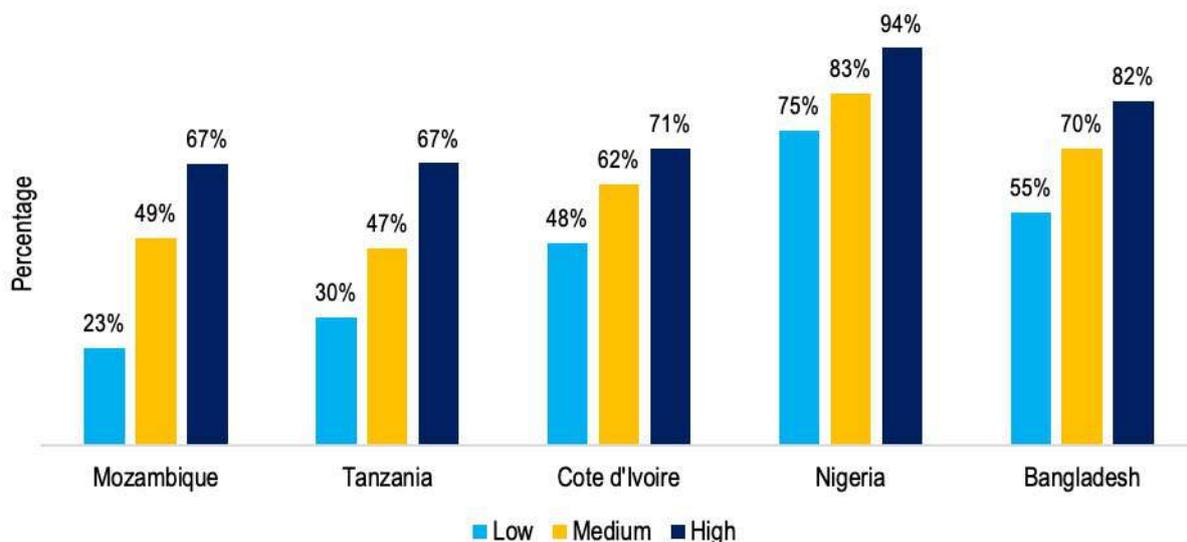


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Most of the high readiness members consider their farm to be a business compared to medium and low asset readiness members. In Nigeria for

instance, over 94% of the members showing high Asset Purchase Readiness consider their farm to be business.

FIGURE 109: PERCENTAGE OF SMALLHOLDER HOUSEHOLD RESPONDENTS WHO CONSIDER THEIR FARM TO BE A BUSINESS - DISAGGREGATED BY ASSET PURCHASE READINESS INDEX



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

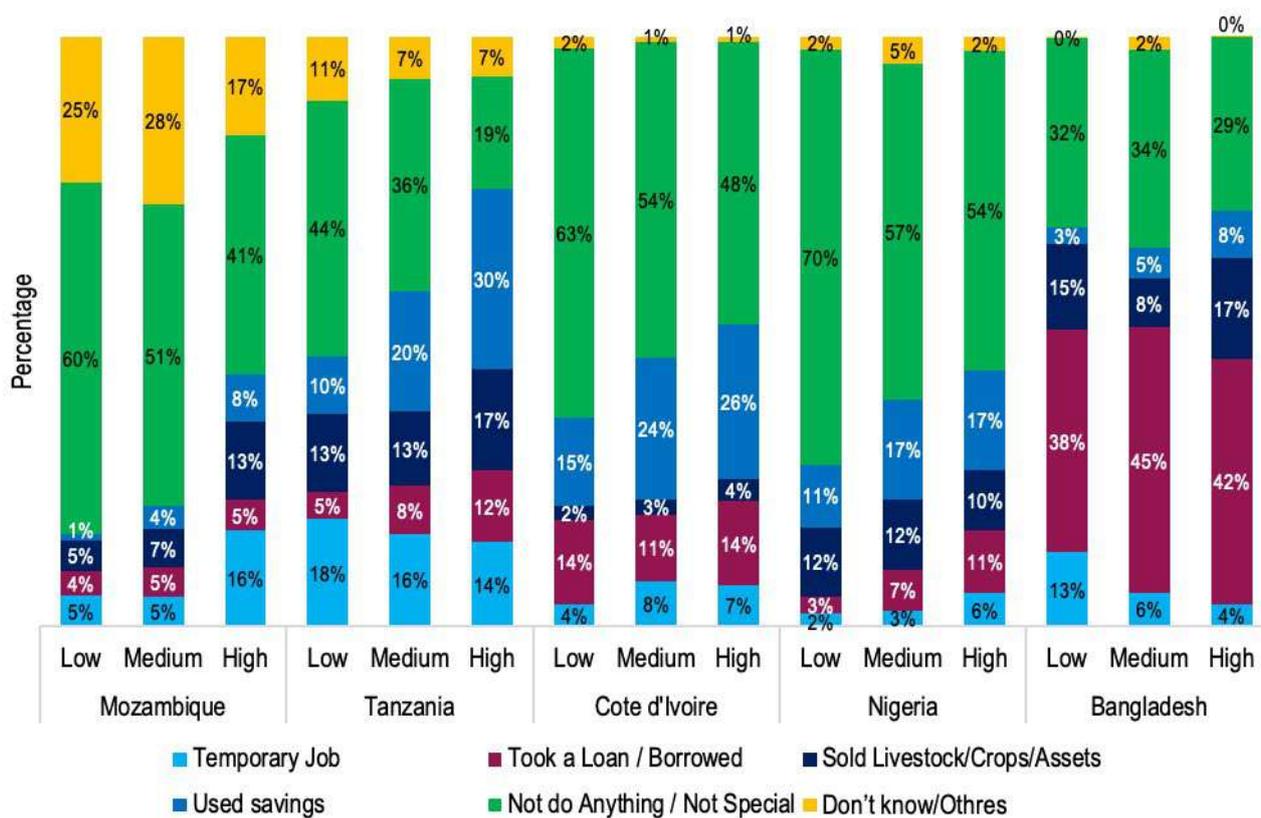
Respondents have also reported various challenges they face in their agricultural activities. In all countries for instance, most respondents irrespective of the scores on the Asset Purchase Readiness Index, believe weather and pests to be the most significant factor affecting agricultural activities. In Mozambique, Nigeria, and Côte d'Ivoire most respondents however reported that they did not do anything to cope with the weather-related challenges they faced. 30% of the Tanzania smallholder household members who show high readiness to purchase assets indicated that they used their savings, while 18% of the smallholder household members who show low readiness to purchase assets indicated that they do temporary job in order to cope with weather-related challenges.

In Bangladesh, most respondents across all readiness categories report that they took a loan or borrowed to cope with weather-related events that affect their agricultural activities. A significant percentage of smallholder household members (17% who show high readiness, 8% who show medium readiness, and 15% who show low readiness to purchase assets) also report that they sold livestock or crops or assets to cope with these challenges.



Photo: Ayesha Vellani / CGAP

FIGURE 110: SMALLHOLDER HOUSEHOLD RESPONDENTS' COPING STRATEGY FOR WEATHER-RELATED EVENT - DISAGGREGATED BY ASSET PURCHASE READINESS INDEX



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

We also looked at how Asset Purchase Readiness varies according to the respondents' access to finance. As expected, members belonging to the high readiness category correspond most to financially included members while financial exclusion is observed in case of respondents showing low Asset Purchase Readiness. In Tanzania, nearly 70% of members showing high readiness to purchase assets are financially included. In Bangladesh, nearly 60% of members showing high readiness to purchase assets are financially included. So, it will be easier for FSPs to target the high readiness smallholder household members to sell the assets through formal channels.



Photo: Ayesha Vellani / CGAP

TABLE 49: FINANCIAL INCLUSION BY COUNTRY AND ASSET PURCHASE READINESS INDEX⁸⁰

COUNTRY	Asset Readiness Index	Banked	Mobile Money	Other Formal	Informal	Excluded
Mozambique	Low	5%	0%	1%	12%	82%
	Medium	15%	0%	5%	12%	68%
	High	27%	1%	7%	21%	45%
Tanzania	Low	3%	24%	1%	8%	63%
	Medium	6%	38%	2%	5%	49%
	High	16%	48%	3%	6%	28%
Côte d'Ivoire	Low	1%	11%	0%	13%	73%
	Medium	5%	25%	1%	14%	55%
	High	13%	36%	2%	7%	44%
Nigeria	Low	7%	0%	1%	19%	73%
	Medium	24%	0%	3%	18%	55%
	High	32%	0%	3%	21%	44%
Bangladesh	Low	13%	7%	20%	1%	58%
	Medium	20%	12%	21%	1%	46%
	High	28%	11%	18%	3%	40%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The number of members from smallholder households within the high, medium and low index groups can be estimated and disaggregated by country. We use Bangladesh as a case study to illustrate opportunities for service providers. As can be seen in **Table 50**, in Bangladesh, smallholder households have roughly 93

million members above 15 years of age. Out of 93 million, 40 million are in high readiness group. These 40 million form the potential target segment for FSPs, government and the donor agencies to offer financial services related to asset ownership.

TABLE 50: NUMBER OF SMALLHOLDER HOUSEHOLD MEMBERS BY ASSET READINESS INDEX AND COUNTRY

COUNTRY	Estimated Smallholder household members - above 15 years	Percentage			Estimated Population (millions)		
		Low-Asset Purchase Readiness Index	Medium-Asset Purchase Readiness Index	High-Asset Purchase Readiness Index	Low-Asset Purchase Readiness Index	Medium-Asset Purchase Readiness Index	High-Asset Purchase Readiness Index
Mozambique	12.6	65%	25%	9%	8.2	3.2	1.2
Tanzania	25.2	18%	39%	43%	4.5	9.8	10.9
Côte d'Ivoire	7.5	35%	44%	21%	2.6	3.3	1.6
Nigeria	66.0	30%	37%	33%	20.0	24.4	21.6
Bangladesh	93.0	24%	33%	43%	22.1	30.8	40.1

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

80 Banked: Respondents who have Bank accounts; Mobile Money: Respondents who are using mobile money but do not have bank accounts; Other Formal: Respondents who use like MFIs, SACCO, Co-operative, Post office, etc.; Informal Finance: Respondents who uses informal financial service such as money lenders and Excluded: Respondents excludes from all form of financial services.

In Rangpur and Dhaka regions, smallholder households show high readiness towards purchasing assets. Looking more closely at Bangladesh in **Table 51**, more number of respondents from Rangpur show high readiness towards asset purchase (11.3 million smallholder

household members), followed by Dhaka (8.8 million smallholder household members). Stakeholders such as FSPs can focus on Rangpur and Dhaka regions to develop asset backed financial products as these two regions show high readiness towards asset purchase.

TABLE 51: NUMBER OF SMALLHOLDER HOUSEHOLD MEMBERS BY ASSET PURCHASE READINESS INDEX AND REGIONS IN BANGLADESH

REGIONS	Estimated Smallholder household members - above 15 years	PERCENTAGE			ESTIMATED POPULATION (MILLIONS)		
		Low - Asset Purchase Readiness Index	Medium - Asset Purchase Readiness Index	High - Asset Purchase Readiness Index	Low - Asset Purchase Readiness Index	Medium - Asset Purchase Readiness Index	High - Asset Purchase Readiness Index
BARISAL	3.5	36%	45%	19%	1.3	1.6	0.7
CHITTAGONG	16.5	40%	31%	29%	6.6	5.2	4.8
DHAKA	19.3	20%	34%	46%	3.9	6.5	8.8
KHULNA	13.4	18%	30%	52%	2.4	4.0	7.0
RAJSHAHI	11.9	17%	24%	59%	2.1	2.8	7.0
RANGPUR	26.2	21%	36%	43%	5.5	9.4	11.3
SYLHET	2.3	21%	55%	25%	0.5	1.3	0.6

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.



Photo: Ayesha Vellani / World Bank

06

Smallholder Subgroups and Financial Services

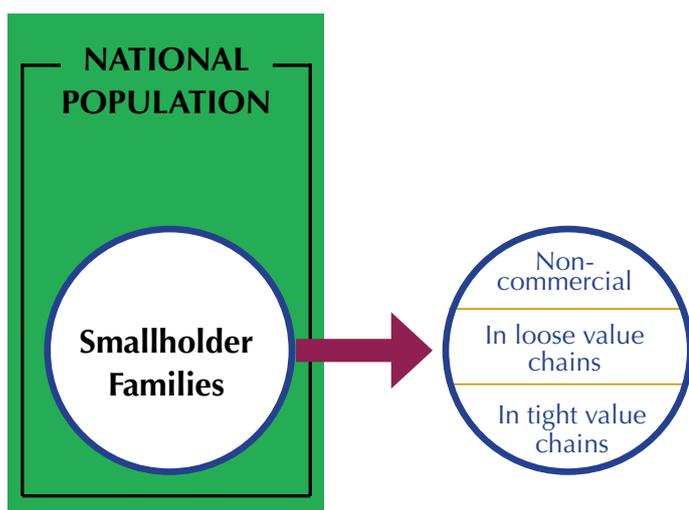
SECTION 06 :: SMALLHOLDER SUBGROUPS AND FINANCIAL SERVICES

6.1 Understanding smallholder farmers and their various subgroups

RESEARCH QUESTION 3.1

Who is a smallholder farmer? What are the key criteria in defining smallholder families as a market?

Understanding what it means to be a smallholder farmer is a critical first step in developing an effective segmentation framework for financial service providers. In the low-income countries where this research is focused, there are a lot of low-income groups, many of whom derive at least some of their income from agriculture. Therefore, we need to answer – what are the characteristics of smallholder farmers that set them apart from the population as a whole? Only then can we begin to understand the salient variables that define different sub-groups of smallholder households.

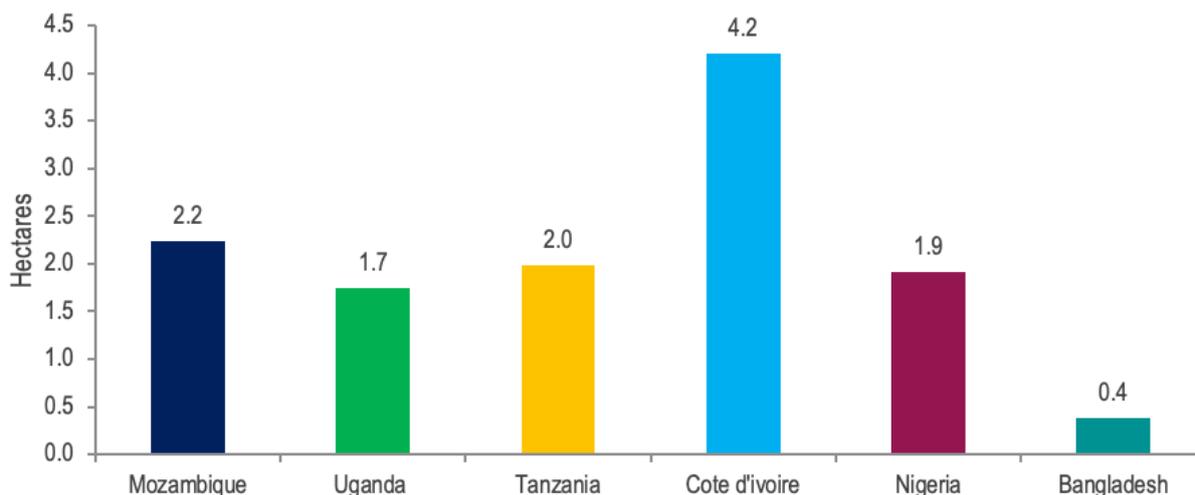


For the purposes of this question, we focus on the aspects of smallholder lives that are identifiable from the data available to us. This means that the emphasis is on financial access and behaviors, and on the demographic and socio-economic indicators also picked up by the national surveys. However, it should be noted that this approach is not fully inclusive in that it does not include a number of other indicators outside of the remit of the national surveys that could be key in defining what is a smallholder household, such as aptitude, endowments, historical factors and local and regional poverty dynamics.

The indicator most commonly used to define a smallholder is literally the “smallness” or size of their holding – typically in most sub-Saharan African countries a plot of below 2 hectare would be considered a smallholding, from which it would be difficult to produce a sufficient amount of produce to move far beyond a subsistence livelihood.⁸¹ In South Asian countries, with higher population densities and often more pressure on land, plots tend to be smaller. The definition of a smallholder varies by country but from our data, the average land holding of a smallholder household in Mozambique, Tanzania, Uganda and Nigeria is between 1.7 and 2.2 hectares, while in Côte d’Ivoire it is significantly higher (4.2 hectares) and much lower in Bangladesh (0.4 hectares).

⁸¹ See, for example, FAO’s “A data portrait of smallholder farmers”: <http://www.fao.org/family-farming/detail/en/c/385074/>

FIGURE 111: AVERAGE LAND HOLDING OF SMALLHOLDER HOUSEHOLDS FROM NATIONAL SURVEYS



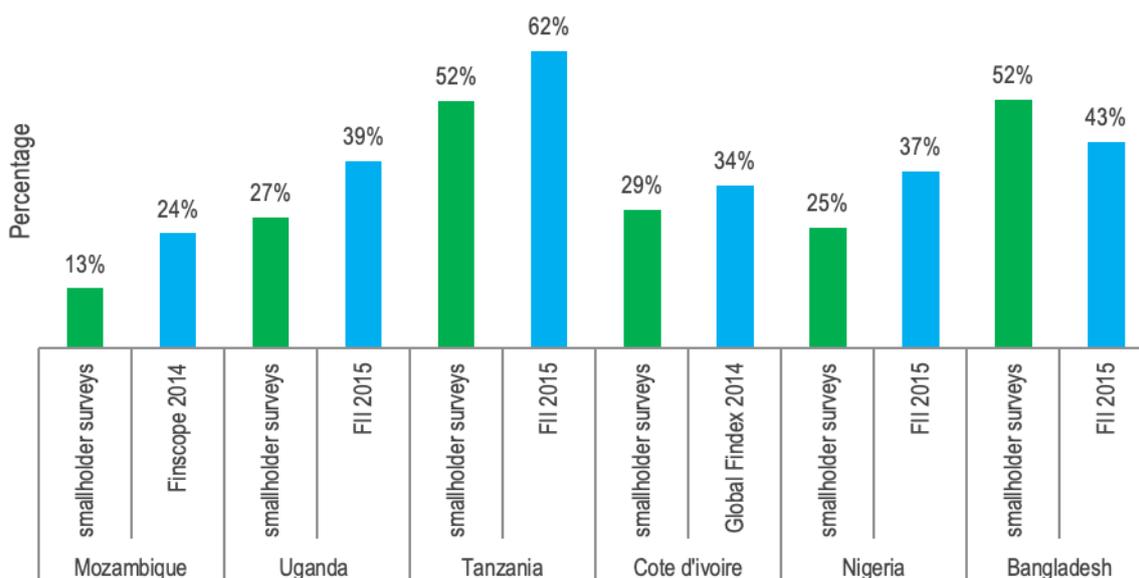
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Beyond a simple definition like this, we wanted to study how financial behaviors could differentiate a smallholder from the rest of their national population. In order to address this we use the smallholder national surveys, which provide a representative sample of smallholder households across the country, and compare the data on these households with equivalent (or near-equivalent) data sets for the national population as a whole (most recent data from Financial Inclusion Insights (FII) for Uganda, Tanzania, Nigeria and Bangladesh, Finscope

for Mozambique and Global Findex for Côte d'Ivoire). We are trying to see what the data says about what sets smallholder families apart from the national populations.

In most cases, the national surveys point to a lower level of financial inclusion among smallholders than national populations as a whole. In all countries except for Bangladesh, it appears that higher levels of financial exclusion is an important characteristic of smallholder households.

FIGURE 112: FORMALLY FINANCIALLY INCLUDED POPULATION - SMALLHOLDER SURVEYS VS NATIONAL POPULATION

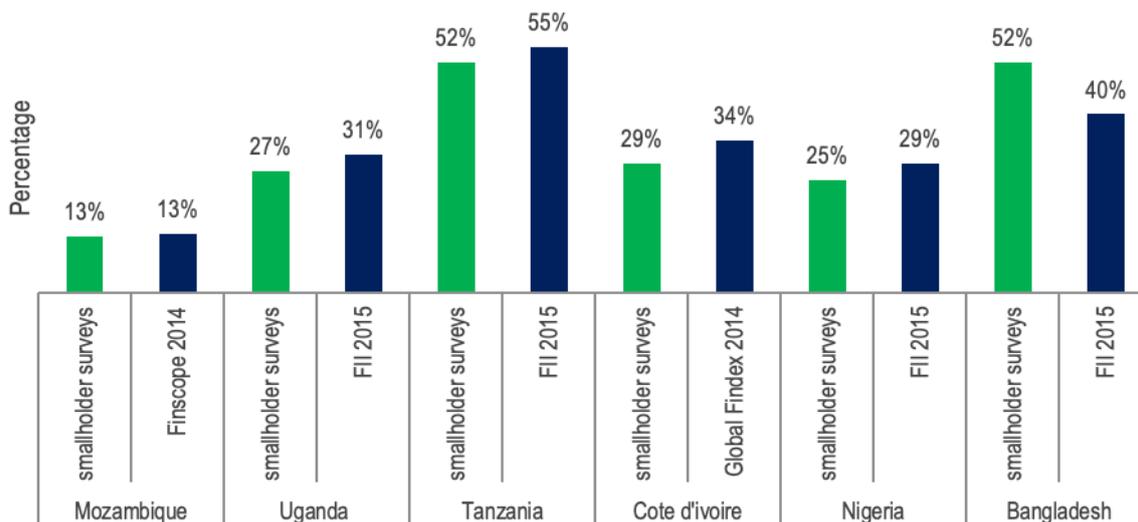


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Perhaps the most important characteristic that defines smallholders may, not surprisingly, be their rural location. For each of the alternative data sources used above, we disaggregated the

financial inclusion data by urban/rural location and compared rural financial inclusion to that from the smallholder surveys.

FIGURE 113: FORMALLY FINANCIALLY INCLUDED POPULATION - SMALLHOLDER SURVEYS VS RURAL POPULATION



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Even allowing for the fact that some of the smallholders interviewed in the national surveys were peri-urban or even urban, the fractions here for Mozambique are remarkably similar, and the gaps in Uganda, Tanzania, Côte d'Ivoire and Nigeria are also very small. The implication from this is that – from a financial inclusion perspective at least – smallholder farmers display characteristics similar to the rural population as a whole.

The implication for this for FSPs is relatively simple – if they're looking for unbanked populations and where smallholder farmers may be, a good bet (in the African countries featured at least) is to simply look in rural areas. This is a jumping off point for segmentation work, as covered in 3.2 – 3.6. However, it is not the case that all smallholders are rural. Urban and peri-urban smallholder families exist in each of these countries and these can be reached at lower cost and with greater ease than those in more rural areas. These more urban households can represent low hanging fruit for FSPs and provide a good opportunity to test products before moving more rural.



RESEARCH QUESTION 3.2

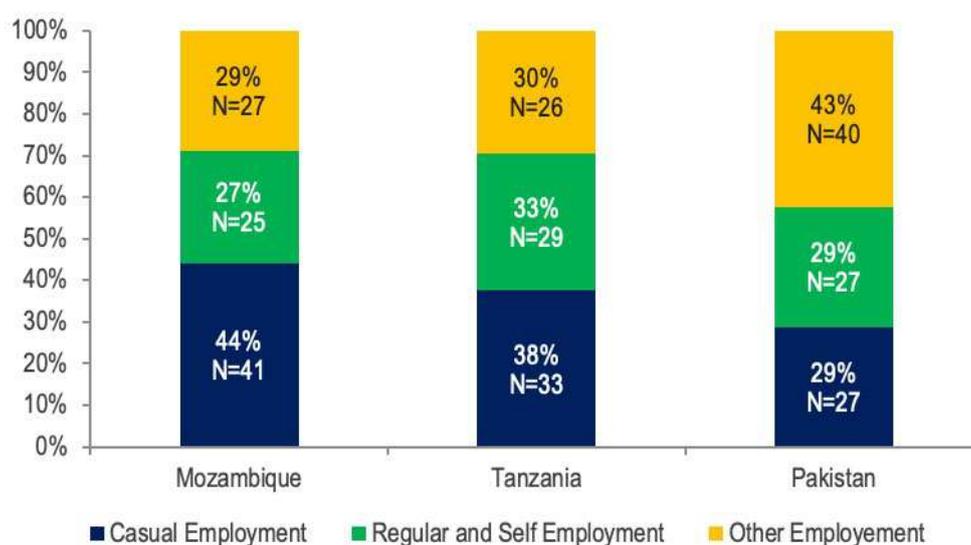
What different segments of smallholder households can be defined according to their household characteristics and source of income mix?

Segmentation by source of income provides a valuable lens through which to differentiate between different groups of smallholder households. To understand what other sources of income are contributing to households in Mozambique, Pakistan and Tanzania aside from agricultural income, the income sources have been segmented from the Financial Diaries with Smallholder Families from June 2014 to July 2015, according to the following 3 key categories, whereby if the household has its highest income from casual employment (putting ag income aside), then they are placed in the casual employment segment:

- Casual employment
- Regular and Self-employment
- Other employment/income: Rental Income, Pass Through Income, Other Income Generating Activity – Income,⁸² Non-Employment Income, Broker Income, Resources Received from Outside.

Figure 114 provides an overview of the segmentation of income sources from the 3 categories mentioned above for households in Mozambique, Pakistan and Tanzania. So, in Mozambique, on average 45% of households earn their highest income through casual employment, 26% from regular and self-employment, and 29% from other employment. Similarly, in Tanzania, 40% also receive their highest income through casual employment. However, in Pakistan there is a larger proportion of households earning their highest income from other employment compared to those casual or regular and self-employment. This could suggest that smallholder households in Pakistan have more available opportunities and assets outside of agriculture for higher income generation and growth.

FIGURE 114: PERCENTAGE OF HOUSEHOLDS REPORTING HIGHEST INCOME FROM EACH INCOME SOURCE



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

⁸² Income earned from other income-generating activities includes compensation for participating in surveys, lottery winnings, gambling winnings, etc. The research firms provided small cash gifts at surprise times throughout the study to thank respondents for their participation. These gifts were tracked as income and recorded as an income source under “other income”.

Another way to analyze this data in more depth is to look at the combinations of income per household and the value of income respectively as per the Table 52.

TABLE 52⁸³ AVERAGE HOUSEHOLD INCOME VALUE ACCORDING TO DIFFERENT COMBINATIONS OF INCOME SOURCES

Combinations of income sources	Mozambique			Pakistan			Tanzania		
	# of HH	Value of income (USD)	Av income per HH (USD)	# of HH	Value of income (USD)	Av income per HH (USD)	# of HH	Value of income (USD)	Av income per HH (USD)
All HH - (no filters applied)	93	28,137	303	94	148,233	1,577	88	42,484	483
# HH earning only from self-employment	-	-		-	-		-	-	
# HH earning only from casual employment	-	-		-	-		-	-	
#HH earning only from other employment	3	314	105	10	6,354	635	8	(1,044)	(130)
# HH earning income from all three segments	49	14,591	298	27	51,209	1,897	53	22,863	431
Income from self and casual employment	49	8,712	178	27	19,697	730	53	11,809	223
Income from self and other employment	63	11,067	176	38	27,238	717	69	9,017	131
Income from casual and other employment	76	13,759	181	73	47,134	646	64	11,603	181
Total amount of income in self-employment	63	6,023	96	38	15,100	397	69	6,910	100
Total amount of income in casual employment	76	8,913	117	73	22,865	313	64	9,253	145
Total amount of income in other employment	93	6,708	72	94	33,453	356	88	2,065	23

SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

⁸³ An example on how to read Table 52: 3 households in Mozambique only earned income from other kinds of employment; the average income per household was USD105.

From Table 52, all households across all 3 countries will earn some income from other employment however, the average income from other employment in Mozambique and Tanzania is the lowest with only 3 and 8 households respectively engaged only in this form of income. This would suggest that income generation from other employment is more of a top-up to other activities.

Also, across all 3 countries, households engaged in a combination of all 3 forms of employment tend to gain the highest average income. However, most households are engaged in a combination of casual and other employment,

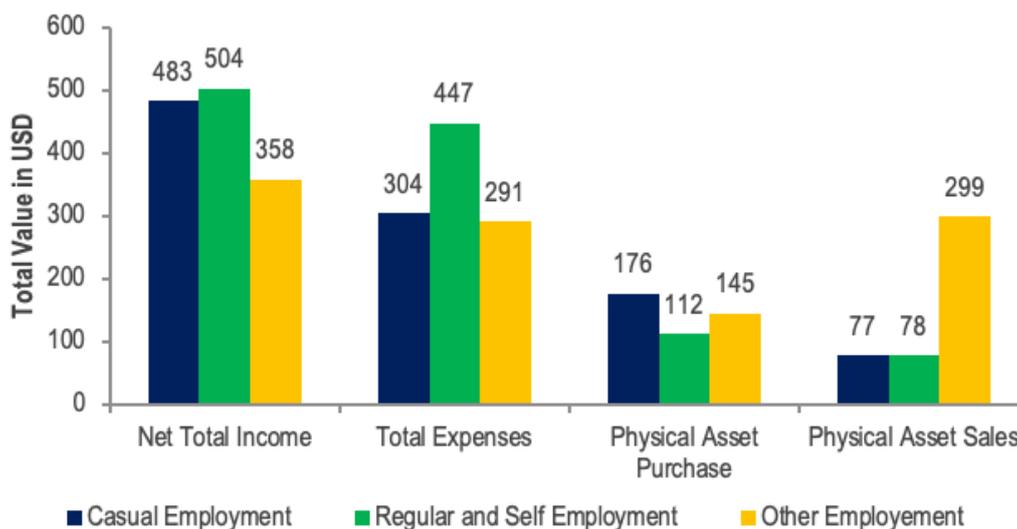
except in Tanzania, where slightly more households are engaged in a combination of self and other employment.

In terms of average income gained from each category of employment, it would appear that in Mozambique and Tanzania, the highest average income is in casual employment. In Pakistan, self-employment brings highest average income.

Taking this segmentation forward, we look into more detail of household financial behavior in each of the three countries according to these employment categories, where net income includes agricultural income.

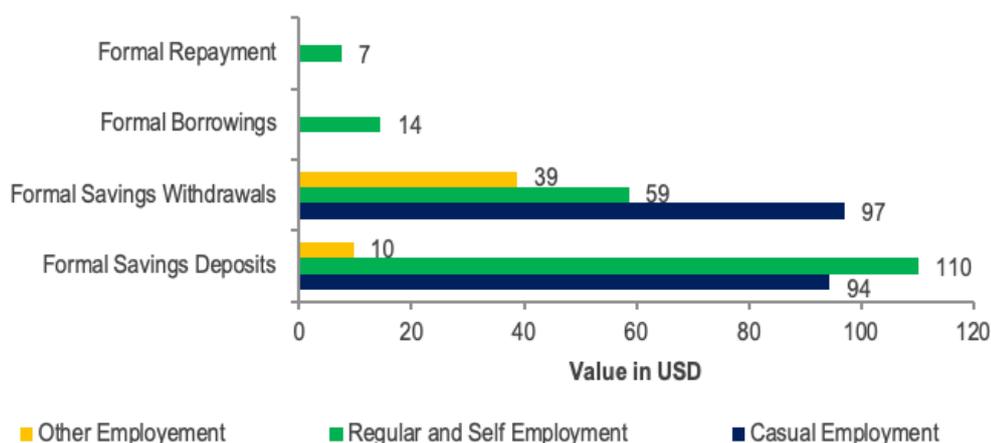
Tanzania

FIGURE 115: TANZANIA - AVERAGE VALUE OF NET INCOME, EXPENSE, ASSET PURCHASE AND SALES BY INCOME SOURCE SEGMENTATION



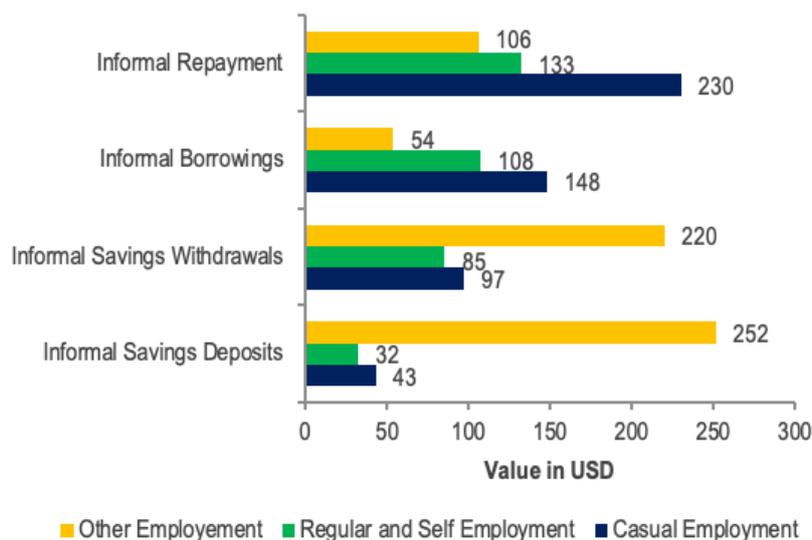
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE 116: TANZANIA - AVERAGE FORMAL FINANCIAL TRANSACTION VALUES BY HOUSEHOLD TYPE



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE 117: TANZANIA - AVERAGE INFORMAL FINANCIAL TRANSACTION VALUES BY HOUSEHOLD TYPE



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Casual Employment Households. As per Figure 115, casual employment households tend to purchase a higher value of assets than those in other segments (unfortunately data is unavailable on quantity of assets purchased so we are unable to determine the average value of assets). These households do not seem to access formal loans (Figure 116) but do borrow more than other households from informal sources (Figure 117) and have a high average value of repayments. This could suggest a lack of access to formal loans and a potential opportunity for FSPs to explore. With regards to savings, these households save a significant amount of formal savings, approximately twice as much as their informal savings which suggests good access and ability to use formal services.

Regular and self-employment households. These households earn a higher income on average than other households but also spend the most. This is also the only segment that makes formal borrowing and repayment transactions, however, still rely more on informal borrowing. They also save the most formally, withdrawing only around half the value of their savings deposited, using use informal savings for smaller values. For an FSP this segment could offer a good opportunity to provide formal loans to.

Other Employment Households. These households have the lowest average value of net income and expenditure. However, the value of physical asset sales is considerably higher than the value of assets purchased (about double). This could indicate an additional stream of income. These households also generate the highest value of informal savings across all segments despite earning the lowest average income. But are also withdrawing around 87% of savings – perhaps to fund the asset purchases. This segment also demonstrates a cautious approach to informal loans, borrowing the lowest average value of the 3 segments and approximately the same value of loans as they have in savings. Repayment values are also very high which could suggest they are paying high interest rates on these loans. More research would be needed to explore this, along with their needs and interest in using loans which could inform product development by FSPs.

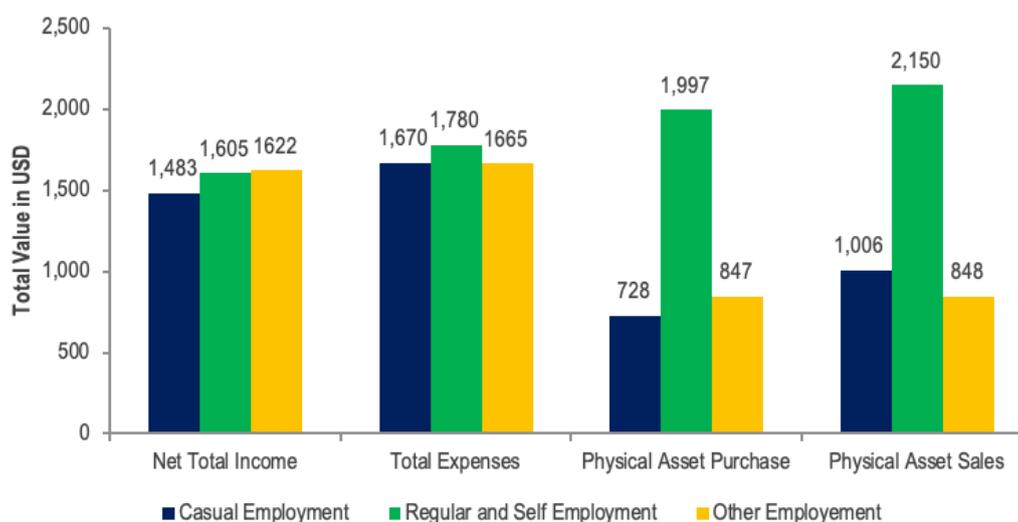
Pakistan

Overall, there does not appear to be much variation of average values of income and expenditure across the segments. It appears that all segments are, on average making a net loss as total expenses exceed total income (Figure 118). This alongside the number of loan accounts open and the value of transactions in borrowing,

would on first impressions, suggest that these households are indebted.

All households access formal loans but the average value of formal loans is still less than informal loans. Not all households access formal savings. Those that do are not saving even a third of what they save informally.

FIGURE 118: PAKISTAN - AVERAGE VALUE OF NET INCOME, EXPENSE, ASSET PURCHASE AND SALES



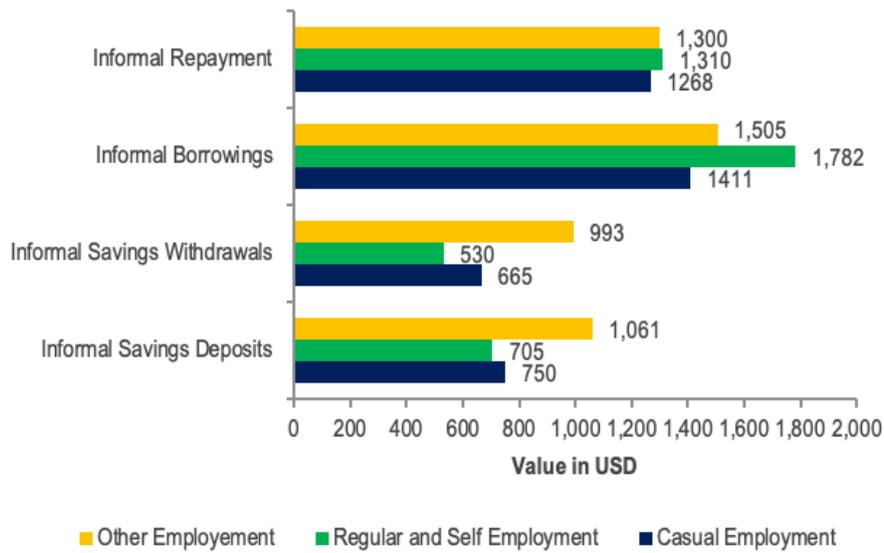
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Casual Employment Households. Casual employment households are the only segment without formal savings (Figure 120) however do borrow from formal and informal sources. Their informal borrowing is more than three times the value of formal borrowing (Figures 119 and 120). This could suggest a potential under-tapped market to an FSP for both formal loans and savings tools. They also tend to sell assets at a higher value than those purchased, suggesting an area of income generation.

Regular and self-employment households. These households stand out in terms of the value of assets purchased and sold as the highest among all segments. It might be that these households are taking higher value loans to purchase these assets. In terms of savings, these households do use formal savings but tend to save more informally. The average values of assets purchased and sold seem to be similar (Figure 118), indicating that is little value added to these assets.

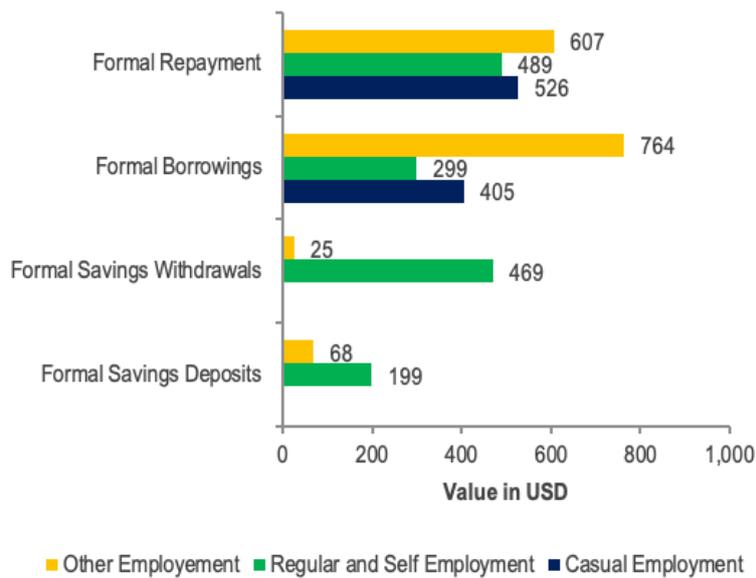
Other Employment Households. In Pakistan, other employment households have the highest average net income and the lowest spend (marginally). These households are engaged in both informal and informal borrowing but borrow twice as much on average from informal sources. In terms of savings, these households are also saving in informal and formal sources, though significantly higher informally. This segment could present an opportunity for FSPs to grow their savings and loan portfolios.

FIGURE 119: PAKISTAN - AVERAGE INFORMAL FINANCIAL TRANSACTION VALUES BY HOUSEHOLD TYPE



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE 120: PAKISTAN - AVERAGE FORMAL FINANCIAL TRANSACTION VALUES BY HOUSEHOLD TYPE



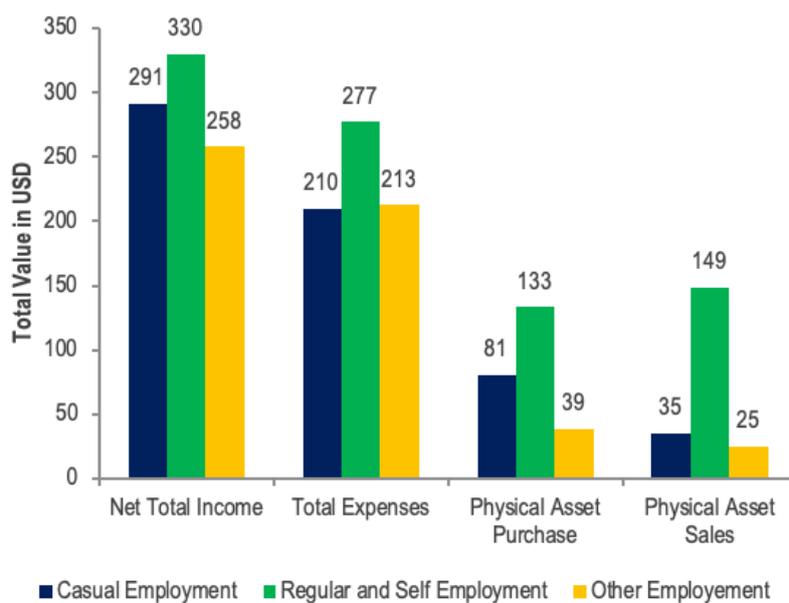
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Mozambique

In Mozambique, only 2 households were using formal products, therefore we would assume that there is a gap in terms of access to formal financial services which FSPs should explore. Informal borrowing among all segments is low (Figure 122). All households tend to borrow

less than their informal savings deposited and withdraw a high value of savings. This could suggest that they are using savings to compensate for a lack of access to loan products. FSPs could explore this further to inform loan product design for this households.

FIGURE 121: MOZAMBIQUE - AVERAGE VALUE OF NET INCOME, EXPENSE, ASSET PURCHASE AND SALES



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Casual Employment Households. The households engaged in casual employment seems to demonstrate very cautious financial management as they demonstrate an ability to save, take smaller loans on average (compared to other households) and purchase more physical assets than sold (Figure 121), perhaps indicating assets that are retained and could be used as collateral for loans. These households would therefore be good clients to target for both savings and loan products.

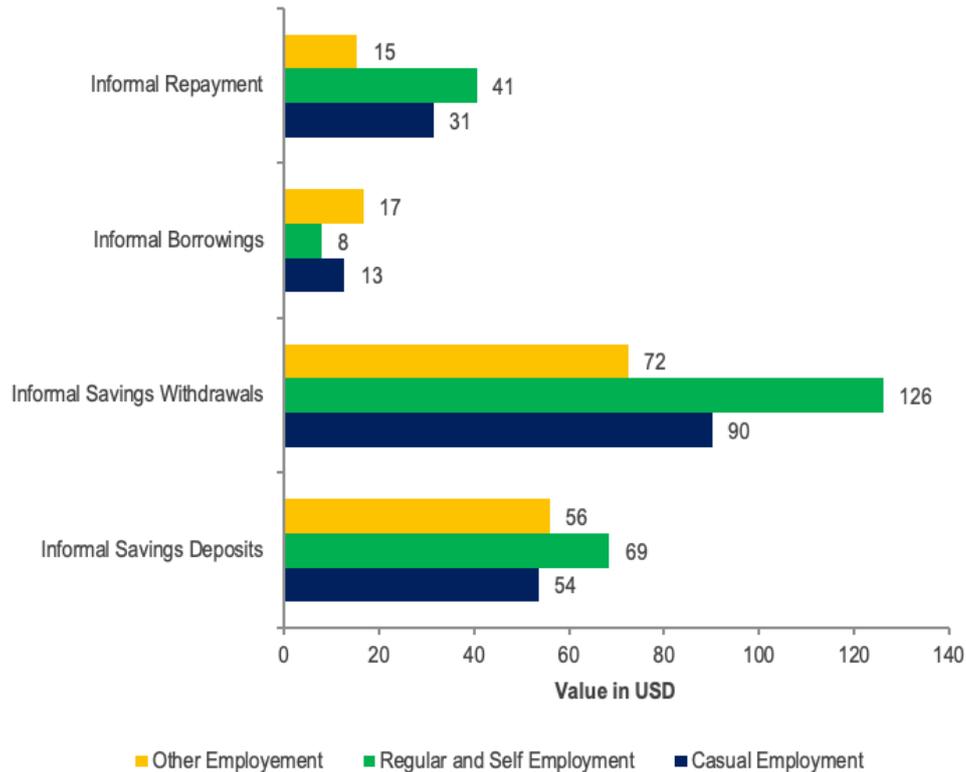
Regular and self-employment households. This segment stands out for having highest average net incomes and expenditures compared to other households. They also purchase and sell the highest value of assets. The low value of borrowing and high value of repayments, could be as a result of loans being accessed are charging a high rate of interest though this would require further investigation. Given the

high value of savings being withdrawn suggests that savings may be being used to plug the gap of loans and repayments.

Other employment households. This segment has the lowest level of income and value of sales purchased and sold. Despite earning the lowest average income against other households, other employment households are able to save a similar amount as others and withdraw significantly less. They are also the highest value borrowers which suggests a demand for loans.

We have explored further in detail using the national surveys of smallholder households with respect to segmentation which is presented in the next section.

FIGURE 122: MOZAMBIQUE - AVERAGE INFORMAL FINANCIAL TRANSACTION VALUES BY HOUSEHOLD TYPE



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

RESEARCH QUESTION 3.3

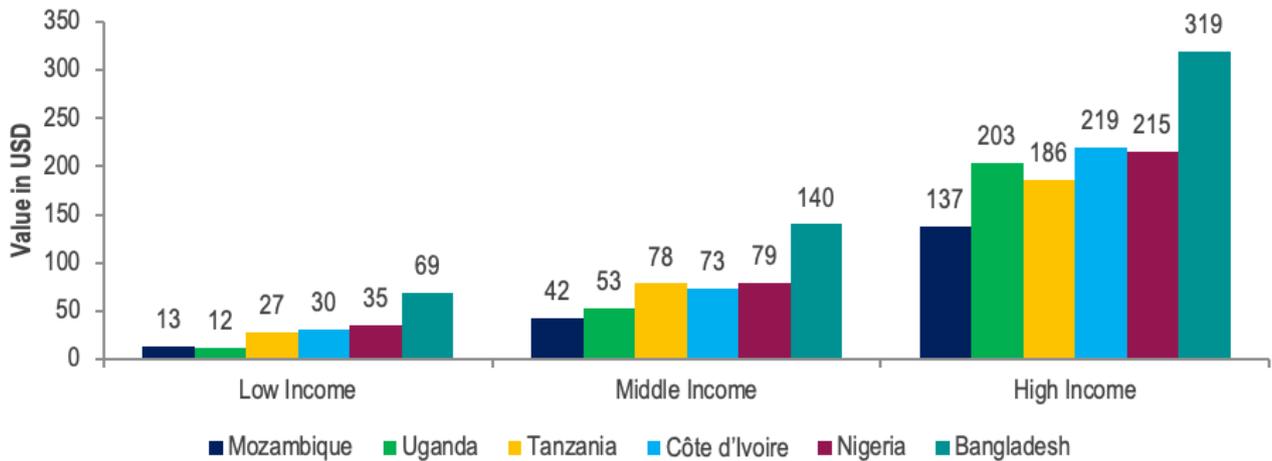
Are there differences in how various subgroups of smallholder households – by gender, different income levels, or education – spend their income (aggregately or proportionally)?

To answer this research question, both national survey data and smallholder diaries data are compared. Please note, however, that segmentation by gender and education and subsequent analysis of spending behavior is already presented in research questions 1.1, 1.4, 1.6 and 2.3. This research question therefore

focuses on segmenting smallholder farmers by different income levels to analyze spending behavior.

To do so, first the income distribution of smallholder households for each country dataset was reviewed. Then three income brackets of similar size were determined for each country sample and defined as either low income, middle income and high income. This was done using both the national survey data as well as smallholder diaries data. Starting with national survey data, Figure 123 shows the average monthly income in USD for households categorized in low-, middle- and high-income groups.

FIGURE 123: AVERAGE MONTHLY INCOME OF HOUSEHOLDS THAT FALL INTO LOW-, MIDDLE- OR HIGH-INCOME CATEGORIES ACROSS COUNTRIES (NATIONAL SURVEYS DATA)



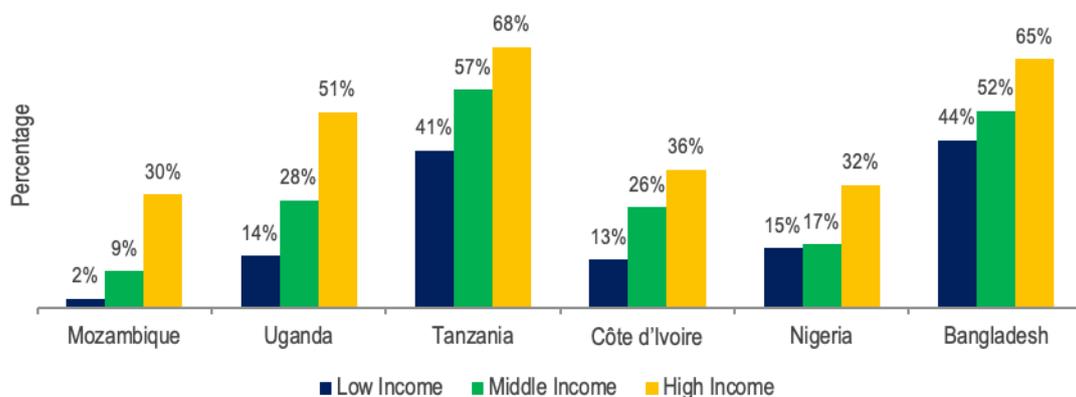
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Figure 123 provides a useful snapshot of the income distributions for each country. Large income disparities are apparent with the low-income groups earning on average only roughly 14% of the high-income groups. This points towards different living standards that go with different educational levels (see research question 1.1 and 1.6) and different livelihood strategies (see research question 3.2).

Furthermore, higher income groups show a clear trend of higher formal financial inclusion across all countries for which smallholder surveys are available. Figure 124 shows for each income category the percentage of smallholder families that use formal financial services while Figure 125 below shows the equivalent percentage of

smallholder families that have a mobile money account. While different degrees of market penetration across countries can be observed, a common theme is that for each country the high-income group has more households that are using formal financial services. A linear relationship between income levels and formal financial inclusion can be observed for all countries. The same trend holds for mobile money. Note however that mobile money is part of the definition of formal financial inclusion. We can therefore see that in Tanzania most of the financial inclusion in Figure 124 for high income groups (68%) is made-up of mobile money usage as shown for high income groups in Figure 125 (65%).

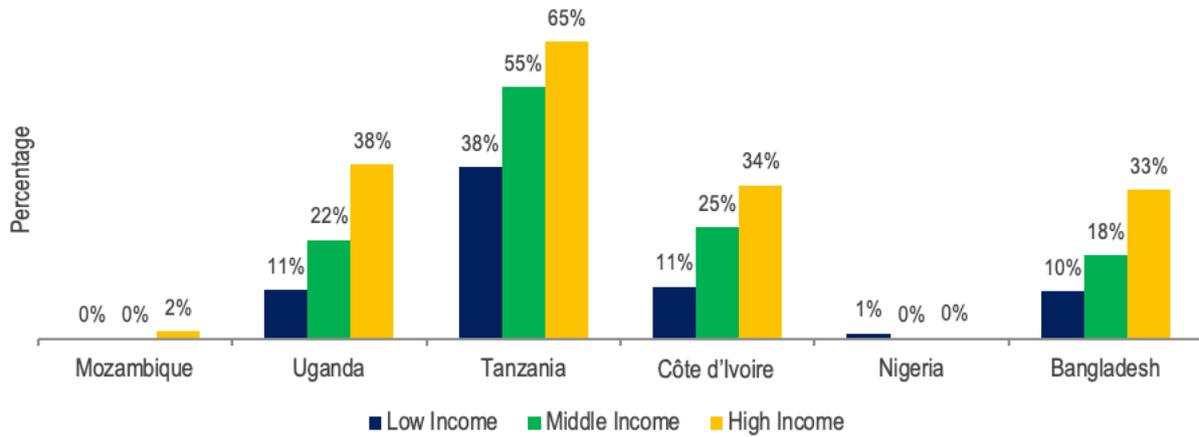
FIGURE 124: PERCENTAGE OF SMALLHOLDER HOUSEHOLDS THAT USE FORMAL FINANCIAL SERVICES⁸⁴ BY INCOME GROUPS (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

⁸⁴ Formal financial services are defined as outlined in the methodology section of this paper.

FIGURE 125: PERCENTAGE OF SMALLHOLDER HOUSEHOLDS THAT HAVE A MOBILE MONEY ACCOUNT BY INCOME GROUPS (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Furthermore, as shown in Annex 3 Figure A3.29 and as has been discussed in research question 1.1, households with higher incomes are more likely to live in urban areas. Here evidence of a market gap is shaping up, implying the need to focus financial inclusion efforts more on rural areas as well as to design products that are attractive and useful for households with lower income levels as these segments of smallholder farmers show the lowest levels of financial inclusion. Research questions 1.3, 1.11 and 3.5 shed more light on the key drivers behind using certain financial products.

When looking at smallholder diaries, interesting aspects of spending behavior can be further investigated. Annex 3 Figure A3.31 shows the percentage of net agricultural income, expenses, physical asset purchases and sales, as well as borrowings and savings over the net total income of smallholders in different income segments. Here the same methodology is applied as described above to determine three income brackets of low-, middle- and high-income smallholder households. The bars here show percentages, indicating the relative size of the different variables when compared to net total income. The following trends are worth highlighting.

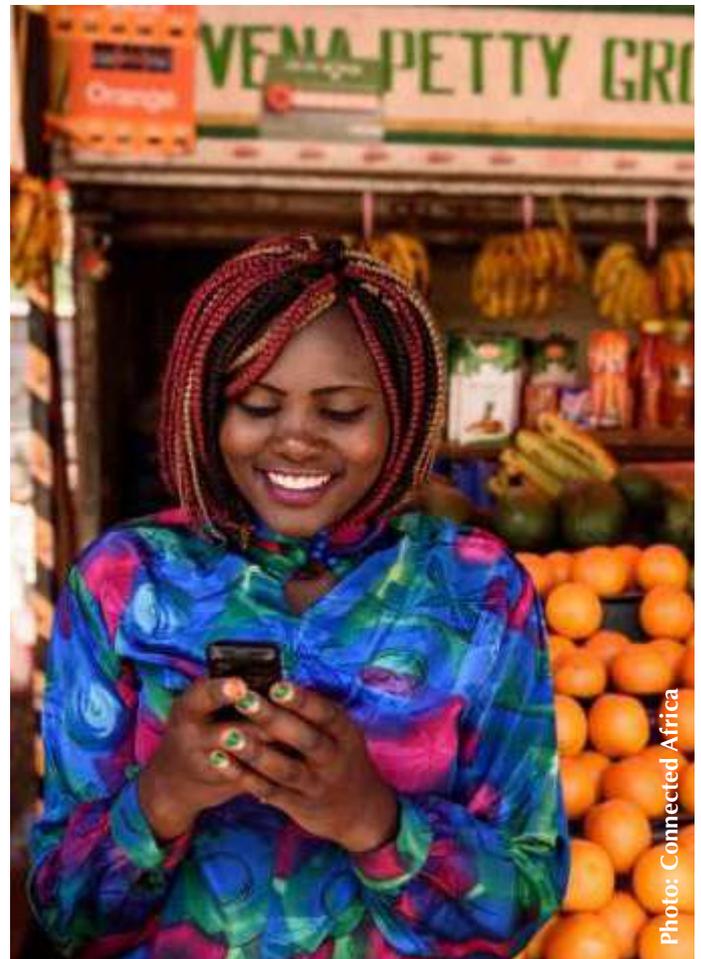


Photo: Connected Africa

FIGURE 126: NET AGRICULTURAL INCOME OVER NET TOTAL INCOME FOR DIFFERENT INCOME GROUPS (SMALLHOLDER DIARIES)

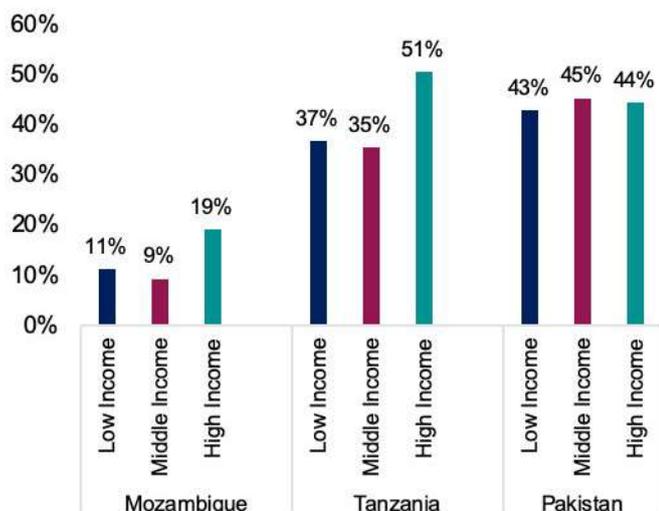
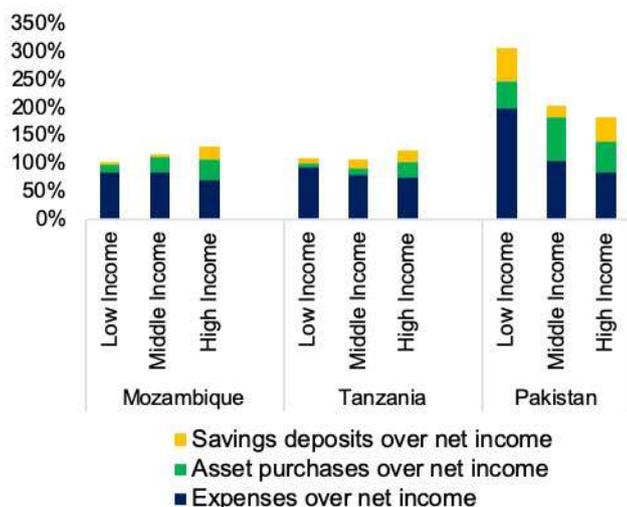


Figure 126 shows net agricultural income⁸⁵ over net total income for different income groups. Here it can be observed for Tanzania and Mozambique that households who are part of the high-income group do have a higher share of agricultural income in their overall net income mix. It can also be seen that in Mozambique, net agricultural income generally does not make-up a large share of net total income (between 10% and 20%), while for smallholders in Tanzania and Pakistan agricultural income has a more substantial share (between 35% and 50%). It can also be observed that in Pakistan the overall income level does not seem to impact much on the share of agricultural income in net total income – implying that both poorer and richer households have a similar relative focus on agriculture in their income mix.

FIGURE 127: EXPENSES, ASSET PURCHASES AND SAVINGS OVER NET TOTAL INCOME FOR DIFFERENT INCOME GROUPS (SMALLHOLDER DIARIES)



Another interesting trend can be observed in Figure 127 when comparing expenses, asset purchases and savings over net total income by different income groups. Here high-income groups spend a smaller share of their net income on expenses such as food, clothing, transport costs,⁸⁶ indicating that a higher share of income can be used for asset purchases or savings. This trend can be observed for both Mozambique and Tanzania, where the share of net income spent on expenses decreases for the wealthier groups and the share of net income invested in asset purchases or savings increases. A strong trend is observed for Pakistan, where expenses are worth twice the amount of net income for households with low income (199%) indicating that these households have to finance expenses through alternative sources, such as asset sales or borrowings as shown in Annex 3 Figure A3.30. The observed trend however is similar to Mozambique and Tanzania where the need to finance expenses decreases with higher income levels.

⁸⁵ Note that all transactions include both cash and in-kind transactions. See methodology section of this paper for more detail.

⁸⁶ See Annex 2 for a full list of transaction types that fall under each category.

RESEARCH QUESTION 3.4

Can we develop an index of commercialization, in order to segment smallholder farmers by the level of commercialization of their agricultural activities? (segmentation by commercialization)

As noted by Jaleta et al. (2009), commercialization of smallholder farmers can be defined in different ways. They discuss a range of possible indices to proxy commercialization – all of which cater to a common, broader definition of commercialization which defines a smallholder household as more commercialized: “[...] if it is producing a significant amount of cash commodities, allocating a proportion of its resources to marketable commodities, or selling a considerable proportion of its agricultural outputs.”⁸⁷

When investigating commercialization of smallholders, one could consider responses to market signals, value chains, crop choice and crop diversification as well as investment in the production process, etc. Following Gabre-Madhin et al. (2007) we use a sales-to-income ratio as the metric of commercialization. With this index we are looking to compare the net agricultural income⁸⁸ from agricultural production with the overall net income of the household.⁸⁹ We assume that a household will be more commercialized in agriculture the larger the share of the household’s net agricultural income to total net income.

The diaries data lends itself well to this type of analysis since income transactions are categorized by type of income source (i.e. agricultural, self-employed, casual labor) as well as by revenues and costs that are associated with a certain income-generating activity. This allows us to calculate the net income from agricultural production by subtracting costs (expenses for fertilizer, costs for farmland, wages for additional laborers) from revenues from selling produce in the marketplace (disaggregated by type of crop). Here it is important to highlight that the smallholder diaries transactions data only includes the revenues of selling crops. It is important to note here that this is then only a sub-set of the crops harvested – of which some are stored or consumed by the household.⁹⁰ Therefore the net agricultural income in the smallholder diaries can be defined as commercial agricultural profits.

We can then compare net agricultural income to other net income sources, such as net income from self-employment or income from casual labor to understand the relative importance of agricultural revenues for the income of the household. Note that for all income streams the associated costs have been deducted. We are therefore comparing gross profits of different income sources.

For this we calculate a commercialization index for each household by taking the ratio of net agricultural income over the total net income of the household. We can then rank all households according to a relative *degree of commercialization*.

Figure 128 ranks Tanzanian households by this commercialization index. Households on the far left have the highest index value (i.e. are most commercialized) while households to the far right have the lowest values (i.e. are

⁸⁷ Moti Jaleta, Berhanu Gebremedhin and Dirk Hoekstra, *Smallholder commercialization: Processes, determinants and impact*, 2009, page 4.

⁸⁸ This is the net income from agriculture and only includes revenues from selling crops minus the costs associated with growing them. This does not include casual or regular labor in agriculture on another farm.

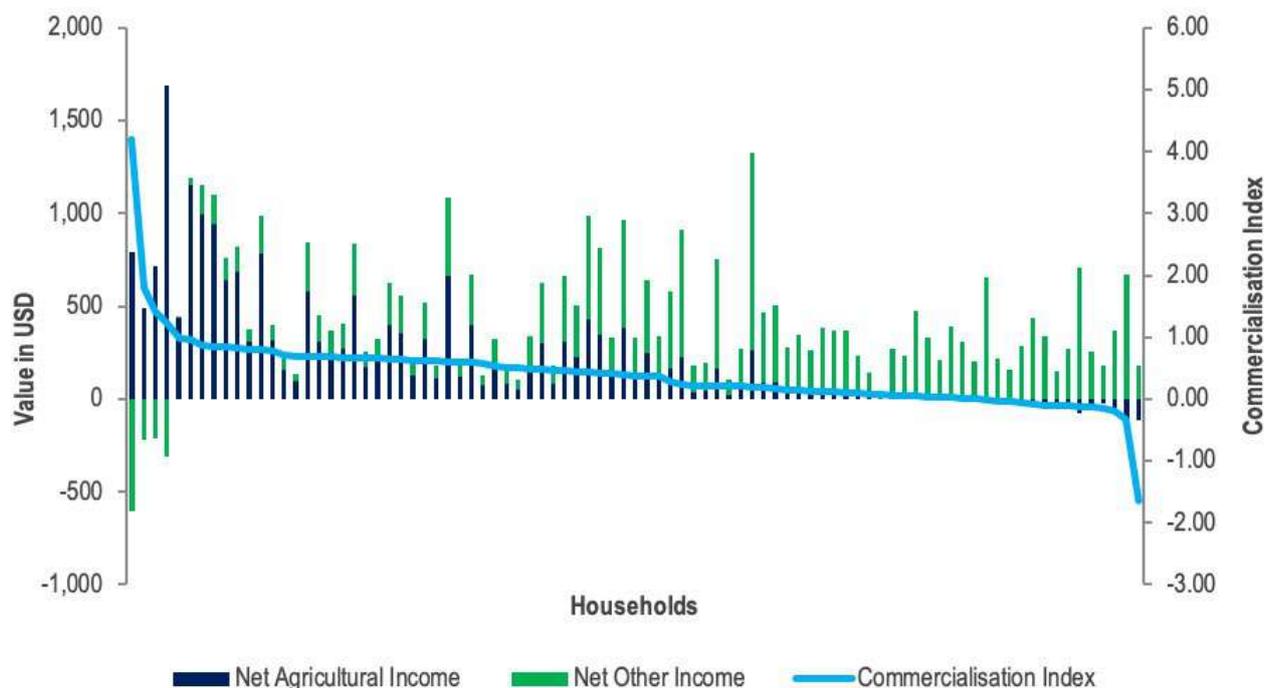
⁸⁹ The net total income includes incomes from all sources, including agriculture, casual labor, regular employment, self-employment, money sent from family and friends, or rental income. Note that costs associated with generating income are already deducted - hence we are talking about net total income.

⁹⁰ Note that data relating to crops consumption and overall harvest is part of the *crops tracker*. We have produced additional analysis using the crops tracker and will present this as part of the agreed opportunities.

less commercialized). Each bar corresponds to a unique household and the height of the bar represents the total income of each household disaggregated by net agricultural income (navy

part of the bar), and profits from other net income sources (green part of the bar). In Annex 3 Figures A3.32 and A3.33 we show the same data for Pakistan and Mozambique respectively.

FIGURE 128: SMALLHOLDER DIARIES HOUSEHOLDS' TOTAL INCOME RANKED BY COMMERCIALIZATION INDEX FOR TANZANIA



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

From eyeballing Figure 128 it seems as if for about a third of the households in Tanzania agricultural income dominates the household budget. For these households the navy part of the bar is larger than the green part of the bar. This we can estimate by looking at the blue line which corresponds to the value of the commercialization index. The size of the index can be read from the right-hand side axis. Where the commercialization ratio takes the value 0.5, net agricultural income equals net income from other sources – where it equals 1 the net household income comes entirely from agricultural production.⁹¹ Data for Pakistan show that more households profit from agricultural income (Annex 3 Figures A3.32) while for Mozambique only few households seem to profit from selling agricultural produce (Annex 3

Figures A3.33). This hints at a higher commercial integration of smallholder farmers in Pakistan while smallholders in Mozambique seem to farm for subsistence, selling only a small share of their produce to supplement other income sources.⁹²

To better understand the differences between smallholder farmers with different degrees of commercialization we have split the sample into two groups: more commercialized farmers and less commercialized farmers. This will allow us to compare two types of farmers in terms of average transaction values of income, expenses, savings and borrowings (Table 53).

While we do find differences in the average total net income between more commercialized and less commercialized households, these are not statistically significant. This implies that while the

⁹¹ In some cases, the commercialisation index exceeds the value 1. This is due to other income sources having negative net values, i.e. the household's small business did not break-even or the household is sending more money to family and friends than they are receiving.

⁹² Similar findings were reported in Anderson and Ahmed, 2016.

averages between the two groups are different, the variation in incomes between the two groups still overlaps a lot. This shows that there is a segment of smallholder farmers who do not focus as much on agriculture but are still pursuing livelihood strategies which is as profitable as commercializing in agriculture. We also find that

households with lower commercialization ratios tend to have a significantly higher number of income sources. This indicates the importance of diversification, for example by both running a shop and engaging in casual labor. Research question 3.2 investigates different income mixes of smallholder farmers in more detail.

TABLE 53: SMALLHOLDER DIARIES – COMPARING INCOMES, EXPENDITURE, SAVINGS AND BORROWINGS OF MORE AND LESS COMMERCIALIZED HOUSEHOLDS

VARIABLES	MOZAMBIQUE			TANZANIA			PAKISTAN		
	High Ratio	Low Ratio	Mean Test	High Ratio	Low Ratio	Mean test	High Ratio	Low Ratio	Mean test
Net agricultural income	9,865	965	***	755,424	71,579	***	126,858	28,325	***
Net Total Income	13,696	10,040		980,960	784,476		162,711	157,125	
Income source	3.9	4.4		4.9	5.3	**	3.7	4.2	***
Total Expenses	11,065	7,346		740,193	630,837		166,128	176,421	
Educational Expenses	297	100		69,647	182,763		8,683	8,508	
Physical asset purchase	2,599	3,402		455,454	107,479	***	96,041	135,719	
Physical asset sale	195	2,951		298,150	189,281		104,684	146,016	
Informal savings				169,429	140,667		106,917	64,164	
Informal borrowing received				247,132	164,608		159,301	156,303	

SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

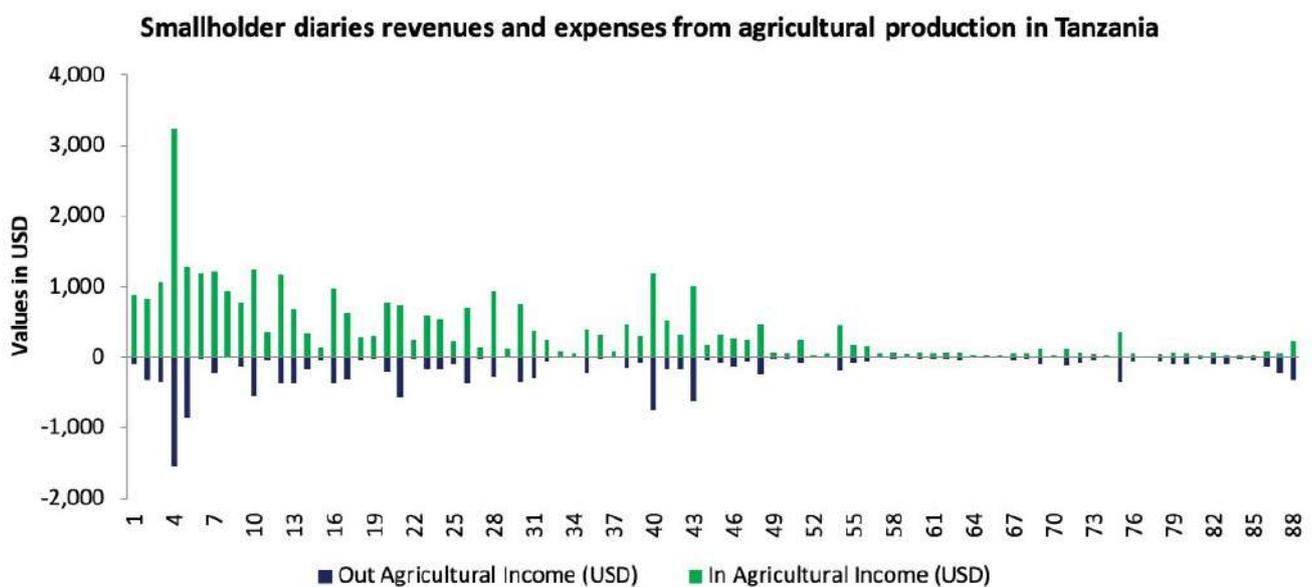
For Tanzania specifically we find that more commercialized households engage significantly more in physical asset purchases as well as in informal borrowing. Physical asset purchases include investment in livestock and machinery and items that could make farming more productive. More commercialized households do also make more use informal borrowings (Table 53). This could hint at smallholder households that take out loans to invest in improving the productivity of their agricultural production and offers an opportunity for FSPs to provide loan or layaway products.

A similar trend can be observed in Tanzania when comparing agricultural expenses with agricultural revenues for each household. Figure 129 ranks Tanzanian households by the commercialization index and shows revenues from selling agricultural outputs in the navy columns and agricultural expenses in the green columns for each household. Note that each bar corresponds to a household as in Figure 128. A clear trend can be observed where higher revenues are associated with larger investments.



Photo: Ayesha Vellani / CGAP

FIGURE 129: SMALLHOLDER DIARIES REVENUES AND EXPENSES FROM AGRICULTURAL PRODUCTION IN TANZANIA



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

6.2 Subgroups of smallholders and financial services

RESEARCH QUESTION 3.5

What profile of smallholders is most likely to demand and actively use certain financial products (e.g., savings, layaway, mobile money, general short- and long-term credit, input credit) and formal and informal tools? How does this differ between meeting general household needs and priorities, and those linked to agriculture (segmentation by financial usage)?

The analysis for this question can be done in different ways, either focusing on each product and identifying the profile of clients who most use these products or by looking at each sub-segment of clients and identifying which financial products they use. Due to the huge volume of data available for this question, we have provided the analysis in both formats for one country, Uganda, as an example of how the data can be interpreted. Depending on the stakeholder preferences, this can be repeated for other countries, or can focus on a particular client sub segment across all countries.

The data has used responses to questions from all three datasets - household questionnaire (specifically average household income), multiple-respondent questionnaire (regarding the use of financial products by smallholders and size of landholding) and single respondent questionnaire. In reading the figures below note that the “Yes” in the key equates to those who use the product, and “No” means those who do not use the product. Also, worth noting are the definitions of the saving, investment and insurance plans which can be either/or formal and informal tools.⁹³

- A Savings plan is defined as “An arrangement that allows pooling aside funds to enable one achieve long term goals”.
- An investment plan is defined as “Placing funds in ventures based on one’s future goals, time and priorities to allow them produce financial rewards over time”.
- An insurance plan is defined as “An arrangement by which an individual, company or government provides protection against a possible eventuality in return for payment of a premium”.

Overall trend on financial product usage in Uganda

As per Figure 130, usage of formal bank accounts⁹⁴ among smallholder households is low, with only 10% of the sample using them. By contrast, 34% of smallholder households are using informal credit and savings groups. This is not to say that there is no combination of households using both a bank account alongside the informal groups, but it would be interesting to explore further as to whether there is an untapped potential market here for banks to increase outreach. Mobile money accounts are also being used more than bank accounts with 21% of households using this service. The data also suggests 31% and 22% of the households use savings or investment plans respectively. Loans from formal providers seems to have a low uptake in both rural and urban⁹⁵ areas according to Figure 131. More research to understand whether this is due to a preference to use savings before credit, or whether there are barriers preventing access to formal loans would be useful to inform FSPs about how to increase loan product uptake. In urban areas, households are more likely to use mobile money and savings

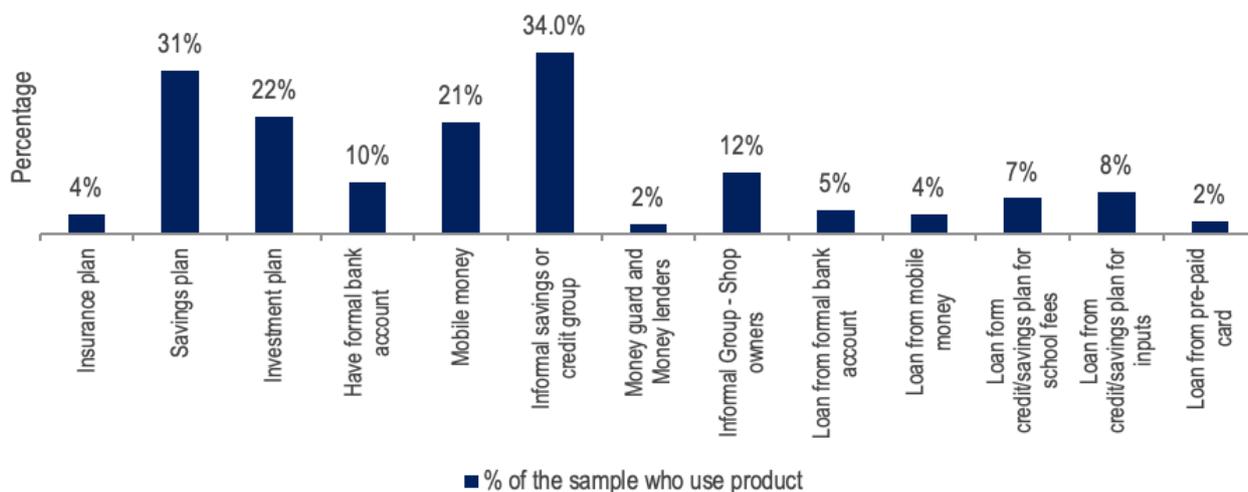
⁹³ According to Intermedia, the suggested definitions for these plans are only helpful for interpreting the data. Ultimately, however, the precise definition of the terms was open to the interpretation of the survey respondent and will be specific to the local context.

⁹⁴ For the national surveys, a household is considered to be formally included if they had an account registered in their name with a bank, a mobile money provider, an MFI, post office, SACCO, VSLA, credit union or cooperative.

⁹⁵ 24% of the respondents are in urban/peri-urban locations, mainly small towns.

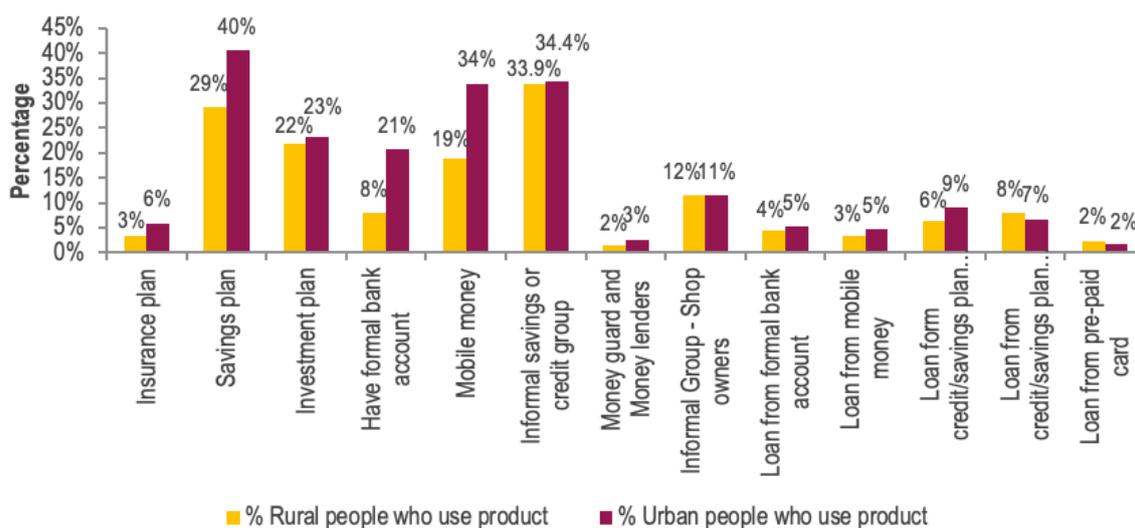
plans which may suggest that further efforts to tailor and market these products in rural areas could also be beneficial.

FIGURE 130: UGANDA: PERCENTAGE OF THE SAMPLE WHO USE PRODUCT



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

FIGURE 131: UGANDA: PERCENTAGE OF THE SAMPLE WHO USE PRODUCT BY URBAN/RURAL⁹⁶



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Due to the low levels of uptake from the sample of the following products and services:⁹⁷ money guard and money lenders; informal group – shop owners; loan from formal bank account; loan from mobile money; loan from credit/savings plan for inputs; loan from pre-paid card, it would be difficult to draw significant conclusions on the profile of these clients when usage levels are so

low. Therefore, the analysis below focuses more on the products with higher usage levels: Savings plans, investment plans, formal bank accounts, mobile money and informal savings and credit groups.

⁹⁶ The urban/rural classification is based on the 2014 population census.

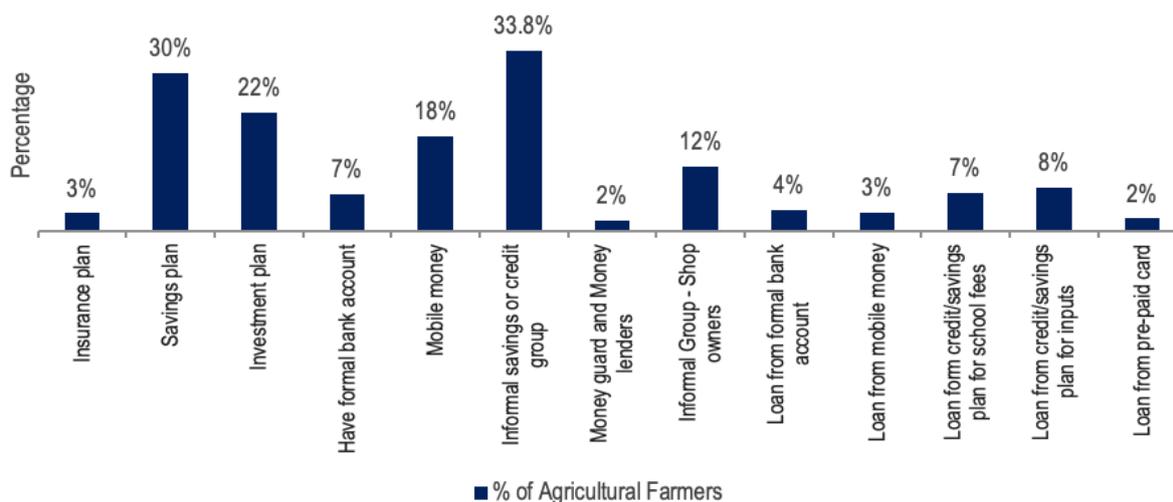
⁹⁷ According to Intermedia the definitions of these products and services were open to interpretation by the interviewee.

Subgroups of smallholder households

Smallholder households who earn a majority of their income from agriculture. When looking at smallholder households, the majority of their income comes from agriculture. Therefore, we wanted to explore the use of financial tools among agricultural farmers with a majority of income from agriculture as a sub-group for analysis (described as agriculture farmers for

short). The most popular financial tool among this sub-group is the informal savings and credit group, which is used by 34% of smallholder households (Figure 132). 30% also have a savings plan and 22% have an investment plan. However very few use insurance (3%). 18% use mobile money and 7% have a formal bank account. The most popular source of loans is from the credit/savings plan.

FIGURE 132: UGANDA: PERCENTAGE AGRICULTURAL FARMERS WHO USE PRODUCT



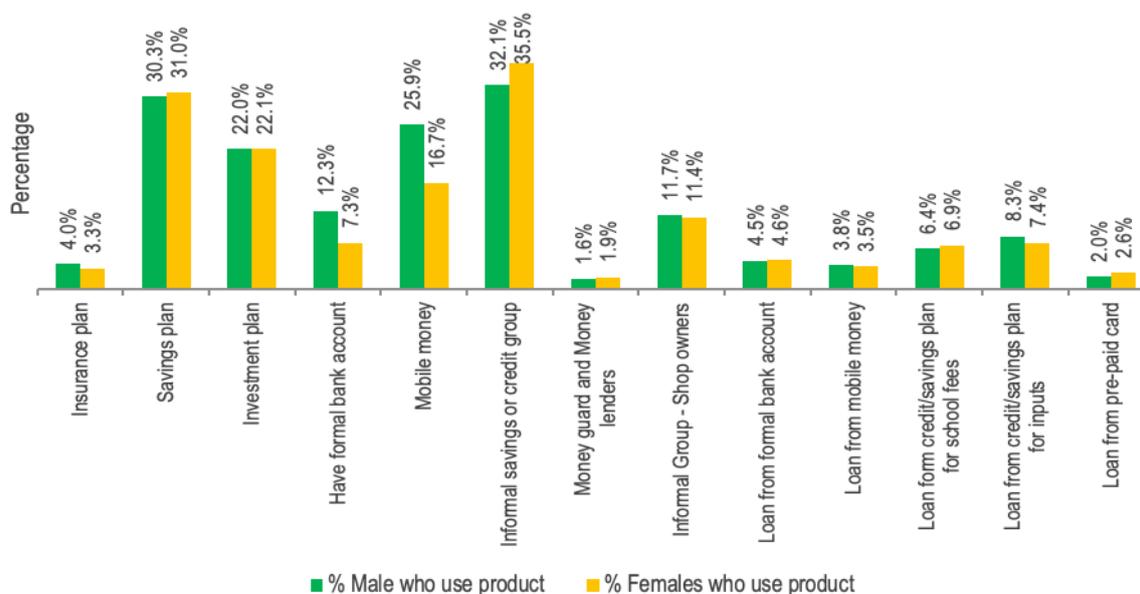
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Gender. The most commonly used financial plan among smallholder households is the savings plan, with similar levels of usage by men and women in smallholder households, followed by investment plans (Figure 133). Note that the data is referring to individuals here – not the household head. This is possible since several household members were interviewed for the national surveys. This suggests equal access and usage of these products by both men and women in smallholder households. The greatest differences in product usage between genders are found in mobile money, formal bank accounts, and informal savings and credit groups. Men more commonly use a formal bank account (12%) and mobile money (26%) than women (7% and 17%, respectively). This could suggest that women face barriers in accessing these services and/or prefer other financial. Women use informal savings and credit groups (36%) more than men do (32%).



Photo: Allison Shelley / CGAP

FIGURE 133: UGANDA: PERCENTAGE OF THE SAMPLE WHO USE PRODUCT BY GENDER

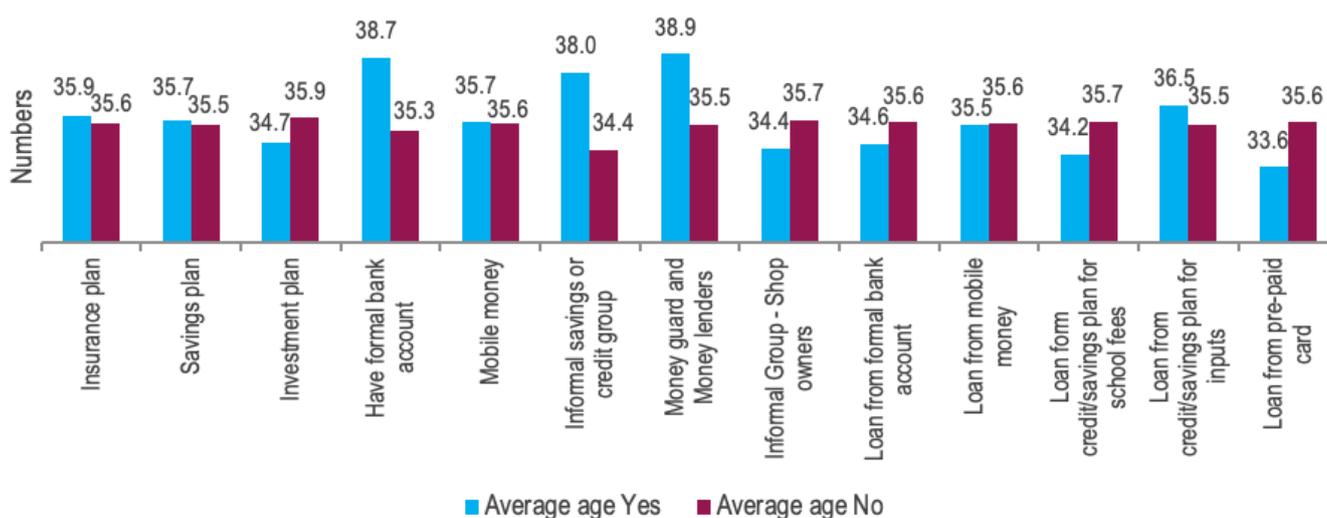


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Age. The average age of respondents using each product in the single respondent survey varies between 34 and 40 years old. Therefore, the disaggregation of responses by age does not give much variation to propose strong analyses. For example, those having a formal bank account average around 39 years old, whereas those who don't have a formal bank account average around 36 years old. This information might not

be too useful for a financial service provider looking for a more specific age range to target. However, as per question 1.5, it does suggest that FSPs could look at adapting their reach to a younger market which appears currently untapped. For more a more detailed breakdown of product usage across age groups, please see question 1.5.

FIGURE 134: UGANDA: AVERAGE AGE

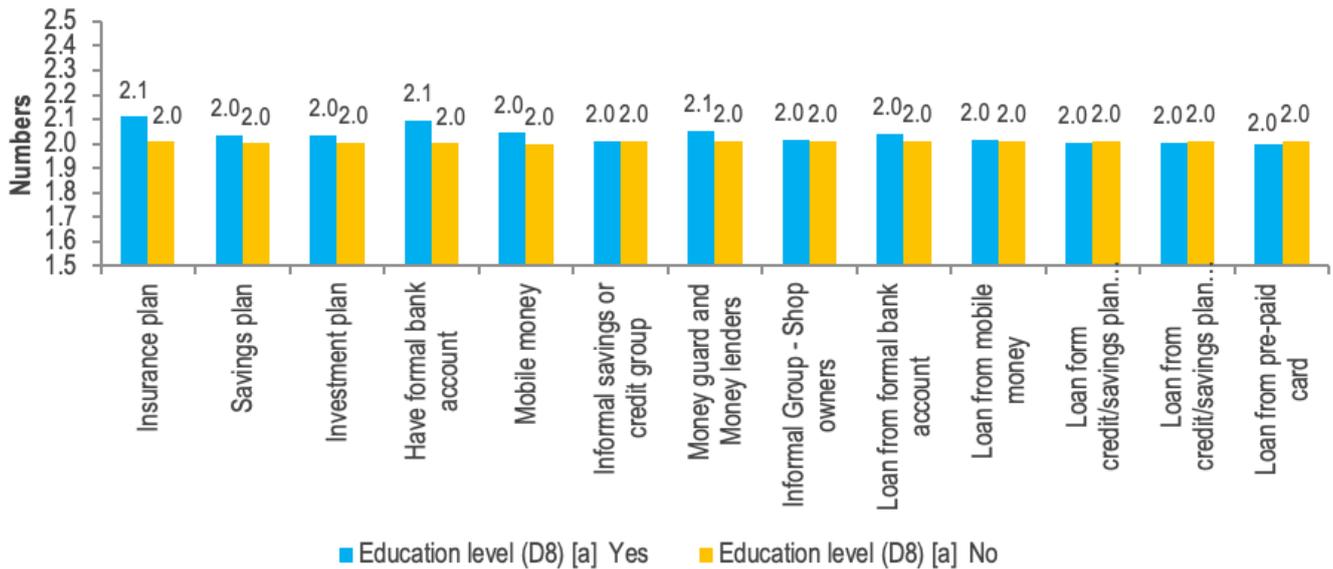


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Education.⁹⁸ Similar to the analysis by age, the disaggregation by education does not provide much variation across product usage with the average education level of all respondents for each product falling under “some primary

schooling” (level 2). Therefore, this may not be a useful sub-category for FSPs to use when targeting clients. For a more detailed breakdown of product usage across different levels of education, please see question 1.6.

FIGURE 135: UGANDA: AVERAGE EDUCATION LEVEL



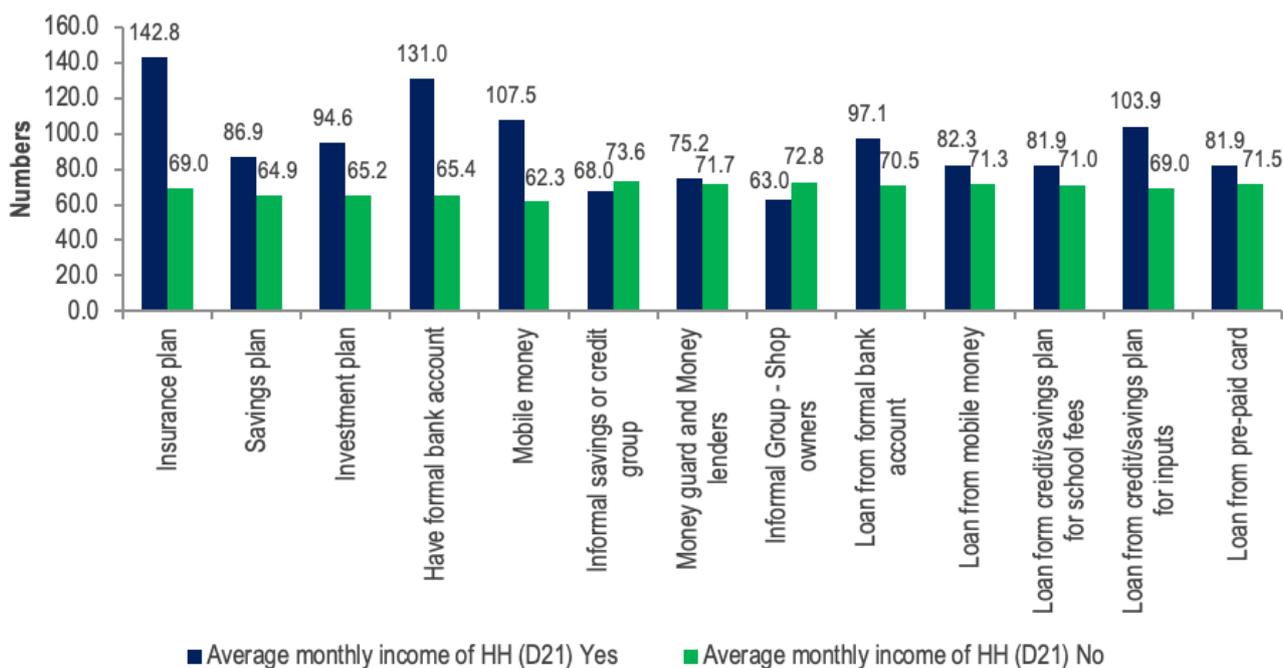
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Average monthly income. As demonstrated in Figure 136, the average monthly income of the sample varies between \$62 to \$143. The data from the sample suggests that in most cases, a higher income correlates with product usage. For example, it is interesting to note that those using an insurance plan earn an average monthly income of \$143 per month. However, those not using an insurance plan earn an income of \$69 per month. This may suggest that people on a higher income value insurance more than those on a lower income. Or it might be that those on a lower income do not have access to insurance, or perhaps are unaware of the value/do not need it and chose not to take up insurance. It is only in the instance of informal savings/credit groups where people on a higher level of income chose not to take up this option of financial service. This may be because they prefer to use other products and services, or they may be excluded from this option due to the level of income they earn. Overall people with a higher average income use insurance plans, formal bank accounts and loans from a formal bank account

more than those with less income. It could be argued that therefore people on higher incomes are more likely to take up formal financial products and services. It also seems as though people on average incomes of less than USD 80 per month are less likely to use or access financial products and services (except through informal groups) and could therefore prove to be a new market for FSPs who are looking to increase their outreach.

⁹⁸ Notes for figure 6: Highest grade achieved is categorised as: 0=No formal schooling; 1=Informal schooling only (including Koranic schooling); 2=Some primary schooling; 3=Primary school completed; ...up to 9=Post-graduate.

FIGURE 136: UGANDA: AVERAGE MONTHLY INCOME

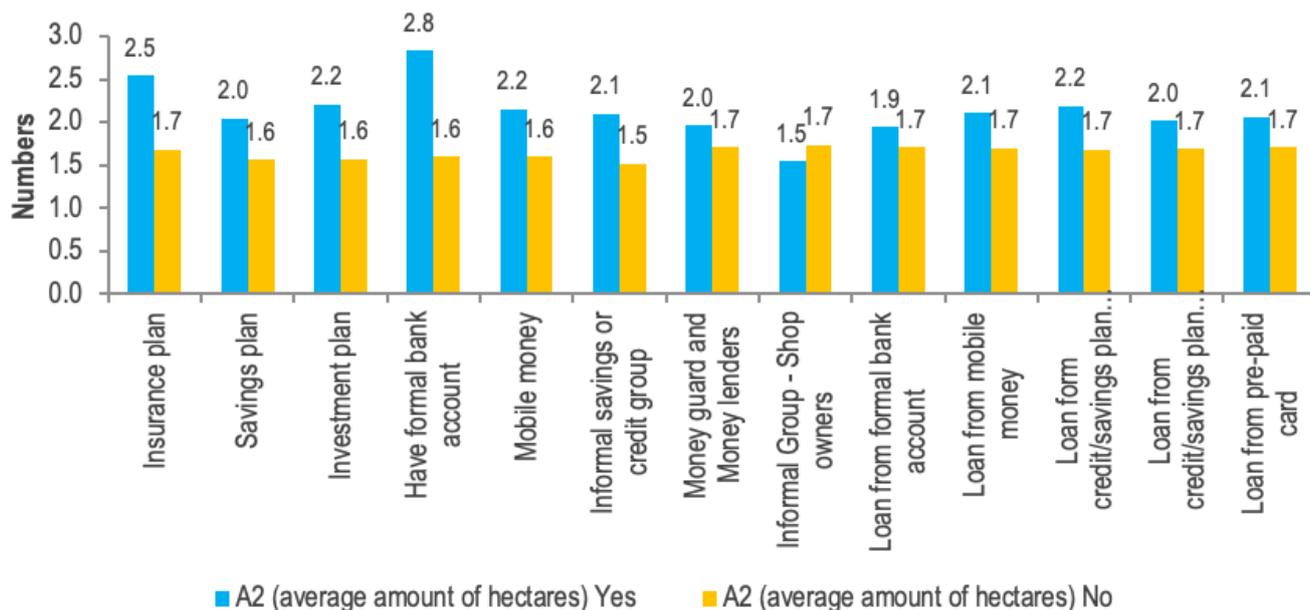


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Land holding size. Interestingly, landholding size does seem to have an effect on those who do use financial services and those who don't. The data from the sample suggests that across all the products and services in the research except informal group of shop owners, respondents with more land, are more likely to use those products

(Figure 137). This might suggest that people with a smaller landholding have less desire to use additional financial products, perhaps due to a level of income that they prefer to manage at home instead or are subsistence farmers. Those with the largest average landholding tend to have a formal bank account and insurance plan.

FIGURE 137: UGANDA: AVERAGE LAND HOLDING SIZE IN HECTARES



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Use of financial products

Savings plans. Savings plans are one of the most commonly used products. The average smallholder household user of savings plans is female located in urban areas and earn most income from agriculture, aged around 36 years old and earns around \$87. Those who are less likely or not able to save earn lower incomes (approx. \$65) and are around the same age (36 years old). Rural smallholder households do save but outreach is much lower. This might be because those earning lower incomes prefer to use informal savings groups instead. People with an average land holding size of 2 hectares are also likely to take up savings plans.

Investment plan. Investment plans are used by 22% of the sample population, more so by people in urban areas (23%) compared to those in rural areas (22%). 22% of agricultural farmers in the sample have an investment plan. Usage among the sample does not represent a strong gender bias with 22% and 22.1% of male and female users respectively. People who use investment plans are on an average income of \$95 per month. Those on an income of less than \$65 are less likely to use a plan perhaps due to lower disposable income for investment of a larger scale. Alternatively, it might be a lack of capacity to develop investment plans and therefore could be an opportunity for BDS providers to target this market. The average land holding size of people with investment plans is 2.2 hectares, suggesting that investment maybe in the form of land or for assets to keep on the land e.g. livestock, agriculture, vehicles and machinery.

Insurance plans. Insurance plans have a relatively low uptake among the samples in rural and urban populations (3% and 6% respectively). This may demonstrate a need to strengthen understanding and awareness of the insurance plans among both populations and could also suggest a lack of availability of relevant products, leading to households perhaps relying on savings to mitigate risk. Therefore, this could be an interesting area for FSPs to explore further. Very few agricultural farmers use insurance (3% of those sampled do). However, people with larger land holdings do take insurance plans. Specifically, people holding 2.5 hectares of land

on average will have an insurance plan. Equally those with the highest monthly average income (\$143) take up insurance, suggesting that there is a market for insurance as incomes grow. Usage among the sample does not represent a strong gender bias with 4% and 3.3% of male and female users respectively. This analysis however is based on a very small sample of users and would require additional research to explore these assumptions further.

Use of Mobile Money (MM). Mobile money usage is higher in urban areas (34% of sample) compared to rural. However, smallholders in rural areas are also using MM – 19% of rural smallholders use MM. In fact, it appears that more people own a mobile money account than a bank account in both urban and rural populations and among agricultural farmers. Also, interesting to note is that mobile money is the second most used financial product in rural areas following informal savings groups, which could suggest a key entry point for MM providers who want to increase outreach. More men (26%) than women (17%) in the sample use mobile money suggesting either a lack of access for women or perhaps a preference for other products, or just perhaps that they are more cautious to take up MM and that this might increase with more understanding and time. In terms of income, mobile money users earn \$108 on average, which is lower than the average income for bank accounts and may suggest that a range of income earners can use mobile money. This is further suggested by the data which shows that people earning less than \$62 per month do not use mobile money, which is the lowest income level for anyone not accessing any type of financial service.

Use of Bank account. 10% of the total smallholder population in Uganda uses a formal bank account., 21% of the sample in urban areas have a bank account – suggesting a lower level to those who have informal savings or credit account. More men (12%) than women (7%) in the sample have a formal bank account which present a market opportunity for FSPs to target women. What is interesting to see is a higher percentage of both men and women using MM, which FSPs should take note of when developing competitive products and services. The data also suggests that people with more land and higher

incomes will open a bank account, specifically people with an average of 2.8 hectares of land and earn on average \$131 per month have a bank account – it might be that this is a criteria demanded by FSPs for individuals opening an account also, which could be reviewed in order to increase outreach.

Informal savings or credit group. Informal savings or credit groups are the most popular financial option for people in rural areas (34%) and second most popular option for people in urban areas (34%). This is also the most popular option for agricultural farmers with 34% of farmers in the sample using informal savings or credit groups. There are slightly more female users (36%) of informal savings or credit groups than men with 32% which could in part be down to the structure of these groups which are usually self-selective. The average monthly income

of those who use savings and credit groups is around \$68 per month which suggests it is a tool used by people on lower levels of income. Users of these groups also hold a smaller amount of land at approximately 2.1 hectares.

Also, of interest for formal financial services providers is that the data shows that informal loan products are still more popular options for people in rural areas compared to formal products, with informal savings/credit groups and shop owners being most used options. This should be a consideration for formal lenders who want to increase their outreach.

The profile of a typical client for each product from this sample is summarized in Table 54, as well as suggestions for FSPs to extend their market.

TABLE 54: SUMMARY OF PRODUCTS WITH MOST POTENTIAL FOR FSPS TO EXTEND AND THE POTENTIAL CLIENTS FOR FSPS TO TARGET

PRODUCT	CLIENT PROFILE (CURRENT)	CLIENT PROFILE (POTENTIAL)
Savings plan (An arrangement that allows pooling aside funds to enable one to achieve long term goals)	36year old, agricultural farmer, in rural or urban location, average monthly income of USD 106 and holds 2.1 hectares of land	FSPs might want to branch out further to include younger clients (under 36) on a lower income (perhaps as low as USD 72 per month) and increase outreach in rural areas, potentially using informal savings and credit groups as an entry point to identify needs and barriers to formal access.
Investment plan (Placing funds in ventures based on one's future goals, time and priorities to allow them produce financial rewards over time)	Urban location, monthly income of USD115 and holds 2.2 hectares of land, agricultural farmers	Further outreach into rural areas targeting agricultural farmers, Business development support services could increase capacity to prepare and use investment plans.
Insurance plan (An arrangement by which an individual, company or government provides protection against a possible eventuality in return for payment of a premium)	Low uptake, mostly larger landholders (2.8 hectares) with high monthly incomes (USD 205)	Expand outreach in both urban and rural locations, explore products to meet needs of agricultural farmers.
Mobile money	Urban location, agricultural farmers, male, average income of USD129	Expand in rural areas, perhaps using savings and credit groups as an entry point, women, lower income clients.
Formal Bank account	Urban location, male, larger landholding (2.9 hectares), higher incomes (USD163 per month)	Perhaps invest in mobile products and services to reach rural clients, review products to facilitate access for women and lower income clients. Use savings and credit group clients as an entry point.
Informal savings or credit groups	Rural and urban locations, women, lower income USD 73	Continue serving current profile, as this is an otherwise untapped market. However, could work with formal FSPs to explore opportunities to offer clients access to formal demand-driven products and services.

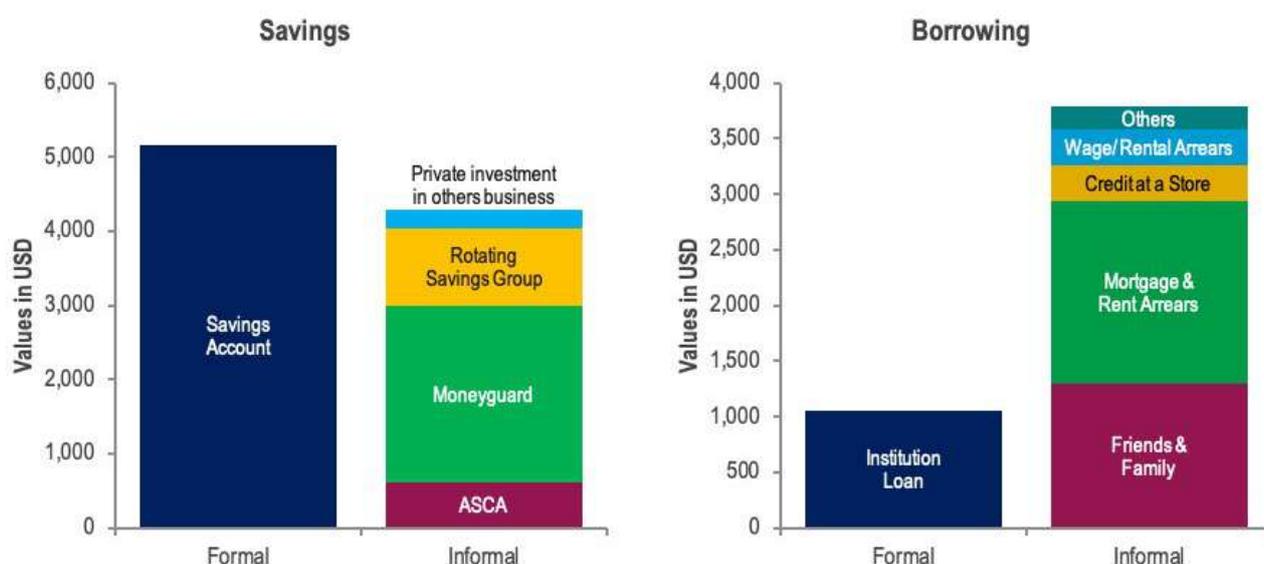
RESEARCH QUESTION 3.7

What are the gaps between current smallholder demand and the financial solutions available?

To address this question, we use the smallholder household diaries data to build a firm understanding of how households are using informal financial tools. This approach is based on the hypothesis that informal tools often fill a gap between what is required by households and what can be provided by the formal financial

sector given the current level of technology. This analysis therefore gives an indication of where there is evident demand for formal financial services that is not being met, and where a gap exists that could be filled by FSPs. This is an imperfect approach, given that it is not necessarily the case that informal services are only used because no formal services are available – there are also other significant factors such as cost, trust, convenience, accessibility, design and bargaining power. But by drilling into what exactly informal services are being used for, we can get an indication of where there may be latent demand for more formal services.

FIGURE 138: FORMAL AND INFORMAL TOTAL SAVINGS AND BORROWING VOLUMES IN MOZAMBIQUE (USD)



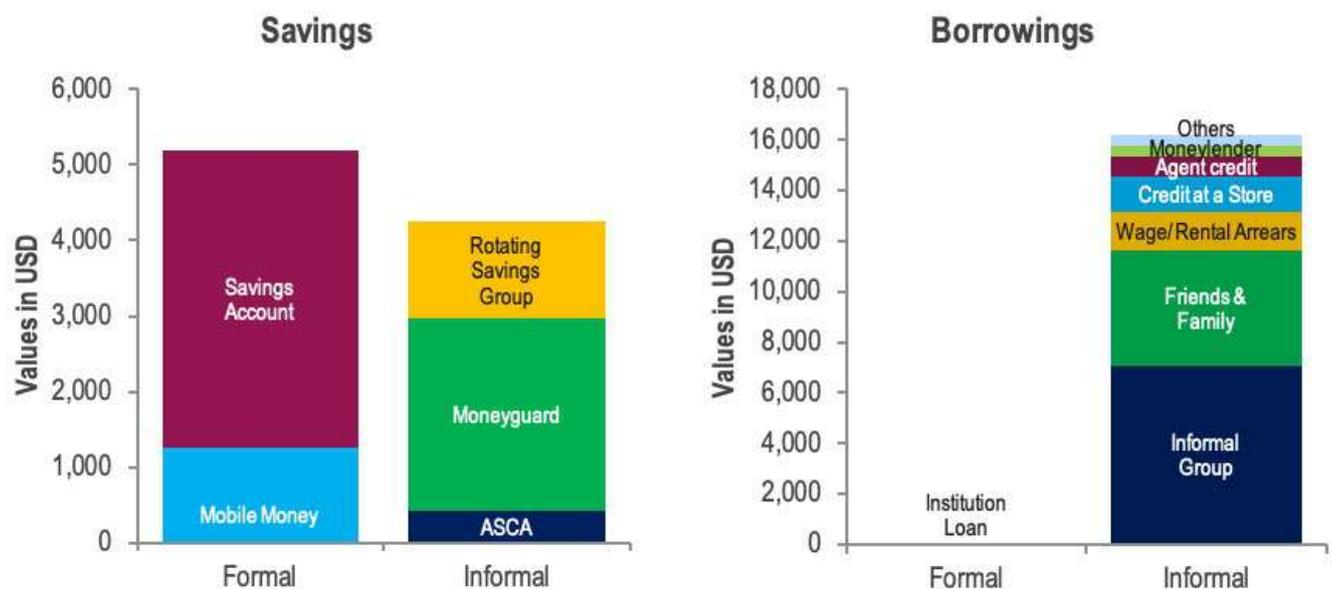
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

In Mozambique, the data show a significant gap between supply of and demand for credit (Figure 138). Formal credit accounted for only 22% of the total value borrowed by smallholder households in the sample. The amount of credit currently provided by friends and family, stores and other sources implies an untapped demand for credit that the formal sector, with the right products, could address.

On the savings side, we see that even though the sample we are looking at in Mozambique displays high levels of financial exclusion, the value of formal savings is actually higher than what we see saved informally. The informal

savings mechanisms however provide an indication of where there are unmet demands for financial services in this survey. The use of money guards, ROSCAs and ASCAs implies that there is some excess liquidity here that people want to lock away safely but, for whatever reason, for example for easy access at short notice especially in rural areas, they are using informal mechanisms to do so. The value of these savings should also be of interest to FSPs who could potentially nearly double the value of deposits from smallholders if they address the issues behind smallholder households saving money informally.

FIGURE 139: FORMAL AND INFORMAL TOTAL SAVINGS AND BORROWING VOLUMES IN TANZANIA (USD)

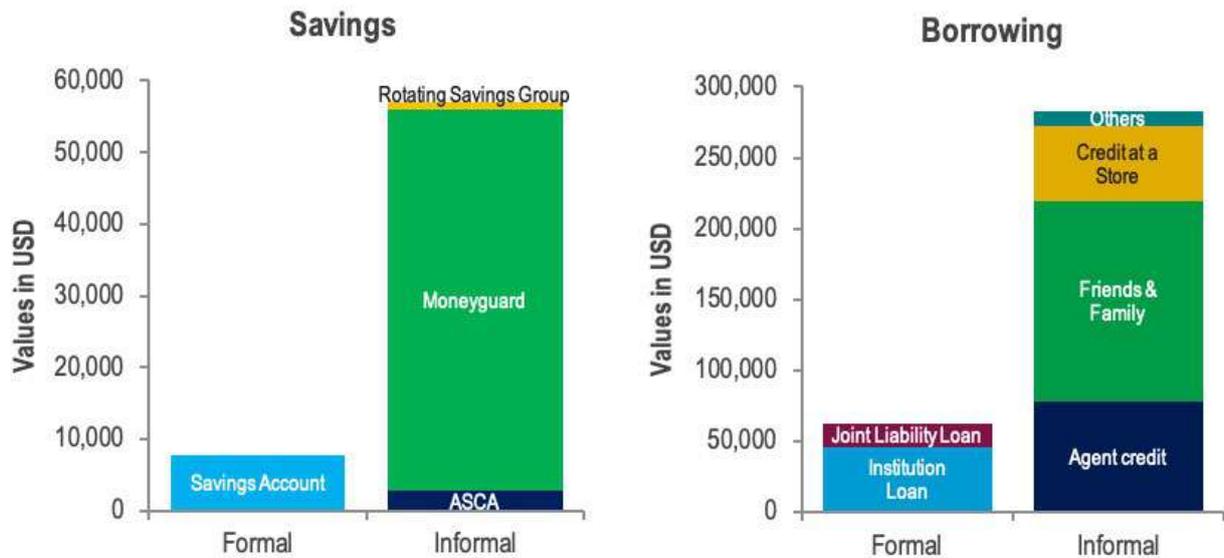


SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

In Tanzania, as with Mozambique, we see a lot of people using money guards, ROSCAs and ASCAs as informal mechanisms to save money (Figure 139). Even though there is significant usage of formal saving mechanisms in this sample, it does imply that there may more demand for formal savings products if providers were able to replicate the flexibility of these more informal mechanisms. Interestingly we see people using mobile money for savings in Tanzania (or at least holding a positive balance in their mobile wallets), which may suggest an opportunity that FSPs need to take into consideration when adapting savings products and delivery channels for this market.

On the credit side, we see a large outstanding demand for loans (NB the different scales on the y-axes in the two graphs in Figure 139). In the Tanzania diaries sample, there is next to no borrowing from formal institutions but significant amounts being borrowed from informal groups, friends and family and other informal sources. Given that we do see some formal savings, this implies that it is not lack of physical access to formal financial services that is restraining credit outreach, but rather either lack of appropriate credit products that are aimed at the smallholder market or reluctance to take on debt. In other words, if an FSP were to design an appropriate loan product for this market (and deal with debt aversion through messaging, terms, dispute resolution, etc.), they are likely to find significant demand (and also likely some capacity to utilize it).

FIGURE 140: FORMAL AND INFORMAL TOTAL SAVINGS AND BORROWING VOLUMES IN PAKISTAN (USD)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

In Pakistan we see very low levels of formal savings relative to informal savings (Figure 140). The apparently widespread use of a money guards is indicative of demand for savings products and the values should be significant to get an FSP interested – over \$50,000 saved over the year by this community of approximately 100 households implies a potentially profitable business case.

A gap between supply and demand also appears to exist on the credit side, where formal loans are significantly outweighed by informal loans from friends and family, store credit and agri credit. Here, the smallholder population appears to be fairly well served for their credit needs, via their close networks and relationships in the value chain (examples in which social and transactional capital reinforce creditworthiness). However, the absolute quantity of informal credit in this sample (over \$250,000) points to a significant opportunity for FSPs even only a fraction of this demand was brought into the formal sector.

RESEARCH QUESTION 3.8

To what extent can we view smallholder households as businesses? How are their cash flows similar/different to a small business?

This question is very important for FSPs looking at the smallholder market, as it speaks to a valuable form of segmentation within smallholder populations, namely: what kind of smallholder farmers are most likely to be creditworthy? Over the years there has been a tendency among FSPs and the donor community alike to treat smallholders with some degree of homogeneity – at one end of the spectrum this might be as all intrinsically poor, subsistence farmers, and at the other end (as has often been the case in the microfinance industry) to treat everyone as micro-entrepreneurs, who just need the right conditions in place (and a loan) in order to realize their dreams of growth.

The reality is somewhere in between and is also far more complex. Entrepreneurship is a potential pathway out of poverty for a smallholder, but so is a job, so is migration, and so is growing a sustainable lifestyle business with diversified assets. For those who can be identified as having

both the desire and the skill to be entrepreneurs, credit might be a critical financial service. For others, it may not be the case that an investment opportunity exists that has an expected rate of return greater than the cost of the loan. For these smallholders, credit might not only have little value, it could even have negative impact (over-extension of credit has been identified as a key factor behind the farmer suicides seen across southern India in recent years).

To evaluate to what extent smallholders can and should be viewed as businesses, we analyzed the expenditure patterns of each of the households participating in the smallholder diaries. Our hypothesis was that households that made the

majority of expenditures on business-related expenditures could be considered more closely aligned with small business, while households that spent most of their money on things like household items and education were considered less analogous to small business.

Here the granular transaction data of smallholder diaries can be used to understand for each household the proportion of expenses for household items to expenses that relate to income-generation and are therefore business-related. Table 55 shows how we define different types of transactions in the financial diaries as either household expenditures or business-related expenditures.

TABLE 55: CATEGORIZATION OF BUSINESS EXPENDITURES AND HOUSEHOLD-RELATED EXPENDITURES IN SMALLHOLDER DIARIES DATA⁹⁹

BUSINESS-RELATED EXPENDITURES		HOUSEHOLD-RELATED EXPENDITURES	
Expenses related to income-generating activities	<p>Expenditures for agricultural production (seeds, fertilizer, plow, tools, wages for worked)</p> <p>Expenditures for self-employment activities (rent for a shop, electricity, stock purchases, wages for workers)</p> <p>Other income-related expenses (taxes for regular employment etc.)</p>	General household expenses	<p>Expenses for education</p> <p>Energy costs for household</p> <p>Food & clothes expenses</p> <p>Medical expenses</p> <p>Smoking & alcohol</p> <p>Transport</p>
Expenditures for income-generating assets	<p>Purchase of crops storage, farming tools and machinery</p> <p>Purchase of farmland or other land plot</p> <p>Purchase of motorcycle</p> <p>Livestock investments (chicken, cow and buffalos, goats and sheep)</p>	Expenditures for household assets	<p>Electronic items like radio, TV, other electronic gadgets</p> <p>Building materials for home maintenance</p> <p>Furniture</p> <p>Household utensils</p>

Next, we calculate the ratio of business-related expenditures over household-related expenditures for each household. This ratio can then be used to ranked smallholders according to their relative share of business expenditures over household expenditures.

⁹⁹ Note that this is not an extensive list of all transaction items.

FIGURE 141: RATIO OF BUSINESS EXPENSES OVER HOUSEHOLD EXPENSES FOR HOUSEHOLDS IN TANZANIA (SMALLHOLDER DIARIES)

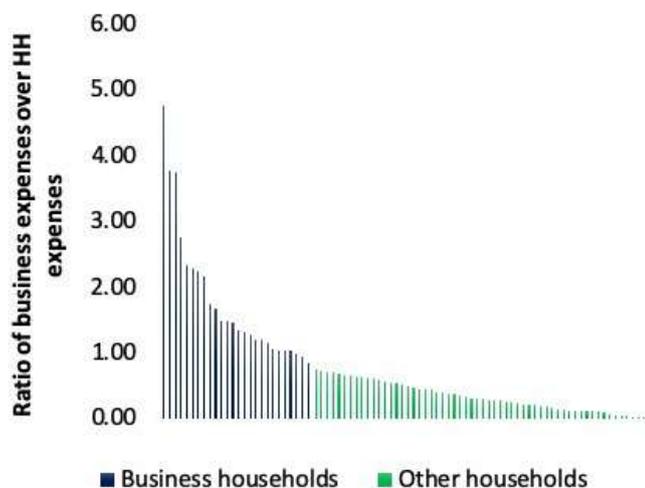
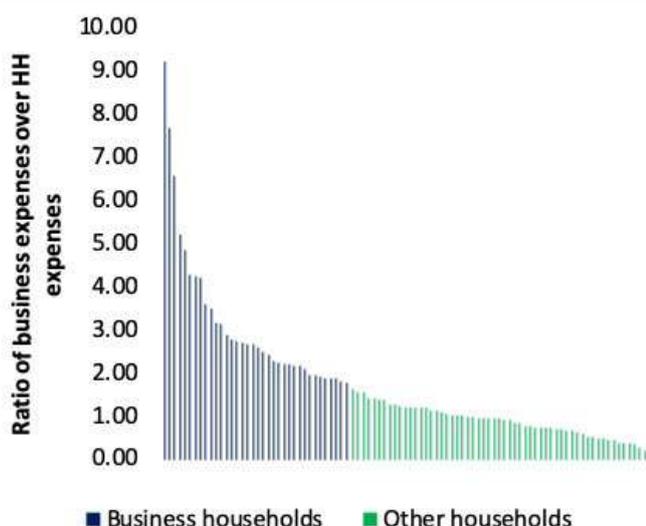


Figure 141 shows the ranking of households in Mozambique, Tanzania and Pakistan according to this ratio. Here, each bar corresponds to an individual household while the height of the bar indicates the ratio of business expenses over household expenses. A ratio of 2, for example, would imply that business-related expenses are double the amount of the value of household related expenses – a ratio of 0.5 would imply that business expenses are half of the size of household expenses. It can be observed that ratios in the Pakistan and Tanzania sample are higher than in the Mozambique sample, with Mozambique scoring on average 0.26 and Tanzania and Pakistan scoring on average 1.15 and 2.04, respectively. This implies that the amount of business-related expenditures only makes up 26% of the amount spent on household expenses in Mozambique, while households in Tanzania spend roughly equal amounts on business expenses and household expenses and households in Pakistan spend twice the amount on business-expenses than on household expenses.

FIGURE 142: RATIO OF BUSINESS EXPENSES OVER HOUSEHOLD EXPENSES FOR HOUSEHOLDS IN PAKISTAN (SMALLHOLDER DIARIES)



To further investigate how the cash flows of smallholder farmers vary, we define two different types of smallholder households: those that have a relatively high ratio of business expenses over household expenses are therefore assumed to behave more like a small business and those that have a lower ratio, spend relatively more money on household expenses and are therefore assumed to behave less like a small business. As for research question 3.4, the Ward's linkage clustering method is used to segment each country sample into two groups. We color-coded households that behave more like a small business in navy and other households, which spend relatively fewer resources on income-related activities, are marked in green.

Here it is important to note that clustering is applied on a country-basis to take into account the relative national distribution of ratios. As a result, the cut-off point for business households is different between countries. When defining a business household for example in Mozambique we are saying that this household is more analogous to a small business when compared

to other households in Mozambique. Next, we will compare cash flows of business households and other households to try and identify different behavior patterns in terms of income-generating activities, asset sales and purchases, and savings and borrowings. We will do so country-wise as we identify very context-specific trends.

Mozambique

FIGURE 143: PERCENTAGE OF INCOME BY DIFFERENT ACTIVITIES FOR BUSINESS HOUSEHOLDS AND OTHER HOUSEHOLDS IN MOZAMBIQUE (SMALLHOLDER DIARIES)

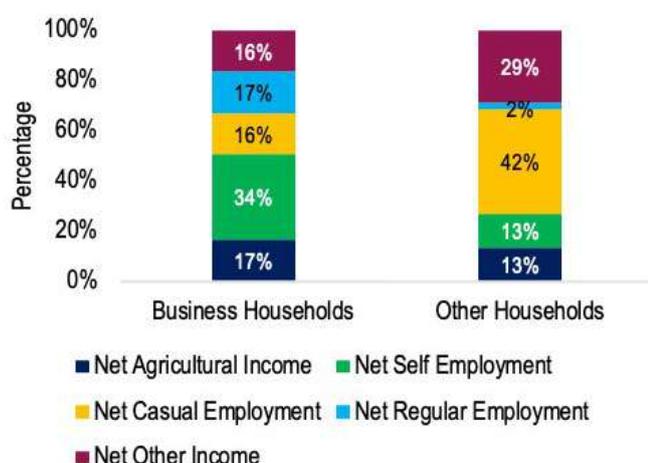


Figure 143 shows the different income streams of business households and other households in percentage out of total net income. The findings are very interesting since they show two different livelihood strategies. Households that are defined as spending more like a small business generate more income through self-employment and regular employment while the other households rely mainly on casual labor and on support from outside of the household – defined as other income here. This corresponds to the profile of a subsistence farmer who does not generate much income from agriculture, depends on support from outside the households and needs to supplement income with casual labor to bridge hunger periods.

FIGURE 144: AVERAGE NET INCOME, HOUSEHOLD EXPENSES AND ASSET SALES AND PURCHASES FOR BUSINESS HOUSEHOLDS AND OTHER HOUSEHOLDS IN MOZAMBIQUE (SMALLHOLDER DIARIES)

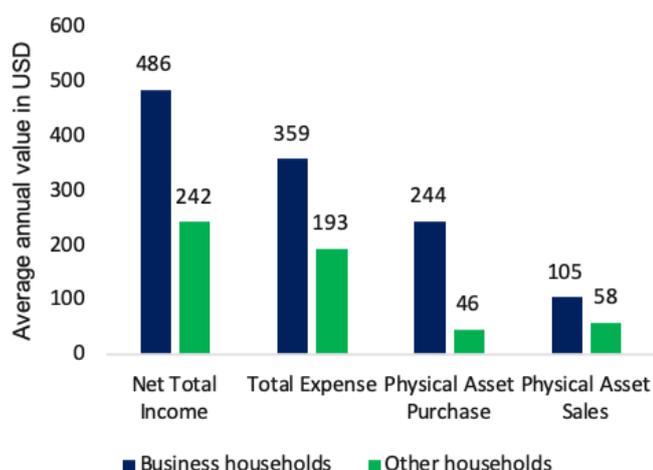


Figure 144 shows the average annual income, household expenditure, and asset purchases and sales for business and other households in USD. Here it can be observed that business households do on average have a higher income compared to other households and spend more in total – and not only in relative terms - on household expenses and asset purchases. Furthermore, other households tend to nearly spend all of their income on essential household expenses like food and clothing, leaving little for investment and signaling a life situation close to subsistence.

Overall, it can be learnt that business households are following a more successful livelihood strategy leaving them better off compared to the other households in the sample. It is important for FSPs to consider these differences between smallholder farmers and develop financial products that take their circumstances into account. While business households could

potentially benefit from a micro loan to invest in their small business, other households which are close to subsistence and who might be more vulnerable to external shocks might benefit from financial products that allow for consumption smoothing, that can layaway small amounts of savings to purchases assets like crop storage mechanisms, or to insure crop returns.

Tanzania

FIGURE 145: PERCENTAGE OF INCOME BY DIFFERENT ACTIVITIES FOR BUSINESS HOUSEHOLDS AND OTHER HOUSEHOLDS IN TANZANIA (SMALLHOLDER DIARIES)

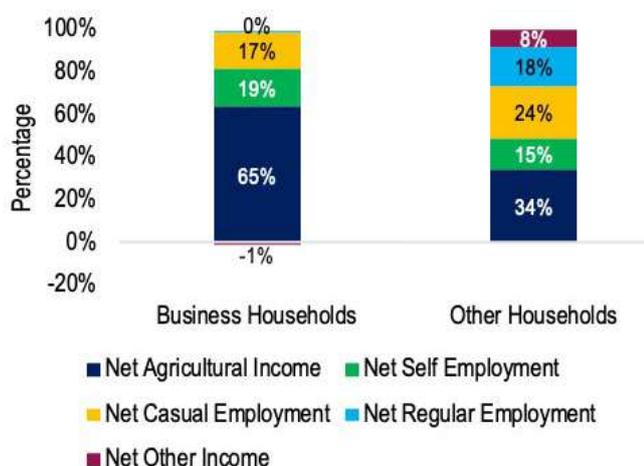


Figure 145 shows different income streams as a percentage of total net income for business households and other households in Tanzania. Here, business households focus significantly more on agriculture while other households more often follow a path towards regular employment. It can also be seen that business households are less dependent on casual labor and support from outside of the households (other income) compared to other households. The two different profiles imply different financial needs which should be considered by FSPs targeting smallholders in Tanzania. In particular, agriculture focused financing strategies appear key to business households which could include products such as agri-leasing to allow increased access to productive assets.

FIGURE 146: AVERAGE NET INCOME, HOUSEHOLD EXPENSES AND ASSET SALES AND PURCHASES FOR BUSINESS HOUSEHOLDS AND OTHER HOUSEHOLDS IN TANZANIA (SMALLHOLDER DIARIES)

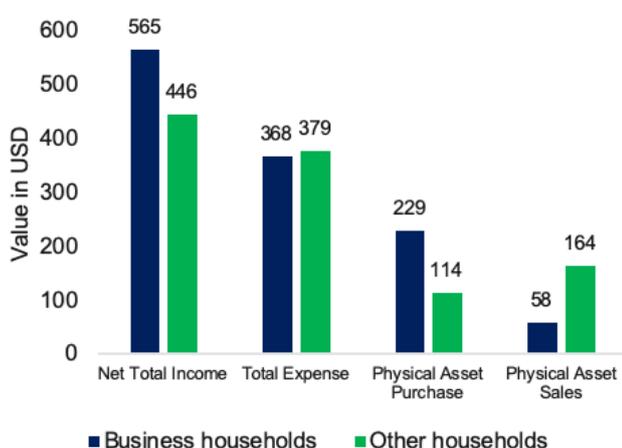


Figure 146 shows differences in average annual income, expenses and asset purchases and sales for smallholders in Tanzania. While there are income differences between the two groups, with business households earning more on average, these differences are not as pronounced as found for the Mozambique sample. Furthermore, it can be observed that the higher average income of business households is re-invested in productive assets, while other households tend to sell more assets than they purchase to complement their household's income.

FIGURE 147: AVERAGE SAVINGS AND BORROWING TRANSACTIONS FOR BUSINESS AND OTHER HOUSEHOLDS IN TANZANIA (SMALLHOLDER DIARIES)

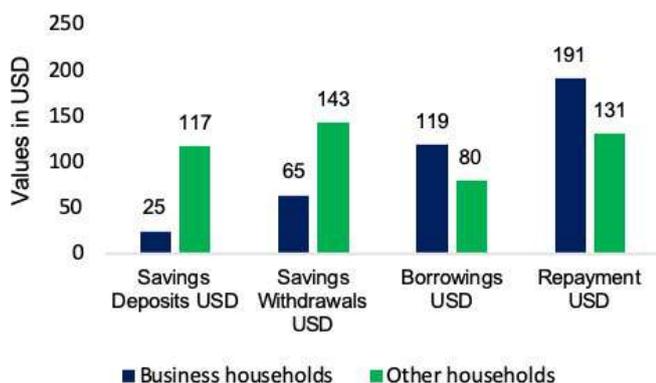


Figure 147 compares average savings and borrowing transactions of the two household types. A strong, reversed trend can be observed between the two groups, showing that business households engage much more in borrowings while other households engage much more in savings. It can also be observed that both business households and other households repay more debt than they take out over the year – showing that this both groups of smallholders are reducing their debt over time. These findings do have very interesting implications for FSPs in terms of product development. Here, the business households could be described as a group of smallholders that focuses more on agriculture and has a need to finance production-related expenses. The other group of households might be more interested in using savings products to store the income that they receive from regular employment.

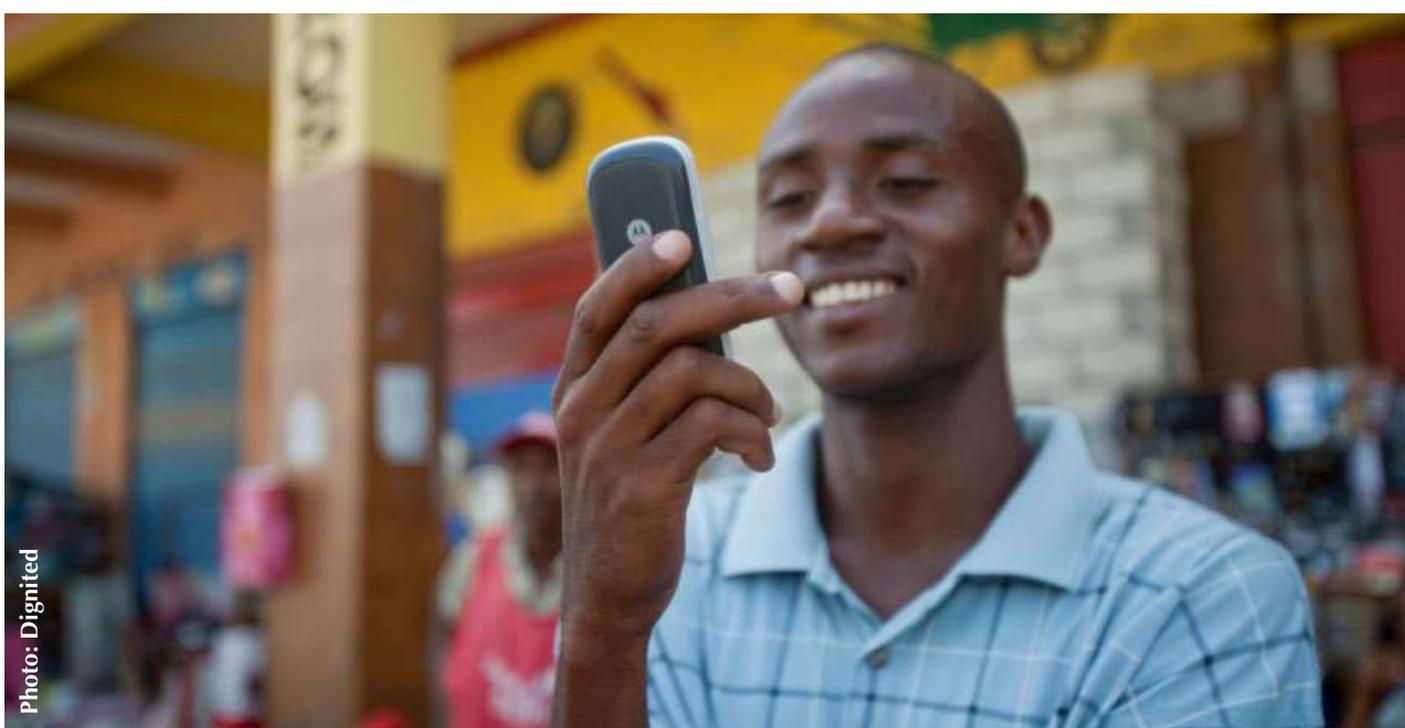


Photo: Dignified

FIGURE 148: PERCENTAGE OF INCOME BY DIFFERENT ACTIVITIES FOR BUSINESS HOUSEHOLDS AND OTHER HOUSEHOLDS IN PAKISTAN (SMALLHOLDER DIARIES)

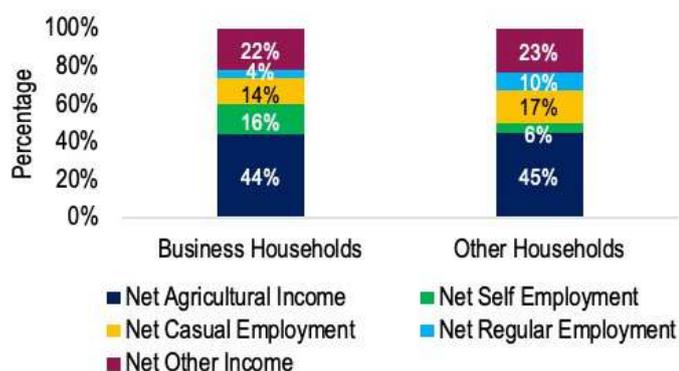


Figure 148 shows different income streams as a percentage of total income for business households and other households in Pakistan. Interestingly the income portfolio is similar between the two groups in terms of agricultural income and net casual employment. Business households seem to engage more in self-employment and less in regular employment compared to the other households. A major difference in livelihood strategies as observed for Mozambique and Tanzania can however not be read from this figure.

FIGURE 149: AVERAGE NET INCOME, HOUSEHOLD EXPENSES AND ASSET SALES AND PURCHASES FOR BUSINESS HOUSEHOLDS AND OTHER HOUSEHOLDS IN PAKISTAN (SMALLHOLDER DIARIES)

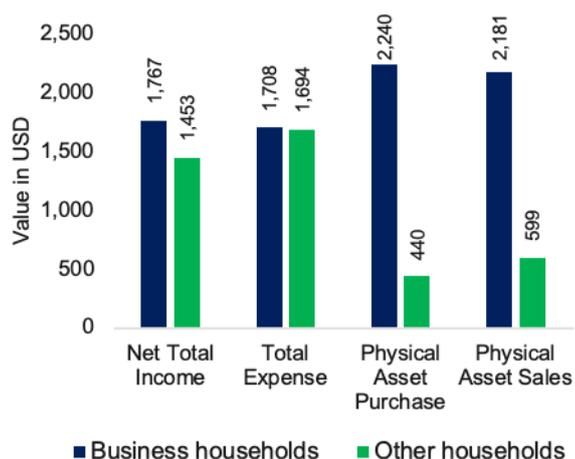


Figure 149 shows how net income, household expenses and physical asset sales and purchases compare between the two groups. Here it is interesting to see the magnitude of the difference in asset purchases and sales. When looking into what asset transactions are made-up of it becomes apparent that business households are engaging much more in buying and selling livestock than the other households. It could be speculated here that business households make a profit on trading livestock which would complement their income and increase the income gap between business households and the other households. Furthermore, business households are much more financially active compared to the other households, with larger transaction sizes for savings and borrowings – all of which are found to be statistically significant differences when compared to other households (see Annex 3 Figure A3.34).

RESEARCH QUESTION 3.10

What kind of transactions are indicative of a good customer for a financial institution? Conversely, what are the ‘red flag’ behaviors that indicate likelihood of a poor customer?

The smallholder diaries data is a good starting point to look at behavior patterns of smallholder farmers over time. The granular information on loan repayment in the diaries can be used to segment the sample in groups of smallholders that successfully repay outstanding debt and those that struggle to service their debt over the year. As the diaries data track households over a one-year period, our analysis can only look at loan repayments during this period to determine who ‘good’ and ‘bad’ customers are.

Here it is important to note that since each open loan account has a unique account ID, repayments, new borrowings as well as account

closure after full repayment can be tracked for each household over time. The final balance at the end of the data collection period can be calculated by subtracting any repayments that are made over the year from the starting balance. Smallholder households can have multiple loan accounts of different types (friends & family, agent credit, informal credit at store, formal loan with a bank). A household might therefore have fully repaid the outstanding loan that was taken at a store while another loan account, i.e. from a friend or family, has only been partly repaid. To take the loan repayment behavior for each type of loan product into account, an average of the percentage repaid across all open loan accounts is calculated for each household. The average percentage of loans repaid can then be used to rank households and segment the sample into different groups. Note that the last two months of the time series data were excluded in the calculations. This was done to exclude loans that were issued just before the end of data collection. In other words, we are going to calculate the percentage of loans that are repaid after 12 months – while we only take into account loans that were taken out in the first 10 months of the data collection period.

FIGURE 150: PERCENTAGE OF LOANS REPAYED FOR EACH HOUSEHOLD IN PAKISTAN (SMALLHOLDER DIARIES)

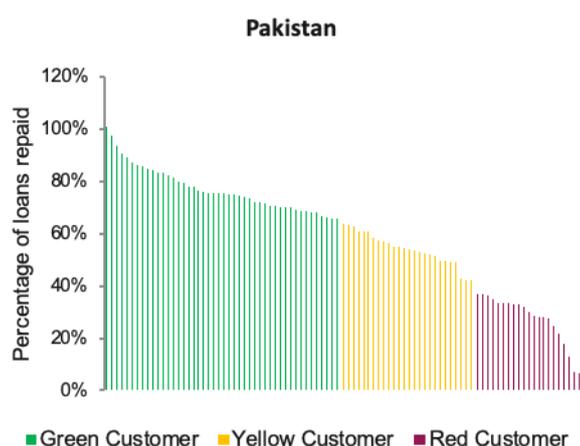


Figure 150 shows the distribution of households by percentage of loans repaid for the Pakistan sample (see Figure 151 for Mozambique and Tanzania). Each bar here corresponds to a specific smallholder household and the height of the bar shows the average percentage of loans repaid.¹⁰⁰ The Ward Linkage clustering method is applied to segment the sample into three groups: green customers, yellow customers and red customer. The clustering method produces groups with similar loan repayment figures based on the overall distribution of the diaries sample. For the Pakistan sample, households that have repaid more than 66% of their debt are defined as green – or good – customers. Households between 42%-66% are defined as yellow, and

¹⁰⁰ Note that the calculation of loan repayment only takes into account loans that were issued within the first 10 months of data collection. This is to reduce the bias of new loan accounts that are taken out towards the end of the data collection period and for which repayments are less likely to happen within the limited time frame (regardless of customer type).

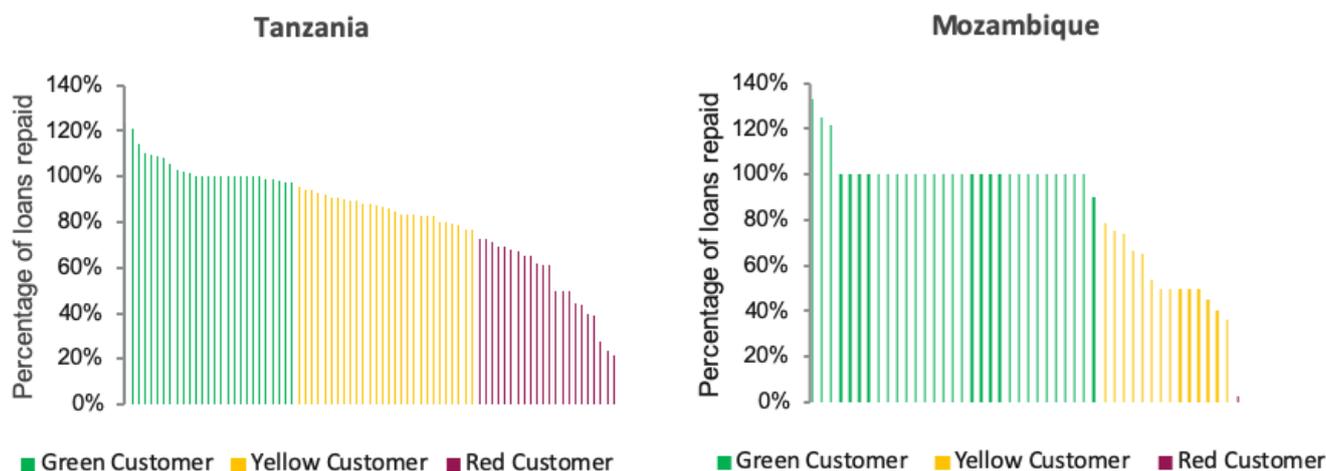
households that have repaid 0%-42% are defined as 'red flag' customers. A limitation here is that the diaries data does not indicate any due dates for loan accounts. There are also instances where new borrowings are taken out from the same loan account throughout the year. The size of the loan can therefore vary over time. It is therefore not straightforward to establish whether a loan is short-term or long-term.

It is important to note that the bounds to define green and red-flag customers are calculated based on the country-specific distribution of repayment rates using the Ward's linkage clustering method as describe in the methodology section of this paper. Comparing Figures 150 and 151 shows that the bounds determining the customer types varies across countries. This implies that no cross-country cut-off point for good or bad customer behavior is introduced but that the repayment behavior is interpreted within the country context.

This is necessary since households in different countries carry different loan portfolios which imply different loan repayment patterns (i.e.

short-term versus long-term loans). Households from Pakistan, for example, have on average repaid less of their outstanding debt than the Tanzania or Mozambique sample. Here it is important to note that due to different borrowing cycles, which can relate a lot to the Arthis and harvesting seasons in Pakistan, the country comparisons might be skewed depending on which time in the cycle the data collection ended. These households do however engage more often in several running loans at a time – more of which are long-term and larger in size. While households in Mozambique, on the other hand, have more often fully repaid their loans, these households do engage less frequently in borrowing and their loans are smaller in size and short-term – often coming from family and friends. Households in Pakistan can therefore not be expected to repay the same percentage of their overall debt in the same time frame than households in Mozambique. The interpretation of repayment rates and classification of customer types will therefore be made focusing on each specific country.

FIGURE 151: PERCENTAGE OF LOANS REPAYED FOR EACH HOUSEHOLD IN TANZANIA AND MOZAMBIQUE (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

In the following, more in-depth analysis of green, yellow and red customers in Pakistan is presented. Here we will use the segmentation shown in Figure 150 to analyze how the three different groups compare in terms of income, expenditures, asset purchases and sales, usage

of financial products as well as other socio-economic variables.¹⁰¹

¹⁰¹ Charts for Mozambique and Tanzania will be made available as part of the final submission.

FIGURE 152: PERCENTAGE OF EXPENDITURES TO INCOME AND PERCENTAGE REPAYMENTS TO BORROWINGS FOR GREEN, YELLOW AND RED CUSTOMERS IN PAKISTAN (SMALLHOLDER DIARIES)

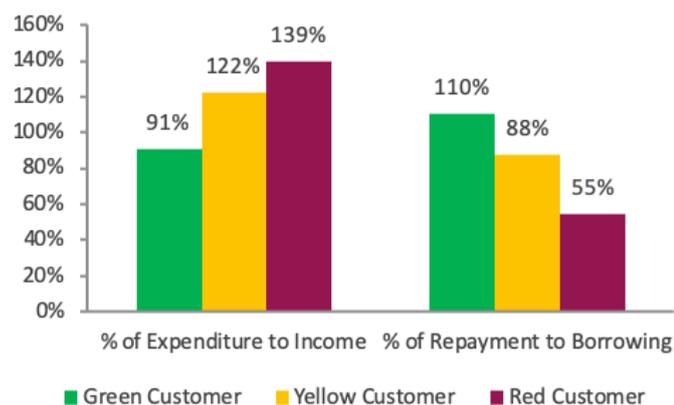
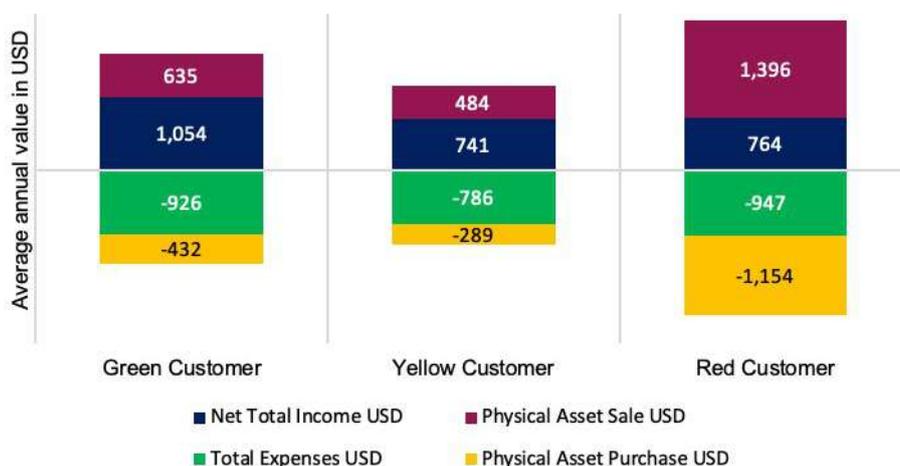


Figure 152 presents the percentage of total expenditures¹⁰² to net total income as well as the percentage of repayments to overall borrowings for households that were categorized as either green, yellow or red as described above. For the purpose of this calculation, transaction values of income and expenditures of households were summed-up over the year. The graph therefore presents an annual average for the different customer types. In terms of repayments the graph illustrates that households who are categorized as ‘green customers’ have on average repaid more than 100% of their debt¹⁰³ while ‘red customers’ have only repaid 55% of their debt.¹⁰⁴ In terms of expenditures the graph illustrates that ‘green customers’ only spend 91% of their net income on expenditures, leaving additional funding for repayments or other investments. Yellow and red customers do however spend more than they earn, which is financed through additional loans with red customer households overall taking out the largest amount of borrowings over the year.

FIGURE 153: AVERAGE NET INCOME, EXPENSES, ASSET PURCHASES AND ASSET SALES OF GREEN, YELLOW AND RED CUSTOMERS IN PAKISTAN (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

102 Expenditures here mainly include household expenditures. See methodology section of this paper for a detailed definition of which transactions are included here.

103 The additional 10% could be interpreted as interest. We can however not claim that green customers pay an interest rate of 10%. Since not all loans have been fully repaid, the interest and the simple repayment cannot be told apart in a straightforward way. Furthermore, there are close to no transactions that identify interest. The analysis can therefore not hypothesise about interest rates at this point.

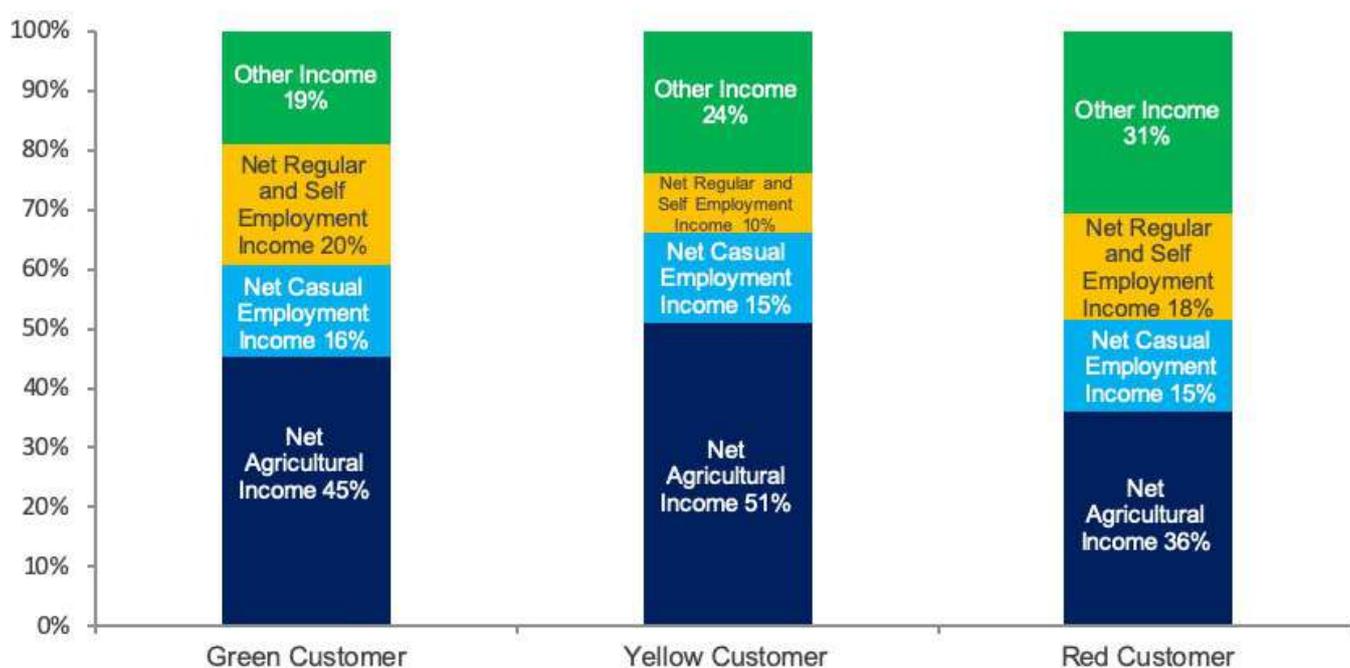
104 Note that Figure 152 includes the last two months of the enumeration period. Average repayment figures are therefore higher than in Figures 150 and 151, which exclude the last two months.

Figure 153 sheds more light on how the different customer types compare in terms of average net income, expenditures, and asset sales and purchases. Asset purchases and expenditures are net cash out flows and are therefore presented as negative numbers here. Each bar presents the average annual transaction volume in USD. It can be seen that while the green customers overall have the largest average net income, the red customer seems to trade a larger amount of assets throughout the year indicated by large asset sales and purchases.

Annex 3 Figures A3.35 and A3.36 show additional analysis on how different customer types sell and buy assets. We find that asset sales of red customers mainly consist of selling livestock (92%). This type of behavior could be interpreted as making use of long-term savings to finance household expenses and to service debt.

Figure 154 shows the share of different income sources out of total net income for the different customer types. While some similarities between the three groups can be observed, red flag customers seem to rely much less on agricultural income and much more on other income sources than yellow and green customers.

FIGURE 154: DIFFERENT INCOME SOURCES OUT OF TOTAL NET INCOME FOR GREEN, YELLOW AND RED CUSTOMERS IN PAKISTAN (SMALLHOLDER DIARIES)¹⁰⁵

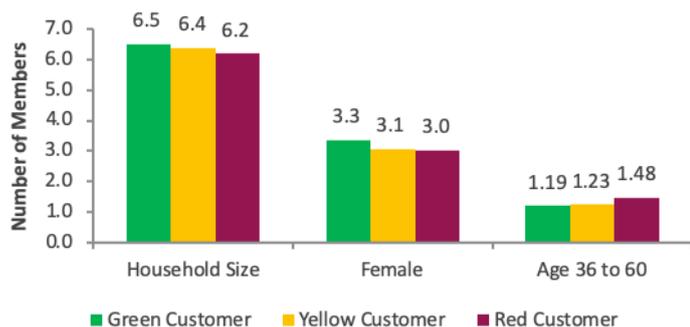


SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

Figure 155 compares the three customer types according to demographic factors such as household size, number of females who are part of the household and number of household members that are older (36-60).

¹⁰⁵ Note that *Other Income* includes receiving funds from family and friends, rental income and other government support.

FIGURE 155: COMPARING HOUSEHOLD SIZE, NUMBER OF FEMALES AND NUMBER OF OLDER HOUSEHOLD MEMBERS BETWEEN GREEN, YELLOW AND RED CUSTOMERS IN PAKISTAN



While trends are not pronounced the analysis shows that households categorized as ‘green’ do on average have more household members of which more are female compared to yellow and red customer households. Green customer households are also younger with fewer household members between 36 and 60.

FIGURE 156: COMPARING DIFFERENT KINDS OF EXPENSES FOR GREEN, YELLOW AND RED CUSTOMER HOUSEHOLDS IN PAKISTAN

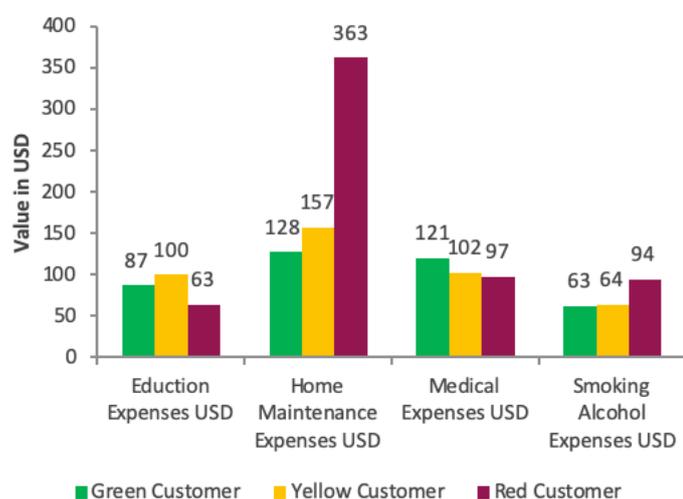


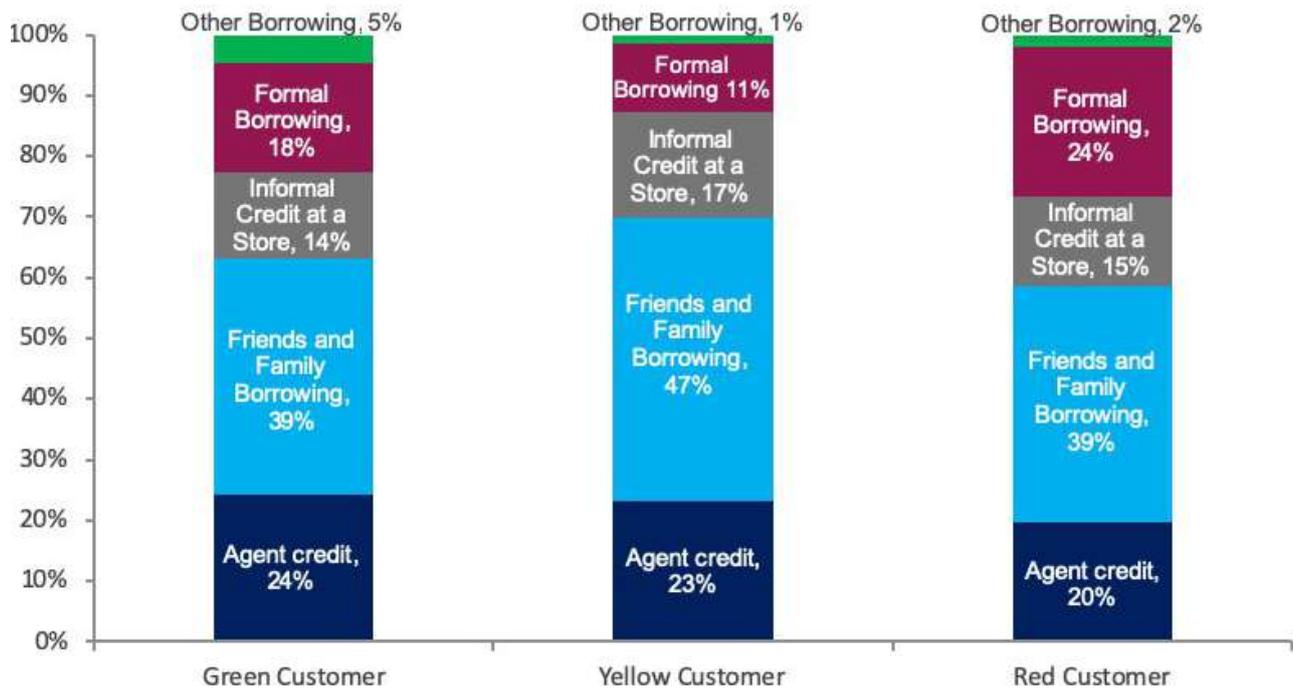
Figure 156 compares different kinds of expenses of green, yellow and red customer households. The height of the bars show the average amount that was spent by a certain household type throughout the year. The graph shows that red customer households spend less on education and on medical expenses while expenses for home maintenance are twice as much as those for yellow customer households. Red customer households also do spend more on smoking and alcohol when compared to other households.

Figure 157 compares the different kinds of loans used by the three different customer types. Here each bar represents the loan portfolio for the respective customer type. The percentages are based on the overall value of borrowings and disaggregated by types of loans. Interestingly the three portfolios are mostly similar with red customer households engaging most in formal borrowings when compared to other household types. When zooming in further into repayment rates for formal borrowings it can be found that red customers have the lowest repayment rate here compared to the yellow and green customer type (Annex 3 Figure A3.37). This confirms the overall average low repayment rates for formal loans of red customer households.



Photo: Ayesha Vellani / CGAP

FIGURE 157: LOAN PORTFOLIOS OF GREEN, YELLOW AND RED CUSTOMERS IN PAKISTAN



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

RESEARCH QUESTION 3.11

Can the data be useful in building credit reference models for smallholders? Are there elements in the data that can give smallholders a credit history or information trail FSPs can use to make lending decisions?

The scarcity of data to support credit decisions for smallholder farmers is a major barrier to the extension of financial services into rural areas and other data-light environments. Credit processes are often circular (you need a credit history to get credit...) and tend to rely on a small number of data points, such as salary and fixed asset-ownership, that rarely apply to smallholders. There has been some progress in recent years in development of models using alternative data – utility bills, mobile phone credit purchases, the data trail from mobile phone usage, social media networks and usage, value chain data and digital transactions – to predict the risk of lending to an individual or

business and their likelihood of repayment. Much of this has benefitted financial inclusion for urban, digitally active customers, for whom the quantum of alternative data has grown exponentially in recent years through accelerated penetration of smart phones.

Neither of the data sets that we are using here – smallholder national surveys and financial diaries – are particularly useful for FSPs in building credit reference models, which generally require personal level data that is relatively inexpensive to collect at scale. The surveys present a representative sample of anonymized household data, and therefore whilst the analysis is definitely useful to help FSPs understand the links between smallholder financial activity and credit risk, this data itself is of very limited utility in understanding how smallholder credit models could be developed at scale. The data collected by the diaries could theoretically be extremely useful in deciding the creditworthiness of households in the sample, but these sample sizes would need to be larger and this data was relatively expensive to generate.

This is not to say however that there are no elements in the data that can be useful for FSPs in building credit models. Though the data cannot be used for making individual or household level credit decisions, it can be useful in the aggregate to model demand and to predict behaviors based on samples of the smallholder population.

The surveys can be useful in modelling the usage of credit among various segments of the smallholder market. The approach that we have taken in questions 1.4-1.7, in which the usage of certain financial services is modelled as a function of a range of household characteristics and behaviors, could be instructive if a financial service provider wanted to understand more about current and potential users of formal credit. It could also help to build risk models by providing evidence on what kind of consumers would be less suited to credit products. However, this could only work in the aggregate.

The diaries could also be of some use to FSPs, if not to build statistically significant credit reference models but to provide some useful insights into how one small group of smallholder households are interacting with credit. For example, as we demonstrate in research question 2.5, there is some evidence of the relative importance of agricultural and non-agricultural cashflows in determining loan repayment. FSPs could extend this kind of analysis to study how other cashflows and variables (for example asset purchases and sales) relate to loan repayment.

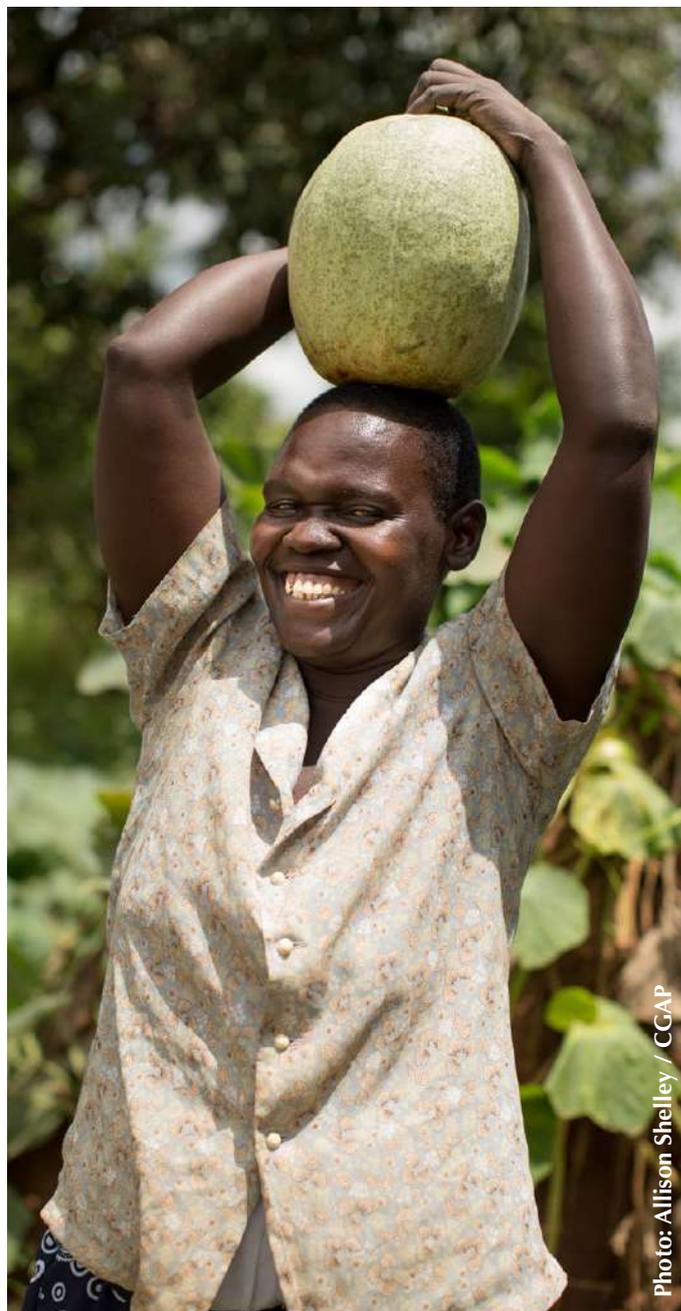


Photo: Allison Shelley / CGAP



Photo: Stephen Nwadior / blog.tradedepot.co

07

Smallholder Household Segments and Financial Services

SECTION 07 :: SMALLHOLDER HOUSEHOLD SEGMENTS AND FINANCIAL SERVICES

The analysis of the research questions presents a wealth of information on the characteristics of smallholder households and interesting insights into their financial behavior and needs. This section will highlight the key findings from the analysis, provide a suggested segmentation of households and focus on opportunities for financial service providers within each of these segments.

In drawing out themes across countries, it is important to note that the stage of financial sector development within a country is a strong determinant of access to and use of financial

services. The countries in our sample vary significantly in terms of the strength of the overall financial sector enabling environment and efficiencies in the banking network. Therefore, while the analysis can highlight opportunities for financial service providers it does not consider structural and regulatory barriers to increasing financial inclusion to the segments identified.¹⁰⁶ The analysis does, however, allow us to identify need and to justify a business case for development of products and services to this segment.

7.1 Segmentation of smallholder households

Despite country and regional differences, key themes and characteristics have emerged allowing us to profile smallholders. The characteristics of smallholder households combined with a consideration of how they manage their incomes and expenditures for resilience, investment and other needs has enabled us to propose an approach to segmentation based on the level of commercialization of the household.

Our index brings together a range of variables that point to the level of commercialization of a smallholder farmer relative to the population of smallholder farmers in their country. Using data from the national surveys we developed a composite index that ranked each respondent according to:

- Size of farm
- Sources of income
- Whether farming is considered a business (according to their perception)
- Contracts with sellers (if they have one)
- To whom they sell agricultural produce
- Types of labor used on-farm

¹⁰⁶ Alliance for Financial Inclusion “*Tanzania narrows the financial inclusion gender gap*” (May 2016) and Women’s World Banking “*A case study of policy change to support women’s financial inclusion*” (May 2016): The National Financial Inclusion Framework developed for Tanzania, for example, highlighted a number of deficiencies in the broader enabling environment for financial services. Deficiencies in the regulatory framework for microfinance services, stringent or lack of proportionate requirements for client on-boarding, delays in rolling out a national ID system, lack of a legal framework allowing for quick contract enforcement in the event of default, stringent Know-Your-Customer (KYC) requirements, high security requirements for bank branches, and the absence of an explicit financial consumer protection framework all impact on the risks and costs of working in this sector.

We then carried out a simplified cluster analysis to understand whether distinct groups existed with similar characteristics of commercialization in each country (see Box 1 for details).

Three segments emerged from this analysis.

1. Subsisting smallholder households. Subsisting, small-scale households are primarily rural, poor and have livelihood strategies centered on agriculture. They generally produce for their own consumption with some surplus traded or sold through local markets, cooperatives or middlemen. They farm small plots and supplement farm income with labor, mostly through casual employment. At times of high demand for labor (e.g. harvest) these farmers are supported by their family, friends and neighbors on a reciprocal basis. This group has the lowest incomes and also the lowest use of both formal and informal financial services.

2. Commercializing smallholder households. Commercializing households are following a livelihood strategy focused on increasing incomes through agriculture. They consider farming to be their main business and earn the majority (between 20% and 50%) of their income from agriculture. Agricultural activities are focused on production for sale, rather than consumption. They are also overwhelmingly rural but farm larger plots and hire in additional day-laborers from outside their immediate networks as required – often from nearby smaller-scale farming households. These farmers are well connected to value chains and sell to wholesalers or processors, often through formal contracts. They earn relatively high incomes and use a combination of formal and informal financial services.

3. Diversifying smallholder households. A third, smaller group follows a diversified livelihood strategy. While this group will still earn some income from agriculture, their primary income source is more likely to be their own business or regular or casual employment. They farm small plots and are much more likely to be found in urban or peri-urban environments – the proximity to urban settlements facilitating their diversification away from agriculture. Most crops that are farmed will be consumed within the household. Incomes tend to be similar or higher than commercializing smallholder households, and they make use of formal financial services such as banks or mobile money.



BOX 1: METHODOLOGY FOR SEGMENTATION OF SMALLHOLDER FARMERS BASED ON LIVELIHOOD

In the 2017 CGAP study, the Nathan Team segmented smallholder households into three groups – 1. Subsisting smallholder households, 2. Commercializing smallholder households, 3. Diversifying smallholder households, based on a commercializing index created using the following components and underlying variables.

Component 1:

- Crop and livestock sales

Component 2:

- Amount of agricultural land

Component 3:

- Perception of farmers' agricultural activities as a business
- Types of agricultural labor used
- Buyers of agricultural outputs
- Use of contracts to sell crops or livestock
- Main reported source of income

The final commercialization index is a sum across the component wise scores and is calculated at the household-level, taking responses from all household members into account. In other words, based on the responses from the questions related to these variables, scores were assigned to each smallholder household. Next, smallholder households were clustered by their scores using the Ward's linkage method to arrive at the index values and thereby the three segments. We define these segments as follows:

Subsisting smallholder households have livelihoods focused on agriculture and generate income from casual labor. They live largely in rural areas and have small farm plots. They generally produce output for their own family's consumption. Relative to the other segments, this segment has the lowest income.

Commercializing smallholder households largely consider farming a business and earn most of their income from agriculture. These smallholder households are better connected to the value chains. Though still poor, they earn relatively higher incomes than Subsisting smallholder households.

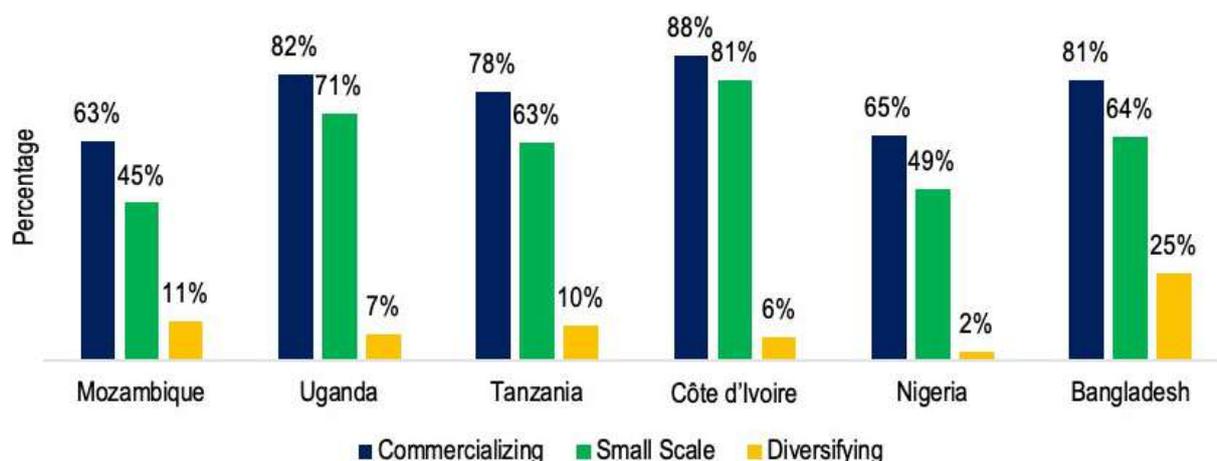
Diversifying smallholder households earn some income from agriculture, though their primary income source is more likely their own business or regular or casual employment. They have small farm plots and consume most of their agricultural outputs. Their income tends to be as high as or higher than Commercializing smallholder households.

TABLE 56: KEY CHARACTERISTICS OF THE THREE SEGMENTS BASED ON THE COMMERCIALIZATION INDEX

	Subsisting smallholder households	Commercializing smallholder households	Diversifying smallholder households
Source of Income	Agriculture and casual employment, often in agriculture	Mainly agriculture, may hire in additional labor	Regular or casual employment, own business, some agriculture
Farm size	Small/medium sized smallholdings	Larger smallholdings	Smallest
Crop variety	Consumption with some surplus for sale	Cash crops for sale	Consumption
Value chain	Direct to public or through cooperative or middleman, and no contract	Sell to wholesalers or processors, often with a formal contract	No contracts, crops occasionally sold locally
Location	Rural (70-90%)	Rural (70-90%)	Urban, peri-urban and rural
Income	Low	High	High
Financial products	Some informal	Formal and informal	Mostly formal

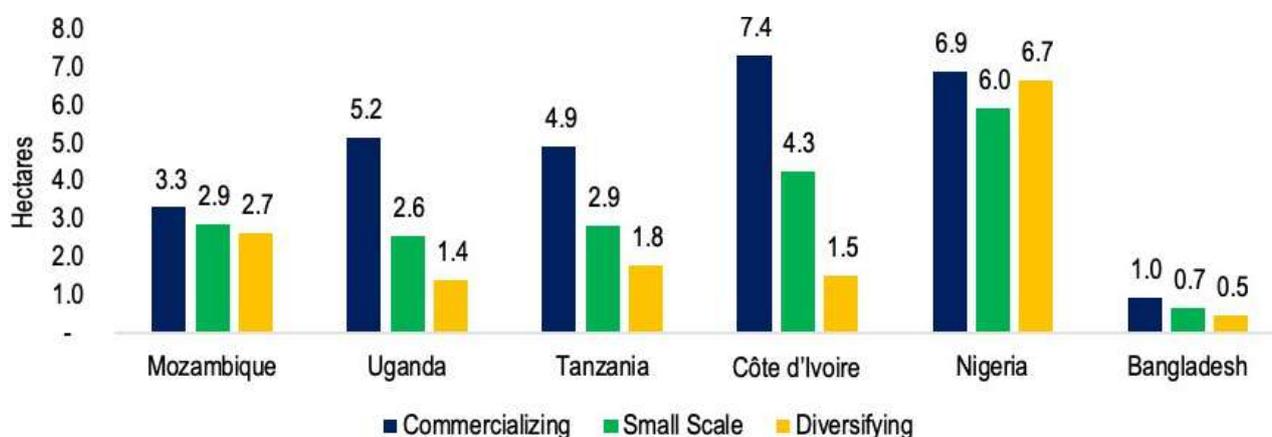
The following three graphs provide a summary of the three distinct groups in this segmentation.

FIGURE 158: RESPONDENTS FOR WHOM THE MAIN SOURCE OF INCOME IS AGRICULTURE



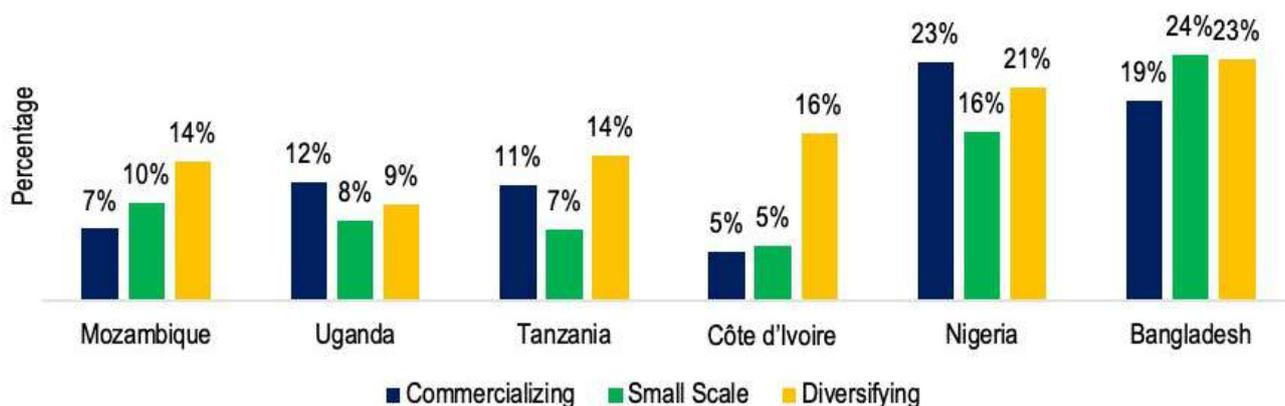
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

FIGURE 159: AVERAGE LAND HOLDING



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

FIGURE 160: PERCENTAGE OF RESPONDENTS WHO USE A FORMAL BANK ACCOUNT

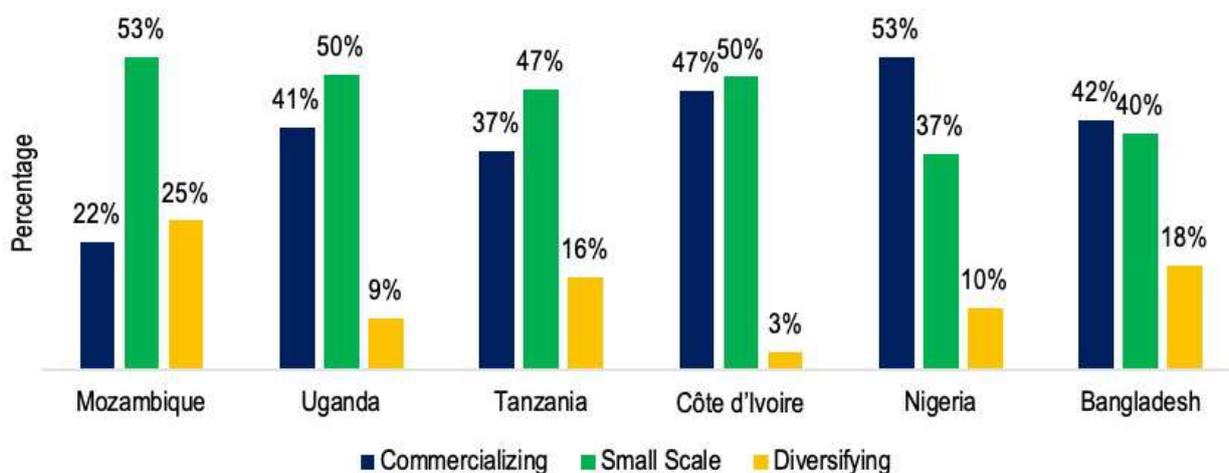


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The distribution of smallholder households across the three groups varies by country (Figure 161), however some consistent themes emerge in the distributions. Across the sample, diversifying households make up a smaller proportion of the

smallholder population, typically 10-15%. The remainder of the smallholder population tends to be split relatively evenly between small-scale and commercializing households.

FIGURE 161: DISTRIBUTION OF SMALLHOLDER HOUSEHOLDS USING SEGMENTATION BY COMMERCIALIZATION



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Although there is no clear trend on gender across all the countries, there are noticeable regional trends. There is a pronounced trend in the Eastern and Southern African countries (Mozambique, Tanzania and Uganda) for commercialized farmers to be mostly male and for diversifying farmers to be mostly female. In West Africa (Nigeria and Côte d'Ivoire) we see more male commercializing farmers, but the trends are weaker. In Bangladesh, there are similar percentages for males and females in all three groups.

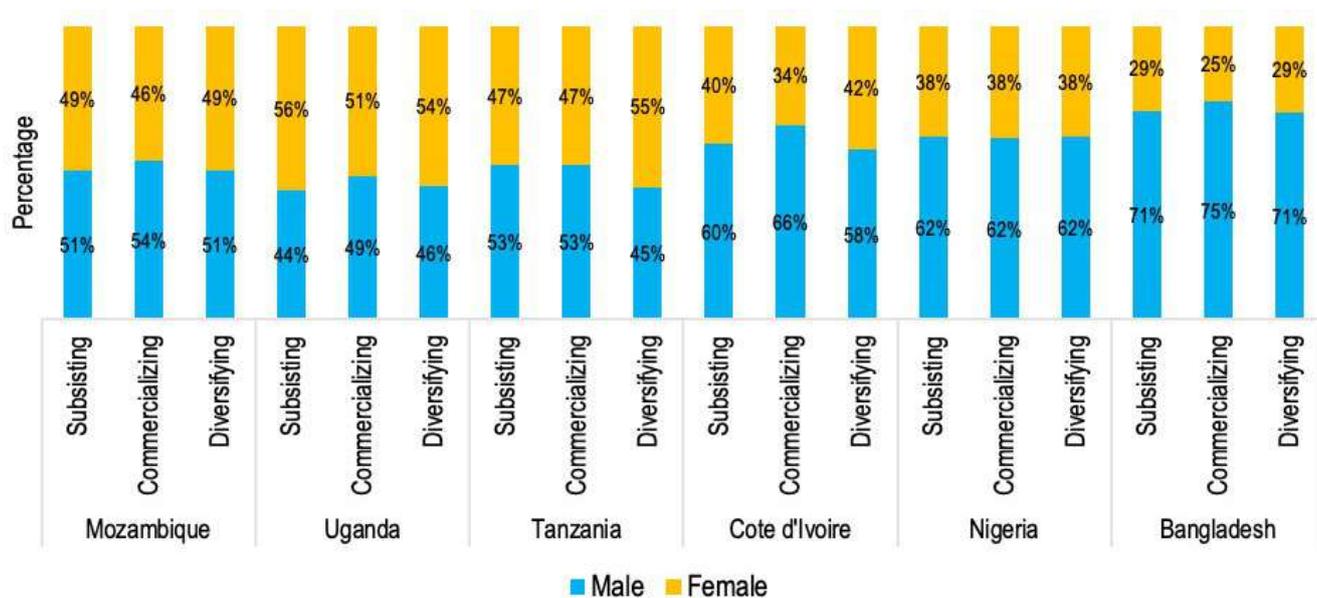
The segmentation approach allows us to determine clear patterns of financial needs within segments and if we compare this to existing usage, we can suggest potential opportunities for FSPs. It is important to note that, from the data available, we cannot always determine whether a financial product or service is not used because it is not needed, whether it is not offered or whether the smallholder does not have the financial literacy needed to demand it. Despite this the following opportunities are presented. For small scale households, financial service providers should consider products that promote

resilience. Our second group (commercializing smallholder households) presents opportunities for finance for growth and the third group (diversifying smallholder households) suggests opportunities for money management. Some of these opportunities are discussed in more detail below drawing on specific findings from the data.

Disaggregating segments of smallholder households

Across all countries, a higher percentage of male members of smallholder households belong to the Commercializing segment compared to the other segments. On the contrary, a higher percentage of female members are in the Diversifying segment across all countries (except in Uganda).

FIGURE 162: SMALLHOLDER HOUSEHOLD RESPONDENTS DISAGGREGATED BY GENDER AND SEGMENT

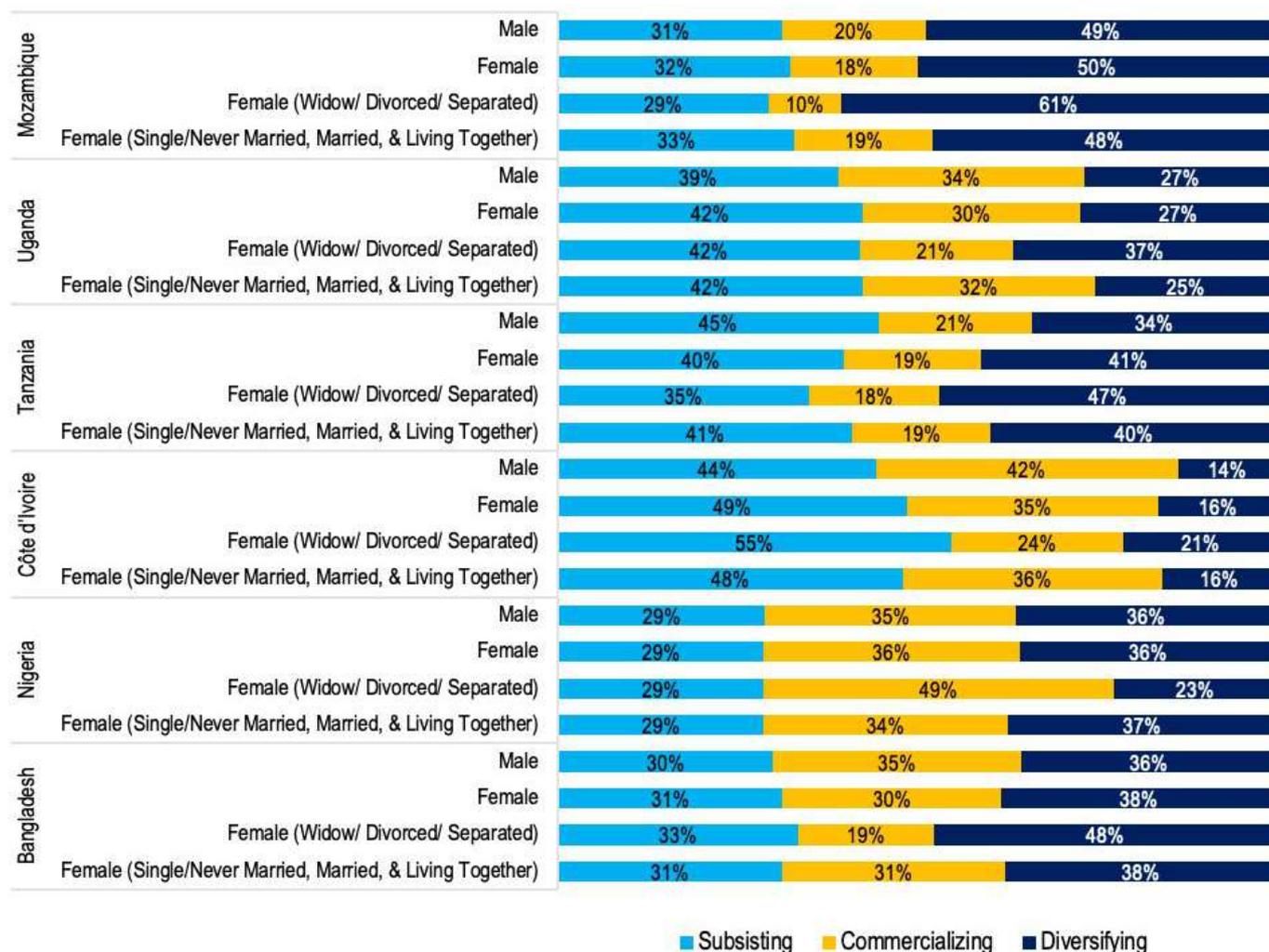


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

In most countries, women are more likely than men to be in the Subsisting segment of smallholder households. For example, in Côte d'Ivoire, among females over 15 years who live in smallholder households and who are widowed, divorced or separated, 55% are considered part of the Subsisting segment. Given the trends outlined earlier, two factors may be contributing to this trend and merit further analysis: one theory to test is that men are more able to leave subsistence households and break out on their own into other livelihoods. Adding to this trend might be the fact that women living with men (the majority of women) are less likely to diversify into other livelihoods, thus keeping their households at subsistence level.

Among women respondents who are aged above 15 years and widowed, divorced, or separated, a meaningful proportion in Bangladesh, Tanzania and Mozambique are in the Diversifying segment. In Mozambique, for example, among female members of smallholder households who are widowed, divorced, or separated, 61% are in the Diversifying segment.

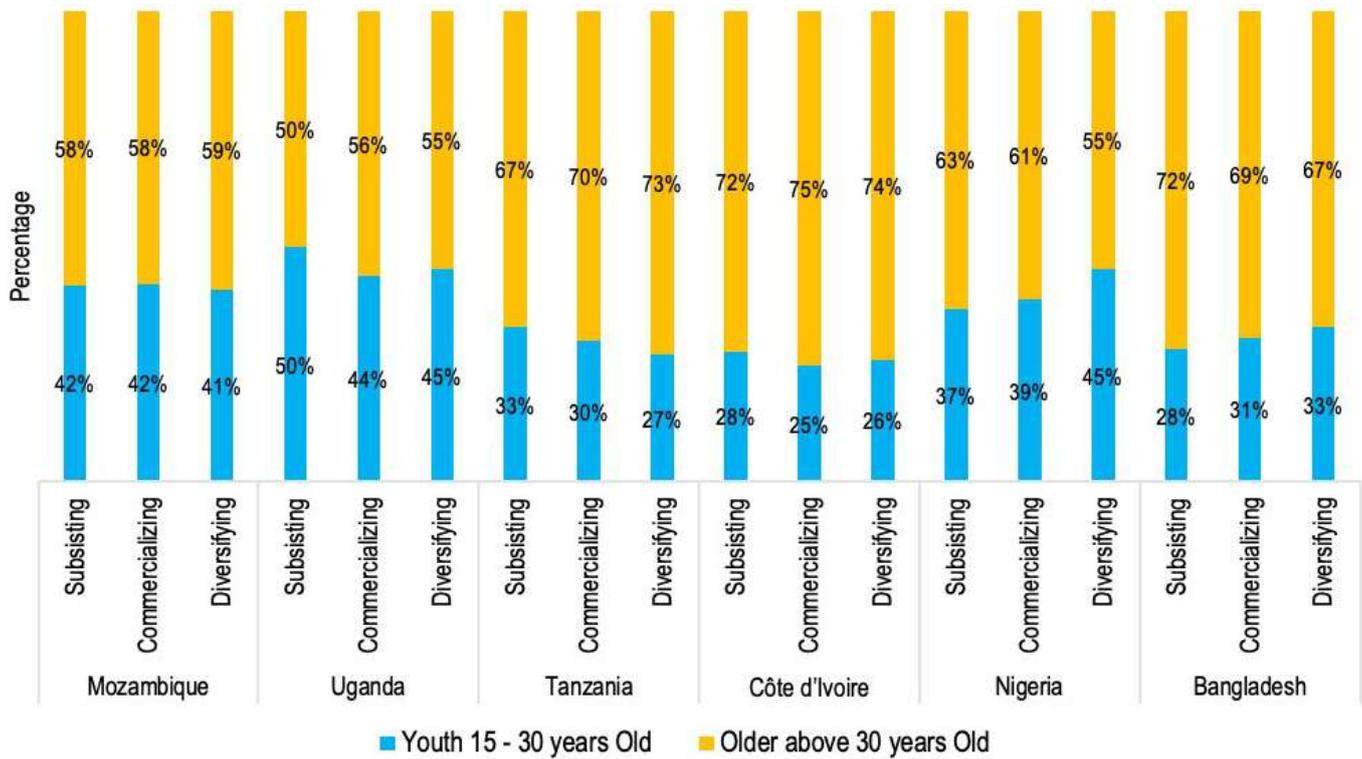
FIGURE 163: AGRICULTURAL LIVELIHOOD PROFILE BY SEGMENT AND GENDER



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Figure 164 shows the distribution of the respondents based on their age and the segmentation category. The distribution of youth aged 15 to 30 years across the different segments varies from one country in our sample to the other. In Côte d'Ivoire, for example, 28% of Subsisting smallholder household members are youth aged 15 to 30 years. Similarly, in Nigeria, 37% of Subsisting smallholder household members are youth aged 15 to 30 years. In Uganda and Cote d'Ivoire, a higher percentage of older respondents (aged above 30 years) are in the Commercializing segment compared to other two segments. Similarly, in Nigeria and Bangladesh, more percentage of youth respondents are in Diversifying segment compared to other two segments.

FIGURE 164: SMALLHOLDER HOUSEHOLD RESPONDENTS' AGE GROUP DISAGGREGATED BY SEGMENT



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Households in Commercializing and Diversifying segments report incomes higher than those in the Subsisting segment. The average monthly income is lowest in Uganda and highest in Bangladesh (Table 57). Barring Nigeria and Bangladesh, households in the Commercializing segment in all countries have the highest average monthly income compared to the other two segments. Members of smallholder households who diversify their farming operations have the highest average monthly incomes in Nigeria and Bangladesh.

Further, in most countries in our sample, all the three segments of smallholder households report that the monthly income is sufficient to cover their expenses. Particularly, the households of the Commercializing segment are able to fully cover their expenses. In 2 countries – Mozambique and Cote d'Ivoire, the Subsisting and Diversifying segments are unable to manage their monthly expenses from their incomes.

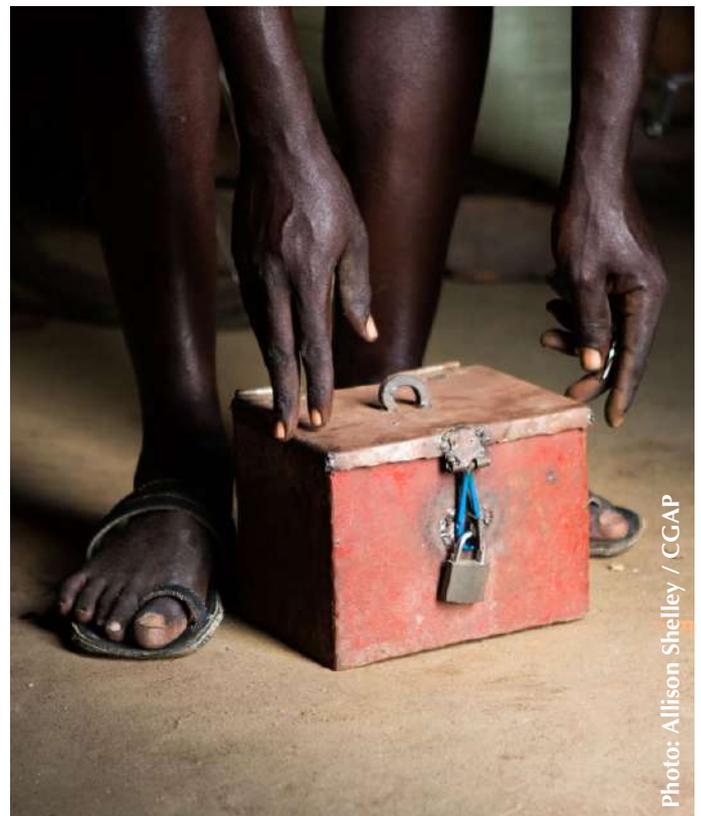


Photo: Allison Shelley / CGAP

TABLE 57: AVERAGE MONTHLY HOUSEHOLD INCOME AND EXPENDITURES (USD)

Country	Commercialization Type	Number of Observations	Monthly Mean Household Income USD	Monthly Mean Household Expenditure USD	HH Able to Manage their Monthly Expenses
Mozambique	Subsisting	458	\$52.2	\$53.8	No
	Commercializing	345	\$60.3	\$58.7	Yes
	Diversifying	686	\$59.9	\$73.6	No
Uganda	Subsisting	1,076	\$48.9	\$34.6	Yes
	Commercializing	875	\$68.7	\$37.0	Yes
	Diversifying	664	\$51.8	\$34.6	Yes
Tanzania	Subsisting	1,146	\$53.4	\$53.4	Yes
	Commercializing	586	\$64.3	\$64.3	Yes
	Diversifying	1,036	\$59.8	\$59.8	Yes
Côte d'Ivoire	Subsisting	1,265	\$134.6	\$137.8	No
	Commercializing	1,115	\$147.9	\$145.3	Yes
	Diversifying	396	\$145.0	\$150.5	No
Nigeria	Subsisting	766	\$116.8	\$85.1	Yes
	Commercializing	1,140	\$128.6	\$87.9	Yes
	Diversifying	937	\$137.4	\$95.3	Yes
Bangladesh	Subsisting	917	\$131.7	\$106.2	Yes
	Commercializing	1,139	\$144.1	\$117.1	Yes
	Diversifying	1,064	\$154.3	\$122.3	Yes

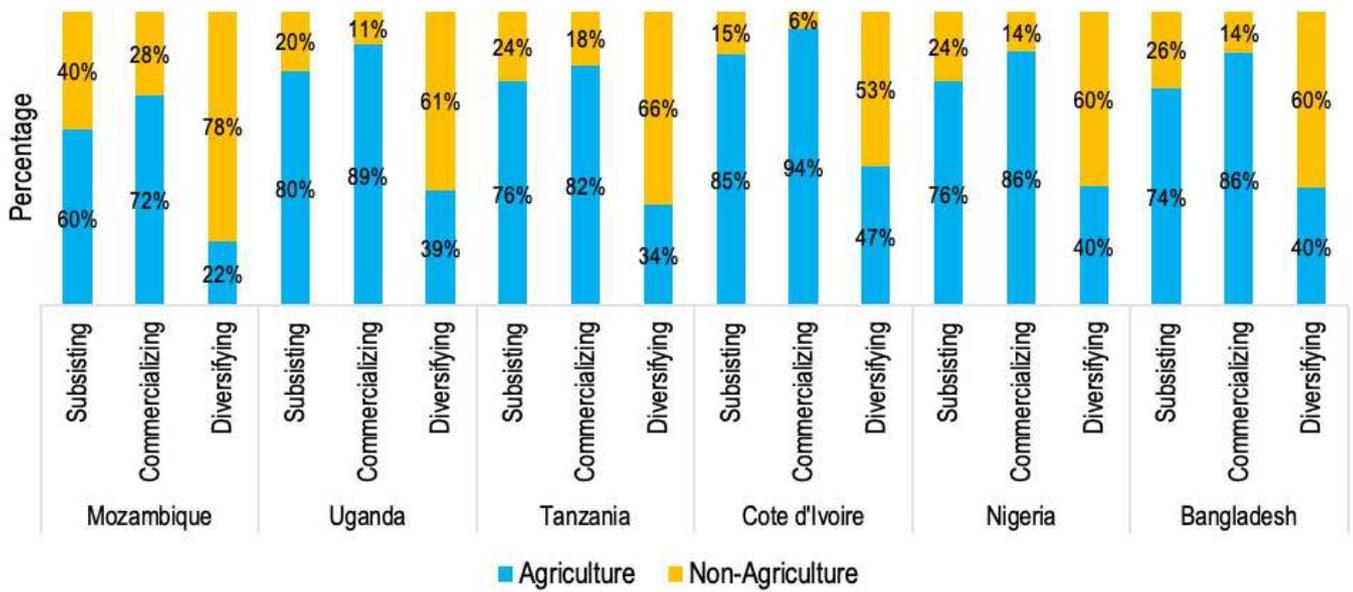
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

The average household expenditure was obtained from household dataset as per question number “D19 - What is the minimum amount your household needs to survive per month (for personal expenses)? I am talking about the amount that will cover just your basic needs for food, transport, cooking fuel, and clothes.” The values were in local country currencies. It has been converted into US dollars for comparison between the countries.

Note: Income and expenditure is calculated after removing outliers.

Most Commercializing households derive their income from agriculture. On an average, 85% of the Commercializing segment’s main source of income is from agriculture sector (Figure 165). Further, on an average, 75% of the Subsisting households’ main source of income is from agricultural activities. However, on average, only 37% of Diversifying households’ main source of income is from agricultural activities. These Diversifying households mostly depend on non-agricultural activities.

FIGURE 165: SMALLHOLDER HOUSEHOLDS' MAIN SOURCE OF INCOME BY SEGMENT



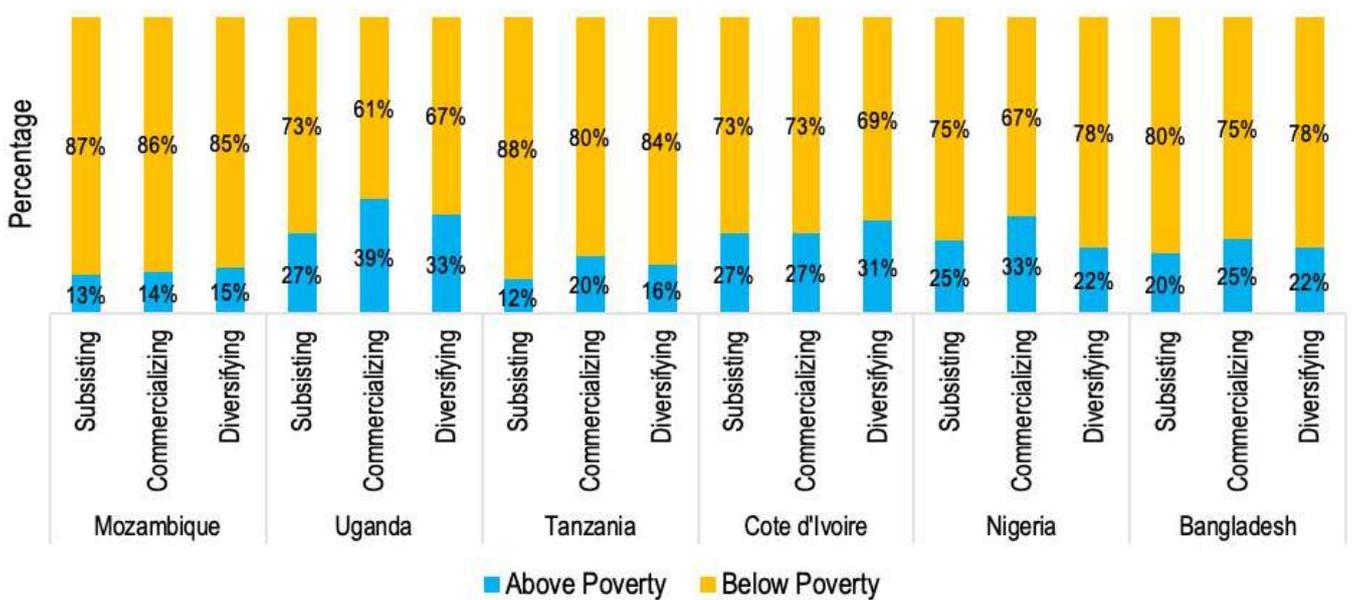
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

NOTE: SOURCE OF INCOME (QUESTION H2. WHICH OF THESE HAS BEEN YOUR MAIN SOURCE OF INCOME IN THE LAST 12 MONTHS?) FROM AGRICULTURE ACTIVITIES INCLUDES "GROWING SOMETHING AND SELLING IT" AND "REARING LIVESTOCK, POULTRY, FISH, OR BEES". NON-AGRICULTURE INCOME INCLUDES "WAGES FROM REGULAR AND OCCASIONAL JOB", "OWN BUSINESS", "GETTING PENSIONS, GRANTS, REMITTANCE" AND "OTHERS".

Across all countries and segments, more than 60% smallholder households are below poverty line (PPI Cut-Off - Eco-status \$2.50 per day). Within the three segments, on an average, only

26% of the Commercializing households, 23% of the Diversifying households and 21% of the Subsisting households are above poverty levels across all countries.

FIGURE 166: BELOW POVERTY LINE - PPI CUT-OFF - ECO-STATUS \$2.50

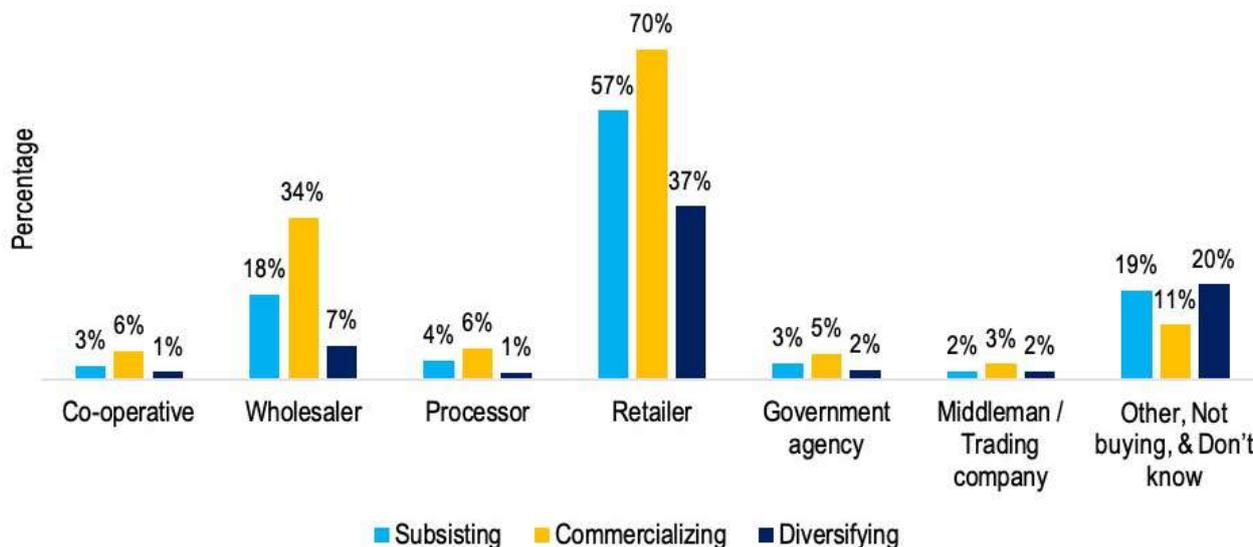


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

On an average, most of the smallholder household members across all study countries report that they purchase their main agricultural and livestock inputs from retailers. A higher percentage of Commercializing members compared to both Subsisting and Diversifying

members purchase their inputs from retailers. The second most reported source of inputs for Commercializing members are wholesalers, while the least reported source of inputs for both the Subsisting and Commercializing members are the middlemen or trading companies.

FIGURE 167: PURCHASE OF MAIN AGRICULTURAL AND LIVESTOCK INPUTS, DISAGGREGATED BY SEGMENT

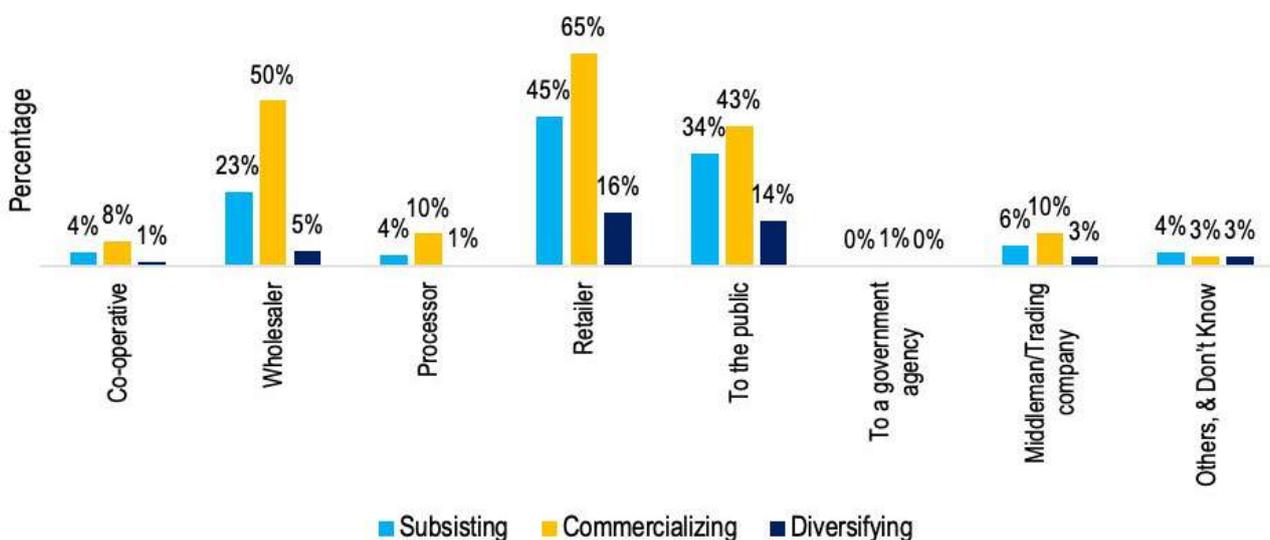


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.
 NOTE: THE PERCENTAGES IN THE ABOVE CHART ARE AVERAGE PERCENTAGES FROM THE SIX COUNTRIES BY SEGMENT.

Retailers are also important to the smallholder households for selling of crops and livestock. Most of the respondents across all study countries and segments report that they sell their crops and livestock to the retailers. The second most reported buyer of crops and livestock for

both the Subsisting and Diversifying segments is the public, while for the Commercializing segment, it is the wholesaler. Across all the segments, very few respondents report that they sell their crops and livestock to a government agency.

FIGURE 168: SALE OF CROPS AND LIVESTOCK, DISAGGREGATED BY SEGMENT

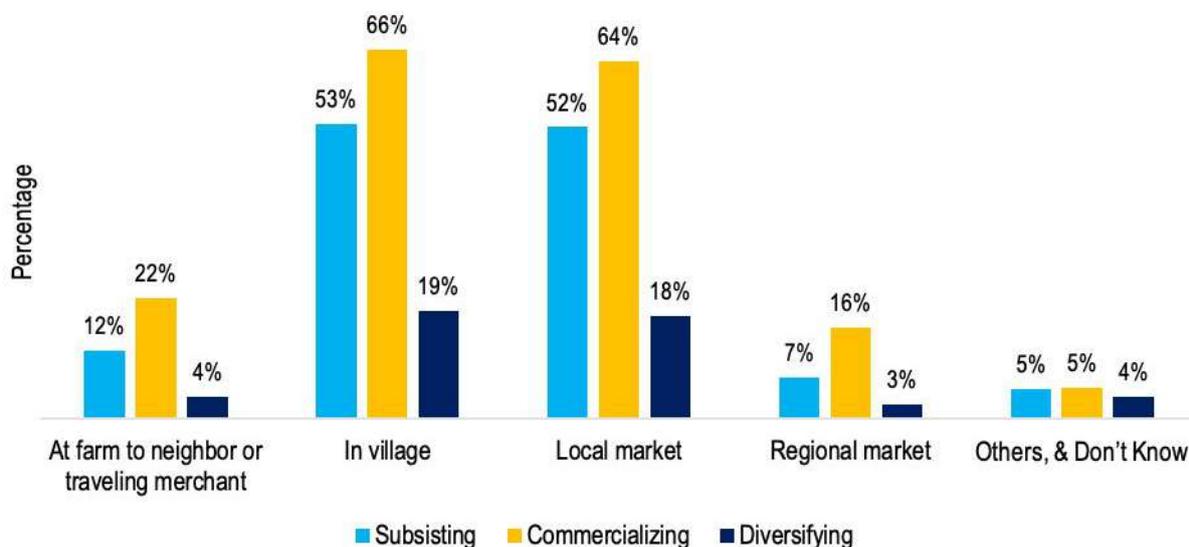


SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.
 NOTE: THE PERCENTAGES IN THE ABOVE CHART ARE AVERAGE PERCENTAGES FROM THE SIX COUNTRIES BY SEGMENT.

On an average, most of the respondents across all study countries and segments report that they sell their crops and livestock in their

village. The second most reported place of sale of crops and livestock across all segments is the local market.

FIGURE 169: NORMALLY SELL CROPS AND LIVESTOCK TO BY SEGMENT



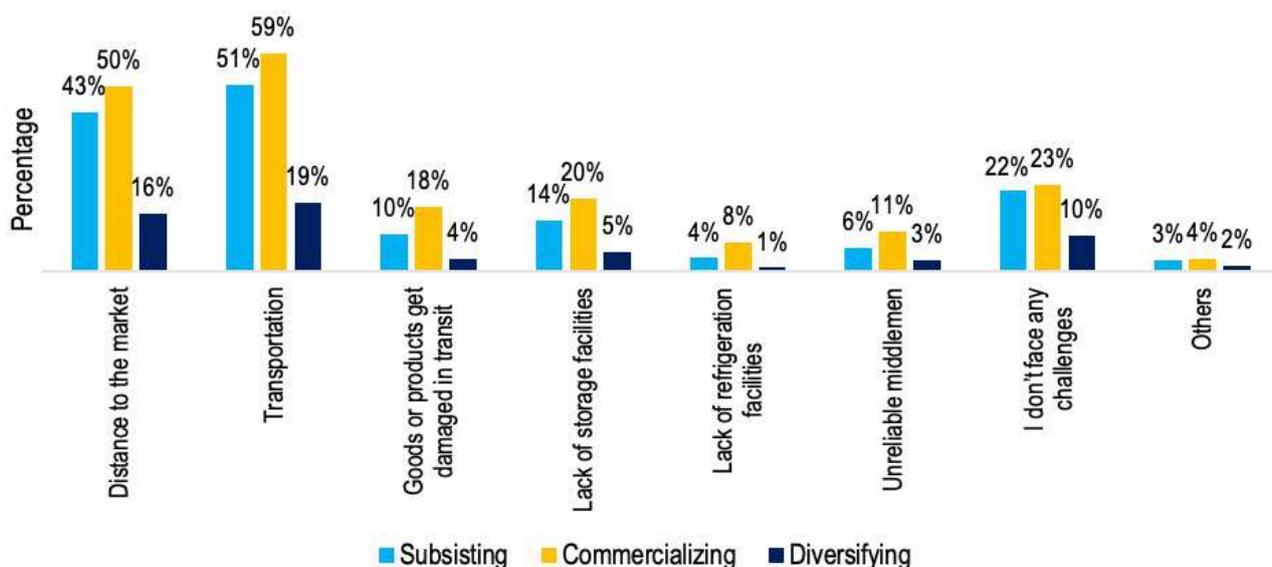
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

NOTE: THE PERCENTAGES IN THE ABOVE CHART ARE AVERAGE PERCENTAGES FROM THE SIX COUNTRIES BY SEGMENT.

On an average, most of the respondents across all study countries and segments report that logistical factors such as transportation and distance to the market are the major challenges faced by them in terms of getting their crops

and livestock to the customers. A significant percentage of farmers across all segments (about 20% across both Subsisting and Commercializing segment and 10% across Diversifying segment) report that they do not face any challenges.

FIGURE 170: CHALLENGES FACED IN TERMS OF GETTING CROPS AND LIVESTOCK TO CUSTOMERS, DISAGGREGATED BY SEGMENT



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

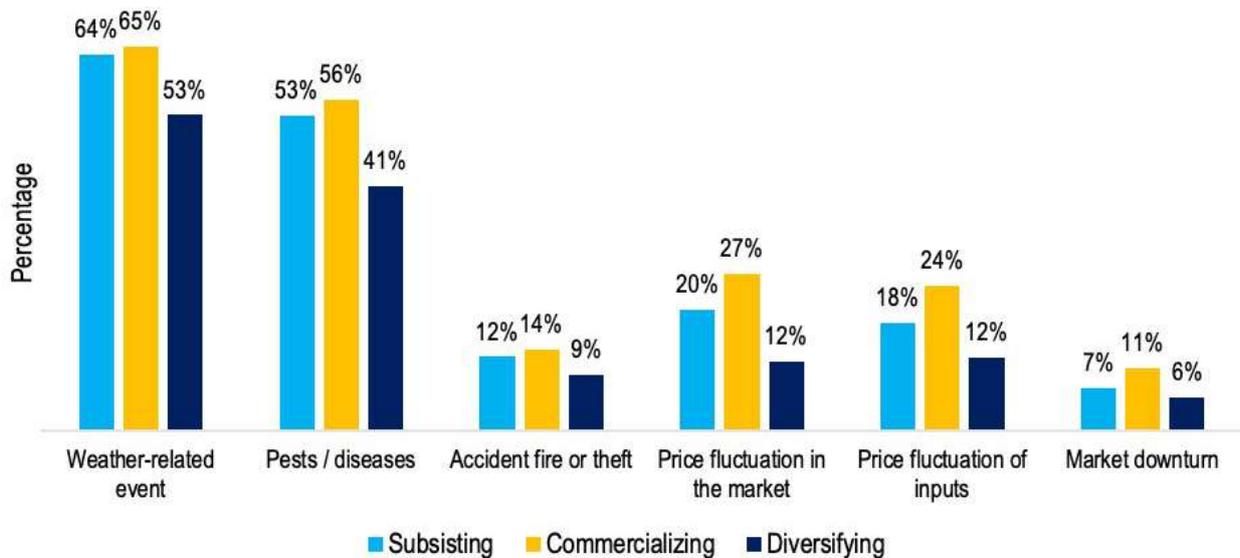
NOTE: THE PERCENTAGES IN THE ABOVE CHART ARE AVERAGE PERCENTAGES FROM THE SIX COUNTRIES BY SEGMENT.

On average, around 60% of the respondents across all study countries and segments report that their agricultural activities have been seriously affected by weather related events in the past three years.

Most respondents report that natural factors such as weather and pests/diseases have affected their agricultural activities (Figure 171).

Further, a significant percentage of smallholder farmer households across all the segments report that market factors such as unexpected price fluctuation for their produce, as well as unexpected price fluctuation of inputs such as seeds or fertilizers have seriously affected their agricultural activities.

FIGURE 171: FACTORS AFFECTING AGRICULTURAL ACTIVITIES IN THE PAST THREE YEARS, DISAGGREGATED BY SEGMENT



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

NOTE: THE PERCENTAGES IN THE ABOVE CHART ARE AVERAGE PERCENTAGES FROM THE SIX COUNTRIES BY SEGMENT.

Access to mobile money is low in Mozambique and Nigeria. Table 58 shows the status of mobile money usage in the study countries, along with the overall situation of financial inclusion. It can be observed that Tanzania has the highest percentage of respondents across all segments reporting that they have a mobile money account, followed by Côte d’Ivoire. Nigeria and Mozambique on the other hand, show negligible presence of mobile money, irrespective of the segment.



Photo: Allison Shelley / World Bank

TABLE 58: FINANCIAL INCLUSION DISAGGREGATED BY SMALLHOLDER HOUSEHOLD SEGMENT

Country	Commercialization Type	Number of Observations	Banking	Mobile Money	Other Formal (MFI, SACCO, Cooperative, etc.)	Informal Finance
Mozambique	Subsisting	692	8%	0.3%	2%	15%
	Commercializing	411	8%	1%	11%	27%
	Diversifying	1,078	12%	0.4%	2%	19%
Uganda	Subsisting	1,129	8%	18%	6%	43%
	Commercializing	890	11%	25%	9%	49%
	Diversifying	749	11%	21%	7%	39%
Tanzania	Subsisting	1,178	8%	45%	8%	15%
	Commercializing	565	13%	55%	10%	19%
	Diversifying	1,052	10%	49%	7%	21%
Côte d'Ivoire	Subsisting	1,352	4%	25%	4%	13%
	Commercializing	1,163	5%	27%	4%	22%
	Diversifying	434	10%	33%	5%	16%
Nigeria	Subsisting	796	19%	0.0%	5%	25%
	Commercializing	977	23%	0.3%	6%	27%
	Diversifying	1,000	22%	1%	3%	24%
Bangladesh	Subsisting	935	20%	16%	35%	15%
	Commercializing	1,030	20%	16%	34%	14%
	Diversifying	1,120	25%	23%	25%	9%

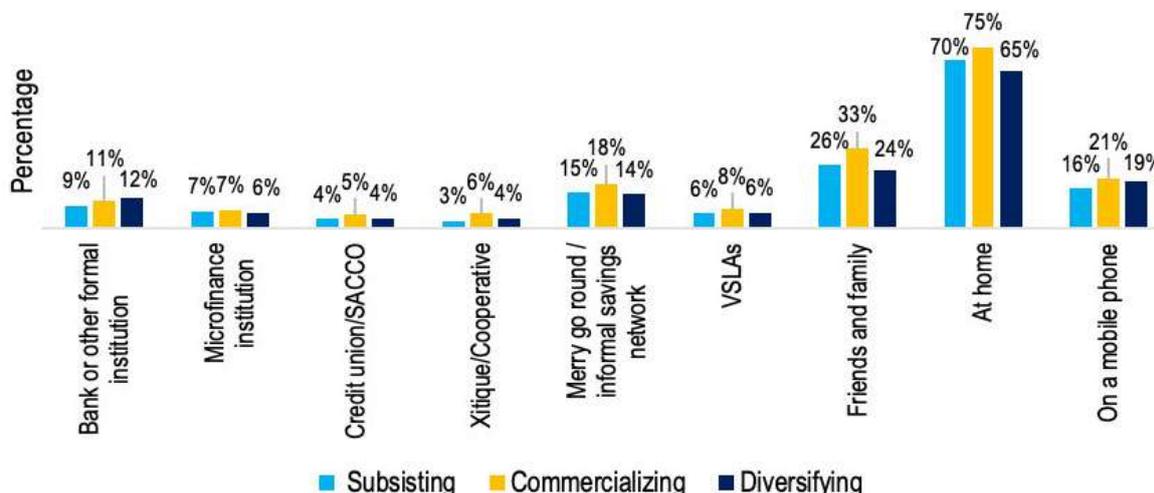
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

On an average, almost 70% of the respondents across all study countries and segments reported that in the last 12 months, they parked their savings at their homes.

The most reliable channel of savings for smallholder households after their homes, and

family and friends, is the mobile money platform. This observation implies that while smallholder households still prefer informal channels for their savings, the knowledge of use and access to mobile phones offers a convenient channel for savings among other formal finance channels.

FIGURE 172: SOURCE OF SAVINGS IN PAST 12 MONTHS



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

NOTE: THE PERCENTAGES IN THE ABOVE CHART ARE AVERAGE PERCENTAGES FROM THE SIX COUNTRIES BY SEGMENT.

Almost 67% of the Commercializing household members would like to have a formal loan from a bank and/or mobile money across six countries. Table 59 shows the members from smallholder households who indicate that they would be interested in a loan from a formal financial institution. Across the study countries and segments, most respondents in Côte d'Ivoire have indicated that they wanted

a loan from a bank or a mobile money agent, while least number of respondents from Nigeria reported this. A common trend observed across the countries is that the members in the Commercializing segment correspond to the segment that most want a loan, the highest being the members of Commercializing segment in Côte d'Ivoire.

TABLE 59: SMALLHOLDER HOUSEHOLD RESPONDENT'S FINANCIAL ACCESS TO BANK AND/OR MOBILE MONEY BY COUNTRY AND SEGMENT

Country	Segment	Currently have Loan	Currently don't have any loan	Total Observations	Need Loan	Don't Want Loan	Percentage of respondents who currently have loan	Percentage of respondents who need loan
		[a]	[b]	[c]	[d]	[e]	[f]=[a]/[c]	[g]=[d]/[c]
Mozambique	Subsisting	37	655	692	390	265	5.4%	56.3%
	Commercializing	52	359	411	232	127	12.7%	56.4%
	Diversifying	68	1,010	1,078	524	486	6.3%	48.6%
Uganda	Subsisting	56	1,072	1,129	600	472	5.0%	53.2%
	Commercializing	56	834	890	514	320	6.3%	57.8%
	Diversifying	35	714	749	364	350	4.7%	48.5%
Tanzania	Subsisting	58	1,120	1,178	898	222	4.9%	76.2%
	Commercializing	39	526	565	447	78	6.9%	79.2%
	Diversifying	53	999	1,052	729	270	5.0%	69.3%
Côte d'Ivoire	Subsisting	70	1,282	1,352	1,114	168	5.2%	82.4%
	Commercializing	62	1,102	1,163	971	130	5.3%	83.5%
	Diversifying	37	397	434	344	52	8.6%	79.4%
Nigeria	Subsisting	31	765	796	397	368	3.9%	49.9%
	Commercializing	33	945	977	524	421	3.3%	53.6%
	Diversifying	43	957	1,000	345	612	4.3%	34.5%
Bangladesh	Subsisting	67	868	935	536	333	7.1%	57.3%
	Commercializing	83	947	1,030	679	269	8.1%	65.9%
	Diversifying	75	1,045	1,120	508	537	6.7%	45.3%
Overall	Subsisting	319	5,762	6,081	3,934	1,828	5.3%	64.7%
	Commercializing	325	4,712	5,037	3,368	1,344	6.5%	66.9%
	Diversifying	311	5,122	5,433	2,814	2,308	5.7%	51.8%

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

Table 60 summarizes the smallholder household members' profiles using 6 country averages of the agricultural and financial characteristics for the three segments discussed above. The members of smallholder households in the Commercializing segment perform better than the members in the

other two segments. Throughout the segments, almost 40% of the respondents are financially excluded indicating potential for FSPs to increase coverage by developing tailored products and services for these segments.

TABLE 60: SMALLHOLDER HOUSEHOLD MEMBERS' PROFILES BY SEGMENT [A]

PROFILE DETAILS	SUBSISTING	COMMERCIALIZING	DIVERSIFYING
Demographic			
Male	57%	60%	55%
Female	43%	40%	45%
Youth 15 -30 Years Old	36%	35%	36%
Older Above 30 Years	64%	65%	64%
Poverty Index (PPI)			
Above Poverty Index	21%	26%	23%
Below Poverty Index	79%	74%	77%
Agricultural Activities			
Average land holding (in Hectare)	3.80	4.95	2.77
Participation in household agricultural activities ^[b]	96%	100%	74%
Income/Expenditure			
Average Monthly Household Income (USD)	\$92	\$106	\$103
Average Monthly Household Expenditure (USD)	\$84	\$88	\$100
Using Financially Services			
Banked	11%	13%	15%
Mobile Money	14%	16%	16%
Other Formal	8%	9%	7%
Informal	20%	21%	19%
Financially Excluded ^[c]			
Excluded	47%	41%	44%
Loan Taking Behavior			
Currently have loan from Bank or Mobile Money	5.3%	6.5%	5.7%
Want to have a loan from Bank or Mobile Money	64.7%	66.9%	51.8%
Investments			
Purchased livestock as an investment	32%	40%	27%
I want to expand my agricultural activities by looking at new products and/or markets	82%	85%	63%
Have a contract to sell any of your crops or livestock	4%	12%	3%
Consider your farm to be a business	64%	72%	31%

Notes:

[a] The percentages and values in this table are average percentages from the six countries by segment.

[b] Household members aged above 15 years old and contribute to household's income. Source: Multiple respondent's questionnaire.

[c] The percentage in each segment that are not using any of those 4 financial services like bank, mobile money, other formal and informal.

SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLD, MULTIPLE AND SINGLE DATASETS, 2016 AND 2017.

7.2 Opportunities for financial service providers

From the analysis, ten key opportunities for financial services providers have been identified and agreed with CGAP.

Opportunity 1: Increase provision of formal financial services to women in Tanzania

Women present a key potential growth area for formal financial service providers. With the exception of Bangladesh, the analysis shows that women still fall significantly behind men in the usage of formal financial services and are more likely than men to look to informal suppliers of finance.

Focusing on Tanzania, the data shows the following trends:

- Women are more financially active than men but the services they use tend to be characterized by smaller more frequent amounts. The most active area of transactions for women falls under expenses implying that, women play a very active role in managing household finances.
- Specifically, women make more savings transactions and of higher value than men. Women make a similar number of withdrawals to men, but tend to be higher in value, possibly for larger household expenditures.
- Men make more borrowing transactions and are more likely to conduct repayments in a smaller number of large value transactions, while women tend to make more, lower value transactions.
- Women are much more likely to use informal channels particularly for savings and borrowing. The tendency to use informal services is supported by survey data that confirms men are 10% more likely to have formal account than women, and women are 5% more likely to use informal services than men.

The implications for FSPs are considerable. It is not only the size of the transaction but also the frequency that is important, with data confirming that women in Tanzania are very financially active. As highlighted above, the majority of this demand is currently being met by informal providers, which suggests a potential market for FSPs. A group like this with relatively uniform and predictable behavior can be important for an FSP looking for quick scalability within a new market and product design should focus on the transactional nature of their behavior.

Opportunity 2: Target savings products at youth

Age is significant in determining the likelihood of financial inclusion. People in the 31-45 age group are more financially included than those in 46-60 age group and the oldest and youngest sections of the population are most excluded from accessing financial services. A further analysis of the financial behavior of youth has highlighted an opportunity to serve this segment.

Counter to the common perception of youth populations, diaries data shows that under 30s in smallholder households make larger savings deposits than any other age group. Encouraging savings in youth has been promoted as a key way to increase financial awareness and can provide a stepping stone to the use of other financial products. In addition to this, linkages have been shown between the level of savings and youth entrepreneurship. Given this, the propensity to save is good news from both a development and FSP perspective and suggests that FSPs looking to design products that meet the needs of younger members of smallholder households should prioritize savings. Shifting emphasis from credit to savings may also lead to greater transaction sizes.

Further research could consider what youth are saving for, allowing FSPs to specifically tailor products for this market. In designing relevant and cost-effective savings products, FSPs should also consider the most appropriate means of delivery and mobile money platforms could offer an opportunity in this respect (see Opportunity 4).

Opportunity 3: Educated Smallholders make more use of formal financial services. Potential to expand select products to less educated.

National surveys data implies a correlation between education and usage of formal financial products showing that educated smallholders make more use of accounts with registered banks and mobile money accounts in particular. While this may not be considered surprising and suggests a ready market for FSPs, it also emphasizes the importance of considering the financial literacy of potential clients and the need to cater financial products to the level of education obtained.

It is also clear that, across all three countries, the more educated group has a higher total net income than the less educated group; analysis of where this income comes from can provide insights for product development. For Pakistan, for example, the data shows that more educated individuals generate more profits from self-employment and agriculture, while less educated individuals focus more on casual employment. We also find that more educated individuals are financially more active with higher borrowings and savings withdrawals. The less educated, on the other hand, invest more in assets which could be regarded as an alternative way of savings or possibly a necessity as savings products are not offered to this cohort.

Looking at savings behavior in more detail shows that less educated individuals engage more in informal savings while more educated individuals tend to use more formal savings providers. This reinforces the suggestion above that the less educated may not have access to formal savings products and, therefore, represent an opportunity for FSPs. In Uganda, Mozambique and Nigeria, the data shows that the least educated smallholders (primary school education or less) are significantly more likely to use informal services. While the findings here are not new, they do highlight that although current demand for formal financial services may be low, if FSPs can provide relevant and correctly priced savings products for this segment, there may be the potential to graduate to the use of other formal financial products representing an

opportunity for FSPs (and an incentive to reach out to this traditionally high cost segment) and a benefit to smallholders.

As a public good, financial literacy training is often an investment that private sector financial institutions are reluctant to undertake, however, product specific training can make significant differences in terms of uptake numbers and sustainability of use.

Opportunity 4: Potential to expand digital financial services - particularly to youth.

Somewhat surprisingly, the data shows that digital financial inclusion tends to spike around the 31-35 age bracket, while those under 20 (who we might expect to have higher capacity for digital services) have very low levels of digital financial inclusion.

Further analysis shows that the likelihood of young people having a mobile phone is high. If we consider the 21-25 age range, the percentage of respondents who own a mobile phone ranges from 70% in Mozambique to 92% in Bangladesh. In Nigeria, this age group is more likely to own a mobile phone than any other (with 84% ownership).

Despite relatively high mobile phone ownership, the penetration of digital financial services is low. In Mozambique and Nigeria there is little or no use of mobile money and more research would be needed to explore the reasons behind this and to build a business case to expand into this segment. In Bangladesh, although 90% of this age range own a mobile phone, only 20% use mobile money. This represents a huge opportunity for financial service providers to target technically savvy youth that own a phone but have not yet used digital financial services. While this segment may have limited financial assets, a strategy that facilitates the receipt of transfers, focuses on transactional needs and provides savings solutions (as highlighted in opportunity 3) will add value to youth.

If we look at opportunities by gender, with the exception of Mozambique (where women are 2% more likely to own a mobile phone), women

are between 9 and 14% less likely to own mobile phone than men dependent on age, but between 4 and 10% less likely to have a mobile money account. This shows that men are not being disproportionately reached by existing mobile money providers, although the transactional nature of mobile money platforms can make women ideal customers for this product.

The data also shows relatively high digital financial inclusion for older groups. While mobile money accounts tail off for older populations, in all countries a significant portion of smallholders over 70 do have a mobile money account. Who is operating these accounts may be a different matter as, in some cases, young people have been found to be managing mobile wallets on behalf of their parents. In Bangladesh, smallholders aged 61-65 are more likely to have a mobile money account than those below 20. Although the provision of digital financial services to older people is not seen as a real growth area for financial service providers, it may tell us more about how institutional payment preferences are beginning to change.

Further research should consider current barriers to the use of digital financial services. There is a greater use of mobile money in urban areas which could suggest that more rural households lack access to a mobile agent or lack mobile signal coverage. Other barriers could include high costs and negative perceptions of these services and low literacy levels resulting in a lack of confidence to move to digital transactions. The diaries and survey data can also suggest what type of digital financial services to offer to whom with relatively simple transactional services such as sending and receiving money representing a potential starting point. In a recent study, BRAC found that connecting mobile money service offerings with specific needs helped program participants to recognize the value of the services provided. As the pilots progressed, some participants also were able to envision additional ways of using mobile money.¹⁰⁷

Opportunity 5: Increasing understanding of agricultural livelihoods strategies can allow formal FSPs to capture new markets through design of credit and risk mitigation products that address the specific needs of each segment.

Agricultural income is important for the majority of smallholder families. Even for those who have alternative incomes (e.g. from employment), the data shows that the agricultural cycle has a large impact on cashflows. Agricultural income is also seen to be a key driver of loan repayments in many countries, which has interesting implications for FSPs.

In Pakistan, for example, there is significant variation in both net agricultural income and in repayments per month. The diaries data shows that a spike in repayment is preceded, in the previous month, by a spike in agricultural income. This strongly indicates that loan repayments may be related not only to current month's income but also to lagged agricultural income. Repayment of loans following harvest implies that people are borrowing against the expected value of their yield. In Pakistan, where smallholders use the most credit, the Arthi system is one example of where smallholders are doing just that. Under this system the ultimate buyer of the produce provides inputs or input loans to smallholders and allows them to repay when produce is sold. While this example may suggest that demand is already being satisfied by the Arthi system, it demonstrates the importance of tailoring products to actual need (something that FSPs are sometimes slow to embrace). The advantage that FSPs have in working in this area is access to capital, transparency and the ability to offer complementary financial services such as leasing or insurance.

¹⁰⁷ <http://www.financialaccess.org/blog/2016/1/19/can-bangladesh-youth-drive-mobile-money-adoption>

In Pakistan both agricultural and non-agricultural income are factors in contributing to loan repayment. In Tanzania, however, agricultural income is the dominant income source that goes towards repaying loans. In this situation, FSPs may want to consider bundling loans with agricultural insurance products to mitigate loan default risks or unexpected shocks for agricultural smallholders (see opportunity 9).

Further analysis of the diaries data suggests that distinguishing the source and use of the loan is important to arrive at more precise opportunities for FSPs. In Mozambique there is a positive and statistically significant correlation between non-agricultural income and total expenses, total deposits, total withdrawals and total repayments. Therefore, for this sample it appears that non-agricultural income plays a more significant role than agricultural income in determining most financial behaviors. For Mozambique, where the majority of loans are provided by informal providers and paid largely from non-agricultural income, risk plays a key factor in business case justification for FSPs. Considering this, FSPs could potentially begin by targeting savings tools and transaction-based services with the objective of graduating customers to tailored credit products over time.

Opportunity 6: FSPs have the potential to increase services to households with strong links to value chains.

The data suggests that stronger value chain linkages are associated with higher incomes, more use of formal financial services and crop diversification. By understanding the opportunities and risks of a specific sector and the financing needs throughout the value chain, FSPs can tailor products according to real demand and minimize risk through tailored credit terms that consider inbound and outbound transactions along the value chain. Unlike some of the earlier opportunities discussed, the data presented does not indicate uniform opportunities across countries but can help highlight what types of household present the best opportunities within each country.

In Mozambique those with medium linkage to value chains (see question 1.9) remain the best prospect for FSPs. Further analysis shows that only 6% of smallholders with medium linkages to value chains are using both formal and informal services with 19% using informal financial services alone. Interestingly 72% of who are not using formal or informal accounts.

In Bangladesh and Tanzania, the use of formal services are much more prevalent across all actors in the value chain but there is the potential to expand services to these segments. Value chain financing often comes from within, for example member organizations providing inputs on credit to members for payment at a later date or buyers advancing credit to small producers. Formal FSPs can add to this by setting up cost and risk sharing arrangements with other major partners in the value chain (such as aggregators, processors and input suppliers. Already established products such as inventory credit, leasing products, warehouse receipts systems and factoring all provide potential opportunities to FSPs to expand services within value chains.

More in-depth analysis could also look into exactly which role formal financial services can play in value chains and how financial and non-financial services (such as business development services to support growth) could reduce the barriers for smallholder farmers to participate in higher value-added value chains.



Opportunity 7: More commercialised farmers provide a strong potential market for formal FSPs. Smaller, growth-oriented value chain actors also provide an opportunity for FSPs.

More commercialized farmers have higher incomes, invest more in physical assets, borrow more and have stronger linkages to value chains. They also are more closely linked to the agricultural cycle and are likely to use some form of credit, formal or informal (often through the value chain itself).

Using either of our commercialization measures, households in Tanzania and Pakistan are more commercialized when compared to Mozambican farmers in the diaries sample. In Tanzania and Pakistan, these farmers are more likely to borrow, save and purchase physical assets. In Tanzania, formal savings dominates over services offered by informal providers, but informal providers provide the bulk of financial services in all other areas. In Mozambique, no borrowing is undertaken through formal providers at any stage of commercialization.

Households with lower commercialization ratios tend to have a higher number of income sources. This could indicate the importance of diversification to their livelihoods strategy or it may be that households with lower commercialization ratios are growing staple or low market value crops, which they can either sell or eat at home as needed or may be engaged in low-yield subsistence agriculture.

The analysis further underpins that we have identified a sub-set of smallholder farmers which focus commercially on agricultural production, have stronger linkages to value chains and successfully do so as reflected in higher incomes. This could be a useful finding for FSPs looking to increase their outreach to smaller value chain actors but are put off by the risks involved. This analysis could support the case to invest in smaller value chain actors whereby support to diversify crops can strengthen access to markets and linkages to stronger value chains. Increased provision of formal financial services to this segment (particularly savings in Pakistan and credit in Tanzania) can support further commercialization which can in turn provide

a more stable income and promote resilience within the household.

Opportunity 8: The data allows us to identify 'business focused' households and the nature of these businesses and financial needs. Financial Institutions can use these insights to tailor services to this segment.

The research framework hypothesizes that households that made the majority of expenditures on business-related expenses could be considered more closely aligned with small business. Using diaries data, an examination of the focus of these 'businesses' shows varying financial needs across countries.

For Tanzania, business households focus significantly more on agriculture, while other households more often follow a path towards regular employment. Business households are more likely to borrow, while other households show demand for savings products. This could indicate a need for business households to finance production-related expenses and therefore have a greater need for credit products. The other group of households might be more interested in using savings products to store the income that they receive from regular employment. Both business households and other households repay more debt than they take out over the year showing that both groups of smallholders are reducing their debt over time - which can give lenders comfort that debt repayment is a priority.

In contrast, in Mozambique, business households generate more income through self-employment and regular employment, whereas other households show characteristics of subsistence farming. Business households could potentially benefit from a micro-loan to invest in their small business, whereas other households which are close to subsistence, and who might be more vulnerable to external shocks, might benefit from financial products that allow for consumption smoothing.

The difference in livelihoods strategy is much less clear for Pakistan. Business households are, however, much more likely to engage in asset purchase and sales and are much more financially active compared to the other households, with larger transaction sizes for savings and borrowings. Further analysis could be done to determine exactly where the need lies.

Opportunity 9: FSPs can help smallholders increase resilience to agricultural shocks

The patterns of financial product usage can tell us a lot about challenges faced by smallholders and how they manage risk. The data shows that different kinds of shocks are spread over the year and smallholders have to deal with unexpected events throughout. The very nature of shocks make them impossible to predict and the ability to deal with these shocks can impact hugely on livelihoods.

In Tanzania specifically, there is higher borrowing following an agricultural shock, suggesting the additional financial needs that households face after the shock has taken place. This further suggests that risk mitigation products are not available or inaccessible to households.

In Pakistan and Mozambique, the analysis shows a significant increase in asset sales after a shock, which implies the financing gap is largely supported through additional asset sales as well as savings. This suggests a gap for FSPs to provide financial services which avoid the need for smallholders to sell productive assets.

The timing of such agricultural shocks can be used to inform providers when to launch products to mitigate the financial impact of these shocks. While shocks cannot necessarily be predicted, patterns can be derived. At the simplest level, enhanced saving products can provide households with a safety net to increase resilience to shocks. There is also the opportunity for FSPs to offer insurance products such as weather-based crop insurance or health insurance to help smallholders mitigate risk. Bundling these products with agriculturally based credit facilities can be effective way of both selling the product and ensuring that customers understand the risks and benefits of a products and how this can be mitigated. An effective pricing strategy is also critical to encourage take-up.



7.3 Final thoughts and opportunities for further research

There is no doubt that the smallholder population would benefit from increased financial inclusion, however, balancing the development benefits of financial inclusion with commercially sustainable and demand driven financial products and services presents a challenge. The analysis put forward goes a long way to enhancing our understanding of the complex livelihood strategies of smallholder households and how financial services can support these strategies, but the risk and costs of working with this segment remain.

The survey and diaries data presents a unique perspective on household behavior allowing FSPs take a data focused approach to targeting new segments and investing in new business models. While this can go some way to mitigating the information risk associated with working with smallholders, this analysis is just the beginning of the story. The transaction costs associated with the provision of services to this segment are high, so as well as identifying the right product, the method and cost of delivery, scale of roll out, and product pricing is key to ensuring sustainability. The use of innovative technology is increasingly playing a prominent role in service delivery, eliminating the need for an expensive branch presence, however, as the analysis shows, take-up of digital financial services is currently mixed with unexpectedly low take-up by youth. Although technology provides a key opportunity to introduce low-cost high-volume products, initial investment costs are high and competition is growing, all of which will influence a provider's decision to enter this market.

Smallholders are not a homogeneous group and segmenting the population by core characteristics has allowed us to consider in detail the needs and potential business case for serving each segment. The analysis shows socioeconomic indicators (education, age and gender) are generally pretty strong determinants of financial inclusion among smallholders but livelihood strategies have an impact on patterns of financial usage and demand, and segmentation allows us to look at these nuances to suggest potential short- and longer-term strategies for FSPs. A

smallholder that is urban, educated, digitally aware, 30-45, of relatively high income and predominantly male may represent the 'low hanging fruit' for financial service providers, however, there are clear opportunities with other types of smallholders as well.

Key themes coming out start to build up a story of where the need is and why. The patterns of financial product use can tell us a lot about challenges faced by smallholders, how they manage everyday financial transactions and obligations, and how they manage risk and volatility. FSPs can introduce products that help customers or potential customers manage risk in their day-to-day lives and for more commercialized and value chain focused households, potential products should consider finance for growth.

Although a positive relationship between formal financial inclusion and income is found using both the smallholder diaries data and the national survey data, the direction of causality is unclear. It is also important to note that the analysis is not claiming that formal financial provision is better than informal provision, and in some cases, formal banking products are not necessarily associated with the most positive livelihood outcomes. However, the analysis has identified potential shortfalls in informal provision or the potential to put mechanisms in place to allow graduation from informal to formal services. There is also much that the formal sector can learn from the activities that are currently provided by informal providers and networks (e.g. friends and family, village groups, savings clubs) in looking to expand and enhance the offerings from these providers.

Going forward, and based on the opportunities highlighted by the data, FSPs need to invest in the research and market information that will allow them to design and tailor products and distribution mechanisms. Research can be expensive and often competes internally for funding with other investments with lower lead times to realizing results. But the institutions that have consistently developed good products for smallholder households tend to employ people

that understand agricultural markets and how financial products can work for differentiated populations. Equity Bank, for example, which operates across East Africa, found from market testing that though Kenyans and Ugandans were willing to pay a similar overall price for a basic current account, Ugandans were happier to pay a single annual or monthly fee for the account whereas Kenyans were more willing to pay a marginal fee per transaction. Centenary Bank, also in Uganda, identified the key constraints for rural populations to be distance, trust and cost, in that order. This information on client needs has helped instruct their product offerings.

There is also the opportunity to delve more into proposed segmentation and consider whether the information derived can be used to develop more sophisticated customer modelling. Traditionally, for example, credit scoring models rely on individual data and the lack of this data for smallholder households has impeded efforts to understand and manage risk. The possibility of building up a financial services history for different segments through technology and pooling of individual data could go some way to looking at this. Mobile money platforms allow the potential for building up a source of financial background data and the transaction history that is so important in establishing ongoing relationship with FSPs.

For development practitioners, the analysis suggests areas where further research or intervention could be useful to bridge the gap between demand and the appetite of FSPs to work with this segment. Initiatives to further trigger innovation in the financial sector or mechanisms which help to get over the hurdle of up-front investment costs for financial service providers should be considered. Further analysis into the role of informal providers and the capacity of these providers to cater for demand may also be informative. It is also clear that financial literacy continues to be an issue and training provision, as a public good, is not easy to address. Finally, it is clear that there is considerable opportunity for further analysis, both with the existing data sets and through the collection of new data.

A list of potential additional research questions is included in Annex 1.



Photo: Allison Shelley / CGAP



Photo: Allison Shelley / CGAP

08

Annex 1: Additional Research Questions

SECTION 08 :: ANNEX 1- ADDITIONAL RESEARCH QUESTIONS

Below we have summarized additional areas of analysis directly related to this piece of work that may be of interest for further exploration. We would also be open to discuss with CGAP additional proposals for preparing a broader

scope of work linking the analysis to other strategic objectives and areas of interest that CGAP might be interested in.

TABLE A1.1: PROPOSED ADDITIONAL RESEARCH QUESTIONS - NOT COVERED IN THE ANALYSIS

PROPOSED ADDITIONAL RESEARCH QUESTIONS - NOT COVERED IN THE ANALYSIS	Related Research Question
Section 1	
The findings from Q1.6 A implies a correlation between education and usage of formal financial products. This highlights the importance for financial service providers to consider the financial literacy of potential clients. We could try to cross references with financial capability studies – as suggested by Carlos	1.6
Review and change the value chain index in Q 1.9 taking into account the latest feedback.	1.9
Q1.9: “The financial inclusion gap between the different types of smallholders is most pronounced in Mozambique and Uganda, where smallholders who have a strong value chain linkage are more often use formal financial services compared to smallholders with weaker linkages” Provide an indication of how much “internal” VC financing may be happening, such as supplier credit, aggregator advances towards commitments to sell. Some additional analysis could be done here when looking at questions F56 and F60. The link to value chains would however not be explicit in terms of supplier credit or aggregator advances. In the diaries there is more information on supplier credit and advances – we do however only find very few transactions (not more than 40 overall). Further research around value chain linkages could add value here; happy to discuss.	1.9
Review the exact questions that were used for the country paper stats so that we can compare to better understand where the differences come from regarding formal inclusion analysis in Q1.11	1.11
Section 2	
Figure 74: Dig even further and show how the mix of informal financial services that the ‘formal’ and ‘informal’ groups are using compares. This could be explored for savings withdrawals, deposits, borrowings and repayments.	2.2
Figure 76: Formal transactions could be disaggregated further by type.	2.2
Q2.3. Explore the constraints faced in accessing products such as loans from the demand side (i.e. Women do not want/need to/are prevented from accessing these products). Specifically, survey questions that ask about interest/need for credit. See the Tanzania paper, pages 99, 102-105. Further research could disaggregate these by gender and check for differences.	2.3
We could look to overlay the analysis from Q2.5 with the segmentation we’ve produced (as suggestion by Jamie).	2.5
Figure 96: To what extent are ‘unexpected events’ related to agriculture? When people are injured, it is related to farming or livestock (e.g. exposure to pesticides, injury due to an implement, lost land due to failure to repay or poor harvest).	2.6
Expected events could be further disaggregated. Furthermore, planting seasons could be defined as an expected event and savings/borrowing patterns could be analyzed before and after these.	2.6
Figure 98: We could disaggregate further by type of financial products used in this chart.	2.6
Figure 101: Create this chart including all 3 countries at once.	2.7

Section 3	
Further analysis on what loans are used for by each category of households (by employment or other) - to inform product development	3.2
Table 53: Would it be possible to disaggregate physical assets even further to see differences in what commercialized, and less commercialized farmers focus on?	3.4
What insurance products and plans are being used and who/what is being insured (depends if data on this is available)	3.5
Is there is a movement towards opening bank accounts away from informal savings? Or do smallholder households prefer to keep both? Or is one a bridge to another? Part of that will be understanding the overlap between these groups. How many of those who use MM also have a formal bank account?	3.5
We could break down expenses further and segment in agri-business, self-employment and other households.	3.8
Segmentation of smallholder farmers	
Further segment the "small scale farmers" category. Particularly to understand those who are more subsistence farmers and very poor versus those with more opportunities and better performing.	
Further segment the "commercializing farmers" category. Particularly to understand those who are further along the trajectory of growth and can be considered "commercialized" vs those at an earlier stage of commercialization.	
Business case development	
Development of a hypothetical business case for an FSP – based on the findings from Opportunity 1: Increase provision of formal financial services to women in Tanzania. Looking at Number of clients, number of transactions, USD volume of transactions, different financial services and comparing this across national statistics.	
Other areas of interest	
Explore further analysis around money transfers, in and out of the households (P2Ps), or transfer payments (G2Ps, P2Bs, or others).	



Photo: Allison Shelley / CGAP

09

Annex 2: Methodology Section

SECTION 09 :: ANNEX 2- METHODOLOGY SECTION

TABLE A2.1: FINANCIAL VARIABLE CLASSIFICATIONS

VARIABLES	CASH FLOW CATEGORY	CASH FLOW TYPE	NUMBER OF TRANSACTIONS		
			TAN	MOZ	PAK
Informal Savings					
Informal Savings Deposit	Saving in an ASCA	2. Deposits	81	51	9
	Use money guard	2. Deposits	15	3	86
	Saving in a Rotating Savings Group	2. Deposits--Contributions	907	62	18
	Private investment in someone else's business"	2. New investments into business	0	3	0
Informal Savings Starting Balance	Saving in an ASCA	1. Starting balance (today)	80	14	32
	Use Moneyguard	1. Starting balance (today)	16	8	61
	Saving in a Rotating Savings Group	1. Starting balance (today)	34	18	7
	Private investment in someone else's business"	1. Starting balance (today)	0	8	1
Informal Savings Withdrawals	Saving in an ASCA	3. Withdrawals	75	8	8
	Use money guard	3. Withdrawals, transfers, debits	34	4	152
	Saving in a Rotating Savings Group	3. Withdrawals--payout of fund to you	37	20	3
	Private investment in someone else's business"	3. Withdrawal or sales of investment	0	6	0
Informal Savings Any Known Fees	Saving in an ASCA	4. Any known fees, penalties, food/host co	42	0	0
Informal Savings Interest Earned	Saving in an ASCA	5. Interest earned	67	0	0
Formal Savings (including Mobile Money)					
Formal Savings Deposit	Mobile Money	2. Deposit	23	0	0
	Checking or Savings Account	2. Deposits	13	25	11
Formal Savings Starting Balance	Mobile Money	1. Starting balance (today)	14	0	0
	Checking or Savings Account	1. Starting balance (today)	5	12	35
	Long-Term Investment Account	1. Starting balance (today)	0	1	0
Formal Savings Withdrawals	Mobile Money	3. Withdrawals, transfers, and debits	23	0	0
	Checking or Savings Account	3. Withdrawals, transfers, debits	19	28	7
Formal Savings Any Known Fees	Mobile Money	4. Any known fees	12	0	0

VARIABLES	CASH FLOW CATEGORY	CASH FLOW TYPE	NUMBER OF TRANSACTIONS		
			TAN	MOZ	PAK
Mobile Money (separately)					
Mobile Money Deposit	Mobile Money	2. Deposit	23	0	0
Mobile Money Starting Balance	Mobile Money	1. Starting balance (today)	14	0	0
Mobile Money Withdrawals	Mobile Money	3. Withdrawals, transfers, and debits	23	0	0
Mobile Money Any Known Fees	Mobile Money	4. Any known fees	12	0	0
Insurance					
Formal Insurance	Life insurance	1. Payments of premiums	0	0	8
	Health Insurance	1. Payments or contributions	9	0	0
Keeping Money Home					
Keeping Money at home Deposit	Keeping Money (Cash) at Home	2. Deposits	4,196	346	264
Keeping Money at home Starting Balance	Keeping Money (Cash) at Home	1. Starting balance (today)	143	145	152
Keeping Money at home Withdrawals	Keeping Money (Cash) at Home	3. Withdrawals	14,049	399	442
Informal Lending					
Informal Lending Out	Friends and Family: Lending	2. New lending	55	14	96
	Credit Given to Clients	2. New sales on credit	188	27	414
Informal Lending Starting Balance	Friends and Family: Lending	1. Starting balance (today)	58	62	150
	Credit Given to Clients	1. Starting balance (today)	15	48	39
Informal Lending In	Friends and Family: Lending	3. Repayments	87	55	161
	Credit Given to Clients	3. Repayments	66	83	152
Informal Lending Loan written off	Friends and Family: Lending	6. Loan written off when known won't pay"	1	0	0
	Credit Given to Clients	5. Loan written off when known won't pay	5	0	0
Informal Lending Interest Accruing	Friends and Family: Lending	4. Interest accruing	19	2	0

VARIABLES	CASH FLOW CATEGORY	CASH FLOW TYPE	NUMBER OF TRANSACTIONS		
			TAN	MOZ	PAK
Informal Borrowing					
Informal Borrowing Received	Agent credit	2. New credits	8	0	0
	Agent credit	2. New credits/borrowing	0	0	833
	Friends and Family: Borrowing	2. New borrowing	237	31	825
	Informal Credit at a Store	2. New purchases on credit	0	7	5,384
	Informal Credit at a Store / Service Provider (e.g., boda boda)	2. New purchases on credit	306	0	0
	Supplier Credit	2. New purchase on credit	14	0	17
	Pawning	2. New borrowing	0	0	2
	Moneylender Borrowing	2. New borrowing	3	0	1
	Wage Advance from Employer	2. New borrowing	0	0	4
	Loan from Employer	2. New borrowing	0	0	8
	Wage or Rental Arrears owed TO respondents	2. New debts owed to respondent (late payment)	39	0	0
	Borrowing from an Informal Group	2. New borrowing	120	2	0
	Arrears owed by respondent	2. New debt	11	0	0
	Informal Borrowing Starting Balance	Agent credit	1. Starting balance	12	0
Friends and Family: Borrowing		1. Starting balance (today)	89	94	776
Informal Credit at a Store		1. Starting balance (today)	0	49	581
Informal Credit at a Store / Service Provider (e.g., boda boda)		1. Starting balance (today)	52	0	0
Supplier Credit		1. Starting balance (today)	6	1	9
Pawning		1. Starting balance (today)	0	6	7
Moneylender Borrowing		1. Starting balance (today)	3	0	6
Wage Advance from Employer		1. Starting balance (today)	0	3	5
Loan from Employer		1. Starting balance (today)	0	0	12
Wage or Rental Arrears owed TO respondents		1. Starting balance (today)	17	7	3
Borrowing from an Informal Group		1. Starting balance (today)	159	6	3
Arrears owed by respondent		1. Starting balance	2	0	0
Mortgage		1. Starting balance (today)	0	1	0
Rent Arrears		1. Starting balance	0	0	8

VARIABLES	CASH FLOW CATEGORY	CASH FLOW TYPE	NUMBER OF TRANSACTIONS		
			TAN	MOZ	PAK
Informal Borrowing Repayment	Agent credit	3. Repayments including deductions from sales	11	0	203
	Friends and Family: Borrowing	3. Payments	216	85	534
	Informal Credit at a Store	3. Payments	0	38	796
	Informal Credit at a Store / Service Provider (e.g., boda boda)	3. Payments	146	0	0
	Supplier Credit	3. Payments	18	1	13
	Pawning	3. Payments	0	3	1
	Moneylender Borrowing	3. Payments	2	0	1
	Wage Advance from Employer	3. Payments	0	1	3
	Loan from Employer	3. Payments	0	0	13
	Wage or Rental Arrears owed TO respondents	3. Arrears paid to respondent	41	5	0
	Borrowing from an Informal Group	3. Payments	849	4	0
	Arrears owed by respondent	3. Paying off debts	8	0	0
	Rent Arrears	3. Paying off debts	0	0	2
Informal Borrowing Interest	Friends and Family: Borrowing	5. Interest accruing	1	0	0
	Agent credit	5. Interest or fees	4	0	0
	Moneylender Borrowing	5. Interest accruing	2	0	0
	Borrowing from an Informal Group	5. Interest accruing	769	0	0
Informal Borrowing Debt written off	Informal Credit at a Store	6. Debt written off	0	0	2
	Informal Credit at a Store / Service Provider (e.g., boda boda)	6. Debt written off	4	0	0
	Arrears owed by respondent	4. Debt written off	1	0	0
	Borrowing from an Informal Group	6. Debt written off	10	0	0
Informal Borrowing Any unknown fee	Friends and Family: Borrowing	4. Any known fees	2	0	1
	Borrowing from an Informal Group	4. Any known fees	21	0	0
Informal Borrowing Loan written off	Friends and Family: Borrowing	6. Loan written off	16	0	0
	Wage or Rental Arrears owed TO respondents	4. Loan written off when know won't repay	3	0	0
Formal Borrowing					
Formal Borrowing Received	Individual Loan from Institution	2. New borrowing	1	1	7
	Joint Liability Loan	2. New borrowing (individual portion)	0	0	18
	Tafu airtime credit	New airtime on credit	2	0	0
Formal Borrowing Starting Balance	Individual Loan from Institution	1. Starting balance (today)	1	0	23
	Joint Liability Loan	1. Starting balance (today)	0	0	44
Formal Borrowing Repayment	Individual Loan from Institution	3. Payments	1	2	25
	Joint Liability Loan	3. Payments	0	0	34
	Tafu airtime credit	Repayment of outstanding credit w top up	2	0	0

VARIABLES	CASH FLOW CATEGORY	CASH FLOW TYPE	NUMBER OF TRANSACTIONS		
			TAN	MOZ	PAK
Formal Borrowing Any unknown fee	Joint Liability Loan	4. Any known fees	0	0	5
	Individual Loan from Institution	4. Any known fees	0	0	1
Formal Borrowing Interest	Joint Liability Loan	5. Interest accruing	0	0	1
Repayment Hire Installment					
Receive Hire Installment	Hire Purchase	2. New purchase on credit--total value	0	0	3
Hire Installment Starting Balance	Hire / Installment Purchase	1. Starting balance (today)	3	0	0
	Hire Purchase	1. Starting balance (today)	0	1	19
Repayment Hire Installment	Hire / Installment Purchase	3. Payments	6	0	0
	Hire Purchase	3. Payments	0	0	46
Money Guard					
Act money guard Deposit	Act as money guard	2. Accepting new deposits	17	1	36
Act money guard Starting Balance	Act as money guard	1. Starting balance (today)	15	6	4
Act money guard Withdrawals	Act as money guard	3. Providing withdrawals	19	3	8
Lay Away					
Layaway Deposits	Layaway	2. New contribution or deposit	30	6	4
Layaway Starting Balance	Layaway	1. Starting balance (today)	8	2	12
Layaway Withdrawals	Layaway	3. Taking good	13	1	0
	Layaway	6. Cancellation/Early Withdrawal	1	0	2
Money Lost Miss Stolen					
Money Lost Miss Stolen	Keeping Money (Cash) at Home	4. Money lost, missing, stolen	0	3	0
	Use money guard	6. Money lost, missing, stolen	0	1	0
	Farmland	4. Loss, give away, theft, death, etc.	0	1	0

TABLE A2.2: ASSET VARIABLE CLASSIFICATIONS

Variable Name (Assets)	Cash Flow Category	Asset Type	NUMBER OF TRANSACTIONS		
			TAN	MOZ	PAK
Bicycle	Bicycle	Personal	0	11	0
	Bicycles		0	0	4
Blankets	Blankets, sheets, and other linens	Personal	12	57	40
Building Materials	Building materials (bricks, cement, roofing sheets)	Personal	51	94	7
Cell Phone	Cell phone, smart phone	Personal	13	34	30
Chicken	Chicken and other poultry	Investment	54	112	13
Commercial for Work or Business	Commercial (for work or business)	Investment	0	53	0
Cow Buffalos	Buffalos	Investment	0	0	91
	Local cows		9	1	0
	Exotic or improved cows		4	0	0
Crops Storage	Crops storage- detached from the house	Investment	0	1	3
Electronic Items	Electric fan	Personal	0	1	7
	Radio		0	37	0
	Television		2	2	0
	Refrigerator/ freezer		0	1	3
	Washing machine or clothes dryer		0	0	1
	Computers, laptops, hardware, accessories		0	0	2
	DVD players, VCRs, or digital video recorders		0	1	0
	Electronic gadgets (iPads, iPods, cameras, etc.)		0	0	4
	Electronic gadgets (iPods, cameras, etc.)		2	0	0
	Stereos, speakers		0	1	1
	Sewing machine		1	0	1
	Torch(es)		6	0	0
	Other appliances		0	12	9
Kettle, blender, other electric kitchen equipment	0	0	40		
Farming Tool	Farming tool	Investment	16	50	4
	Animal drawn plow		0	0	4
	Wheelbarrow or cart		1	0	1
	Manual plow		0	0	1
Farmland	Farmland		7	5	7
Furniture	Bedroom furniture including carpets	Personal	11	52	15
	Dining room and kitchen furniture		5	47	8
	Outdoor furniture		1	2	3
	Stove		0	2	1
	Other furniture		3	10	0

Variable Name (Assets)	Cash Flow Category	Asset Type	NUMBER OF TRANSACTIONS		
			TAN	MOZ	PAK
Goats Sheep	Goats	Investment	25	7	63
	Sheep		1	0	0
Jewelry or Valuable Items	Expensive items of clothing	Investment	17	0	0
	Gold/ precious jewelry		0	0	30
	Other valuable		1	0	48
Land Plot House	Primary residence (home where you live now)	Investment	0	0	1
	Land or plot (no building on it)		1	11	0
	Rental rooms or houses (residential)		0	0	1
Motorcycle	Motorbike, motorcycle	Personal	3	0	16
	Motorcycle		0	5	0
Other	Water pump/tube well/submersible		0	0	9
	Water tanks		0	2	1
	Bed Nets	0	3	0	
	Lantern	0	5	0	
Other Livestock	Other livestock	Investment	3	4	50
	Donkeys	Investment	0	0	3
	Pigs	Investment	5	1	0
Other tools Equipment	Other tools or equipment	Investment	1	1	0
Tractor	Tractor	Investment	0	0	6
Utensils	Utensils	Personal	40	130	1

TABLE A2.3: EXPENSES VARIABLE CLASSIFICATIONS

Variable Name (Expenses)	Cash Flow Category	NUMBER OF TRANSACTIONS		
		TAN	MOZ	PAK
Accessories Expenses	Accessories: bags, belts, jewelry	3	13	73
Clothes	Clothes and shoes	338	756	1,899
Donations	Donations to a house of worship, or to a charity	0	220	691
	Donations to church or mosque, or to a charity	135	0	0
	Contributions to community police or neighborhood association	152	5	0
Education Expenses	Other education-related expenses (room, board, lunches, pocket money)	0	10	27,804
	Books, notebooks, pens, etc.	87	84	826
	School fees (tuition), extra classes	90	18	380
	Other education-related expenses (room, board, lunches, uniforms, pocket money)	113	0	0
Energy Expenses	Electricity, phone charging	875	416	684
	Gas (for cooking), firewood, paraffin, charcoal, etc.	597	0	0
	Wood/Gas (for cooking), paraffin, charcoal, etc.	0	0	99
	Batteries	0	90	0
	Gas (for cooking), paraffin, charcoal, etc.	0	89	0
Entertainment Expenses	Other entertainment	15	13	290
	Public TV and movies	104	0	0
	Toys and games	1	3	91
	DVDs, movie theaters, movie dens	0	0	22
	DVDs, video games	3	2	0
Taxes Fines and Fees	Penalties, fines, fees (including parking tickets)	22	1	42
	Fees for permits, licenses, etc.	0	5	21
	Taxes	8	11	3
Fuel Expenses	Petrol and oil	58	156	8,933
Gifts Expenses	Purchase of gifts for other household members	57	0	828
	Purchase of gifts	0	9	0
Home Food Expenses	Groceries/food to be eaten at home (include baby food)	14,236	6,128	31,813
Home Maintain Expenses	Home maintenance or repairs (painting, construction, etc.)	78	0	0
	Building labor	0	69	0
	House repairs, maintenance	0	0	336
	Housekeeping supplies (soap, Omo, etc.)	1,597	0	0
	Cleaning supplies	0	0	231
	Homecare	0	0	15
	House girls and cleaning help	11	0	0
Internet Landline Expense	Internet service, cyber cafes, landline phone	0	0	8
	Internet service, cyber cafes	8	0	0

Variable Name (Expenses)	Cash Flow Category	NUMBER OF TRANSACTIONS		
		TAN	MOZ	PAK
Medical Expenses	Medical services (clinics, hospitals, dispensaries)	101	117	895
	Medicines	98	291	473
	Hakim/traditional/informal healer	0	0	311
	Traditional healers	14	66	0
Milling Expenses	Posho mill / Grinding machine	1017	0	0
	Milling	0	159	0
Mobile Add on Expense	Pre-paid phone credit and data bundles	1,487	619	5,855
	Cell phone charging, all other charging, pay to use another phone	0	45	0
Personal Care Expenses	Personal care, toiletries, beauty products	225	0	3,133
	Soap, laundry soap, dish soap	0	436	0
	Personal care services (saloon, hair, barber, etc.)	90	142	0
	Haircut, barber	0	0	199
	Diapers and other baby supplies	10	59	13
	Body soap, shampoos, cosmetics, toothbrush, toothpaste	0	43	0
	Services (tailor, shoe repair, etc.)	46	0	0
Restaurant Food Expenses	Food from restaurants, take away, delivery, street food	1,754	386	1,124
Smoking Alcohol Expenses	Cigarettes and smoking supplies	1	1,033	9,120
	Alcohol purchased (either in home or at pub/bar/club)	5,251	0	0
	Alcohol purchased (either in home or at pub)	0	362	0
	Recreational drugs (like marijuana, cocaine, etc.)	0	1	11
Special Events Expenses	Recreation, trips, outings, special events, religious events	33	3	9
Transport Expenses	Rickshaws, buses, other public transport	0	562	1,039
	Buses, other public transport	1,151	0	0
	Vehicle, bicycle, rickshaw maintenance and repairs	0	120	0
	Vehicle, bicycle, rickshaw, car maintenance and repairs	0	0	101
	Vehicle hire	3	0	51
	Vehicle, bicycle maintenance and repairs	19	0	0
	Taxi service	1	0	15
Coffin Burial Expenses	Coffin, burial service for household members	0	19	0

Variable Name (Expenses)	Cash Flow Category	NUMBER OF TRANSACTIONS		
		TAN	MOZ	PAK
Other Expense	Legal/lawyer fees	9	0	36
	Books, newspapers, and magazines	40	0	6
	Multi-item shopping trips	97	0	0
	Matches	0	93	0
	Water (for drinking, washing, bathing)	50	13	0
	Pet supplies, animal feeds	36	0	0
	Rent	5	3	1
	Informal payments (protection money, etc.)	0	4	0
	Informal payments (bribe, protection money, etc.)	0	0	3
	Satellite	0	0	3
	Lottery tickets, betting, gambling, cards, dice	0	0	2
	Misc.	0	0	1



Photo: Allison Shelley / CGAP

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Annex 3: Research Questions Annexes

SECTION 10 :: ANNEX 3- RESEARCH QUESTIONS ANNEXES

Annex for Questions in Section 1

TABLE A3.1: MULTIVARIATE REGRESSION ANALYSIS ON HOUSEHOLD INCOME ACROSS COUNTRIES

Independent Variables	Mozambique	Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
Age category						
Below 30	0.00	0.00	0.00	0.00	0.00	0.00
31 to 45	11.43 *	8.46 ***	4.82 *	19.12	12.01 ***	9.07 **
46 to 60	15.41	12.94 ***	3.66 **	28.57 *	31.51 ***	30.47 ***
Above 60	25.58 **	8.53	4.90	26.12	17.84 ***	17.90 ***
Household Size	0.95 ***	2.25 ***	4.75 ***	2.73 ***	6.85 ***	12.41 ***
Household Head Sex						
Male	-4.64	6.81 *	0.00	0.00	9.82	1.18
Female	0.00	0.00	0.80 ***	-8.71	0.00	0.00
Household Head Marital Status						
Single/Never married	0.00	0.00	0.00	0.00	0.00	0.00
Married	-10.32 ***	2.24	-1.45	10.86	-27.06	-32.75
Divorced/separate	-18.00 ***	-18.37 ***	-7.12	12.20	-54.85 ***	-61.69 **
Widowed	-21.57 ***	-11.86 *	5.02	-15.36	-41.76 *	-17.42
Living together	-8.58	-0.61	-13.72	0.19	-64.24 ***	-19.93
Household Head Education Status						
No Schooling and Pre-Primary	0.00	0.00	0.00	0.00	0.00	0.00
Some Primary and Primary School	-1.24	15.42 ***	16.72 *	64.37	32.27 ***	-19.93
Secondary School	24.59 *	89.47 ***	51.87 ***	67.11	60.41 ***	-7.78
Post-Secondary and Graduates	44.14 ***		104.69 ***	134.95 ***	100.44 ***	33.12 ***
Urban/Rural Households						
Rural	-25.85 ***	-17.06 ***	-26.33 ***	-75.61 ***	0.00	-24.05 ***
Urban	0.00	0.00	0.00	0.00	1.97	0.00
Region/Zone						
North	0.00					
Centre	-0.18					
South	34.28 ***					
Central		0.00				
Eastern		-13.38 ***				
Northern		-37.12 ***				
Western		-13.30 ***				
Border			0.00			
Coastal			25.78 ***			

Independent Variables	Mozambique	Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
Inland			7.43 **			
Lake			3.98			
Zanzibar			51.95 ***			
Foret Est				0.00		
Foret Ouest				23.12 ***		
Savane				13.39		
Barisal						0.00
Chittagong						50.85 ***
Dhaka						42.20 ***
Khulna						-12.49
Rajshahi						-7.72
Rangpur						-19.78 **
Sylhet						40.63 ***
Household's Largest Source of Income						
Agricultural income	0.00	0.00	0.00	0.00	0.00	0.00
Grants, subsidies, or non-refundables from family/friends	10.91 ***	-4.87 ***	8.54 ***	-47.99	3.55	100.16 ***
Self-employment	8.88	15.81	27.74	-0.17 **	-4.31	27.40 ***
Earning Wages	20.25	26.26	29.31	34.66	-5.07	34.21 *
Others	8.68 **	9.43 ***	-9.59 ***	23.83	205.39	20.95 ***
Does Household own bicycles, motorcycles, or motor vehicles						
Yes	0.00					0.00
No	-9.88 ***					-40.88 ***
None			0.00			
One			5.22 *			
Two or more			19.30 ***			
Constant	67.58 ***	59.37 ***	24.88	96.85	43.93 **	146.47 ***
Number of jobs (After removing outliers)						
	1084	2506	2206	1177	1777	2138
R-squared	25%	14%	22%	5%	13%	19%

[1] Smallholder National Surveys.

[2] *10% significant, ** 5% significant, *** 1% significant.

TABLE A3.2: EXCHANGE RATE BETWEEN USD AND OTHER COUNTRIES

Country	Average Exchange Rate to USD	Exchange Rate taken Months	Data Collection Dates
Mozambique (MZN)	38.63	July, August	23 July to 4 Sep 2015
Tanzania (TZS)	2,185.53	February	6 Feb to 8 March 2016
Uganda (UGX)	3,536.24	August	16 Aug to 7 Sep 2015
Bangladesh (BDT)	78.34	March	17 Mar to 21 April 2016
Nigeria (NGN)	314.72	November	21 Nov to 9 Dec 2016
Côte d'Ivoire (XOF)	582.31	April	15 April to 13 May 2016

FIGURE A3.1: CANDLE CHART FOR MONTHLY HOUSEHOLD INCOME

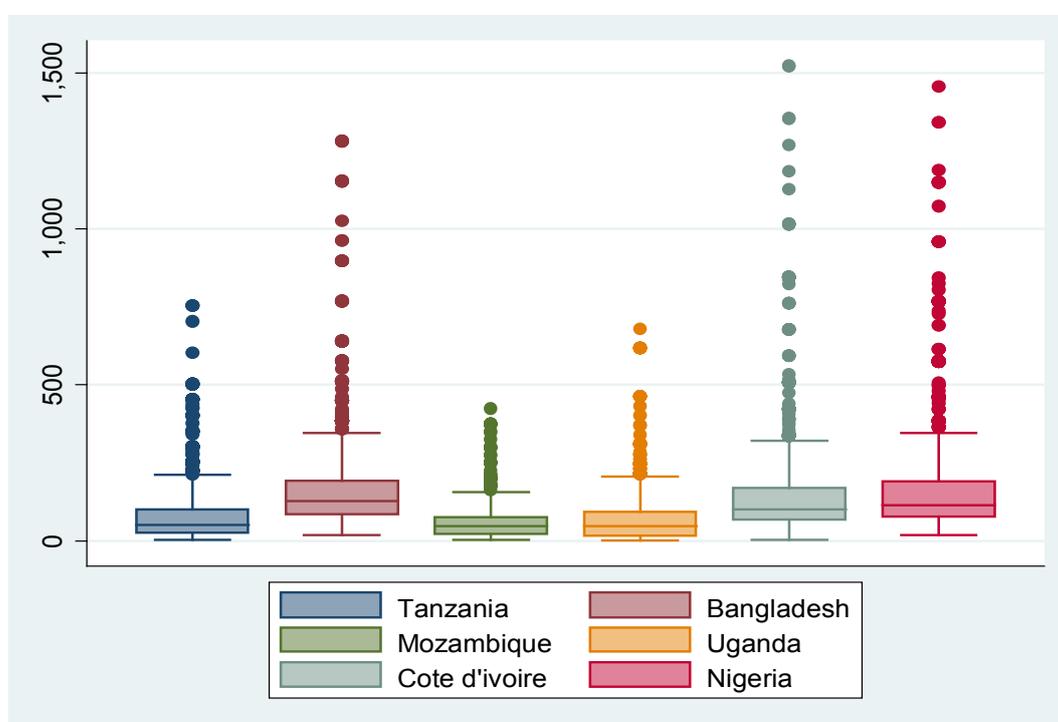


FIGURE A3.2: MOZAMBIQUE

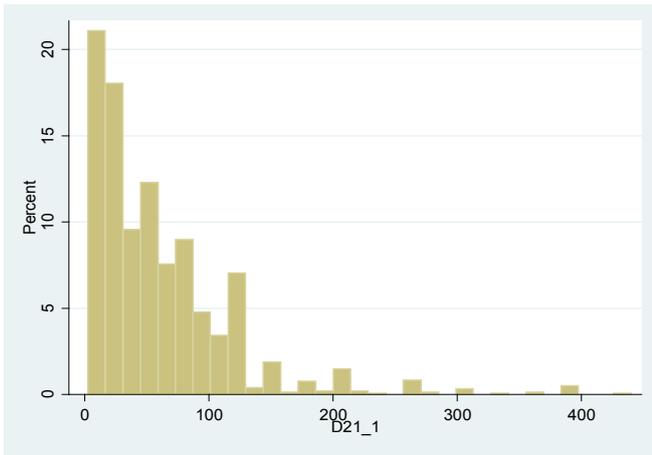


FIGURE A3.3: UGANDA

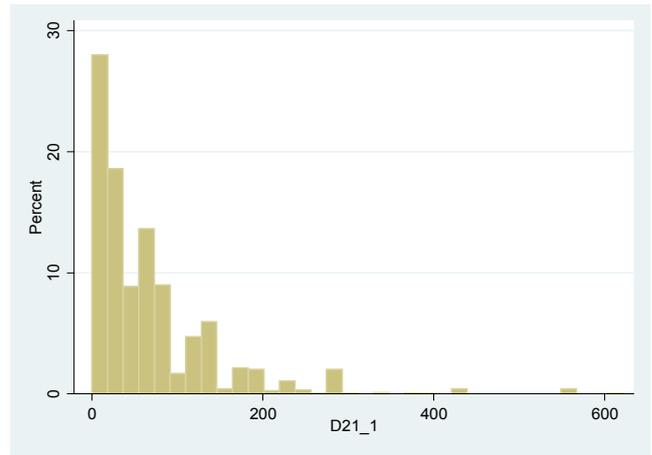


FIGURE A3.4: TANZANIA

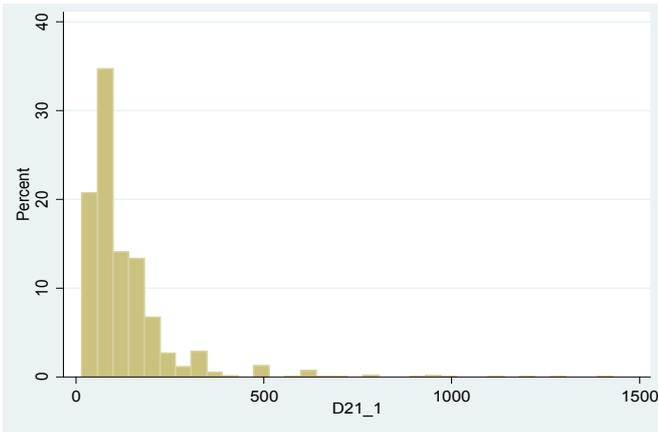


FIGURE A3.5: CÔTE D'IVOIRE

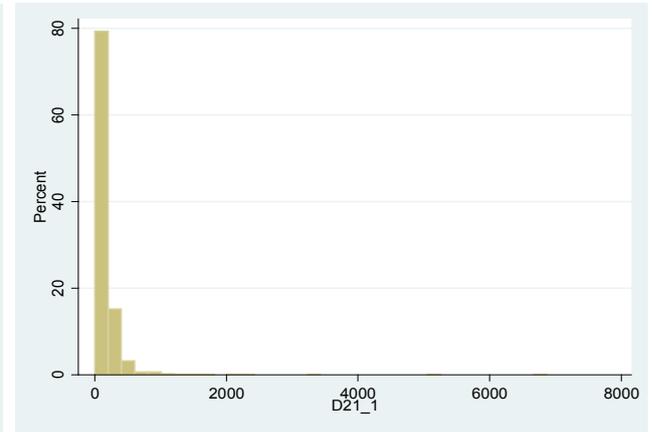


FIGURE A3.6: NIGERIA

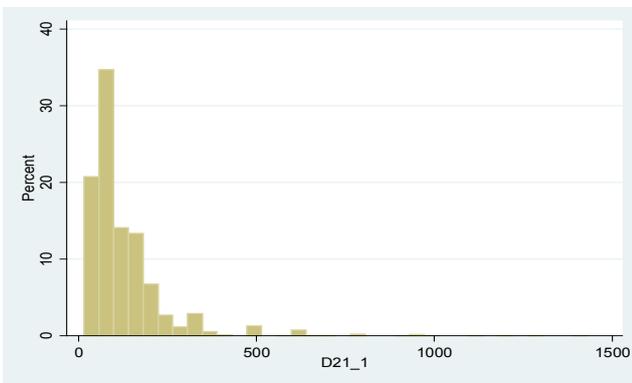
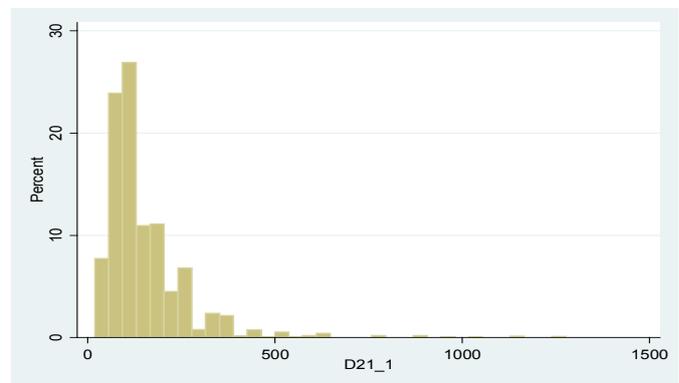


FIGURE A3.7: BANGLADESH



**TABLE A3.3. MULTIPLE REGRESSION RESULTS USING AVERAGE HOUSEHOLD MONTHLY INCOME AS DEPENDENT VARIABLE (NATIONAL SURVEY DATA):
KEY INDEPENDENT VARIABLE - FORMAL BANK ACCOUNT**

VARIABLES	Mozambique		Uganda		Tanzania		Côte d'Ivoire		Nigeria		Bangladesh	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Formal Account	32.96	0.00	30.98	0.00	16.19	0.00	42.52	0.00	24.19	0.05	27.24	0.00
Age												
Age Below 30	0.00		0.00		0.00		0.00		0.00		0.00	
Age 31 to 45	9.11	0.02	6.41	0.08	4.09	0.41	22.39	0.06	11.00	0.23	9.17	0.24
Age 46 to 60	15.12	0.00	10.90	0.01	3.51	0.53	27.21	0.06	34.50	0.00	31.96	0.00
Age Above 60	23.10	0.03	7.36	0.10	6.27	0.36	18.10	0.37	15.13	0.25	19.31	0.07
Total number of household members	1.12	0.17	2.30	0.00	4.74	0.00	2.81	0.15	8.10	0.00	12.37	0.00
Gender												
Female	0.00		0.00		0.00		-12.74	0.58	0.00		0.00	
Male	2.45	0.57	6.14	0.11	0.37	0.96	0.00		9.04	0.65	-6.29	0.59
Marital Status												
Single/Never married	0.00		0.00		0.00		0.00		0.00		0.00	
Married	-13.19	0.04	2.67	0.97	1.82	0.80	7.66	0.69	-22.25	0.16	-35.74	0.19
Divorced/separated	-16.86	0.04	-16.30	0.01	0.48	0.96	7.67	0.87	-57.07	0.00	-67.31	0.03
Widowed	-21.36	0.00	-9.08	0.11	8.24	0.40	-17.41	0.63	-33.87	0.22	-27.44	0.40
Living together/cohabiting	-8.60	0.17	0.52	0.40	-10.61	0.39	0.73	0.98	-84.28	0.00		
Education												
No Schooling and Pre-Primary	0.00		0.00		0.00		0.00		0.00		0.00	
Some Primary and Primary School	-0.21	0.98	9.87	0.00	18.45	0.09	97.99	0.01	43.06	0.00	-17.09	0.59
Secondary School	21.71	0.03	70.40	0.00	49.64	0.00	91.37	0.01	65.22	0.00	-6.54	0.84
Post-Secondary and Graduates	39.54	0.00			99.07	0.00	153.61	0.00	97.64	0.00	31.56	0.35
Urban/Rural												
Urban	0.00		0.00		-25.22	0.00	-64.00	0.00	-8.92	0.46	0.00	
Rural	-24.57	0.00	-12.37	0.00	0.00		0.00		0.00		-23.24	0.08

VARIABLES	Mozambique		Uganda		Tanzania		Côte d'Ivoire		Nigeria		Bangladesh	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Region												
North	0.00											
Center	-3.19	0.38										
South	26.13	0.00										
Central			0.00									
Eastern			-7.22	0.01								
Northern			-29.14	0.00								
Western			-8.62	0.00								
Border					0.00							
Coastal					25.58	0.00						
Inland					7.15	0.10						
Lake					2.94	0.53						
Zanzibar					56.18	0.00						
Foret Est							0.00					
Foret Ouest							23.61	0.03				
Savane							11.92	0.34				
Barisal											0.00	
Chittagong											48.20	0.00
Dhaka											42.51	0.00
Khulna											-12.26	0.19
Rajshahi											-5.70	0.68
Rangpur											-16.56	0.09
Sylhet											46.84	0.00

VARIABLES	Mozambique		Uganda		Tanzania		Côte d'Ivoire		Nigeria		Bangladesh	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Income Source												
Agricultural income	0.00		0.00		0.00		0.00		0.00		0.00	
Earning Wages	15.31	0.00	20.14	0.00	28.01	0.00	29.35	0.10	-15.15	0.32	35.30	0.00
Grants, subsidies, or non-refundables	4.00	0.61	-6.21	0.17	5.76	0.59	-40.65	0.16	60.69	0.25	87.83	0.00
Others	9.31	0.31	10.86	0.46	-11.06	0.10	22.88	0.44	197.97	0.20	15.80	0.21
Self-employment	5.34	0.28	10.74	0.00	22.83	0.00	-6.36	0.76	-4.24	0.72	23.90	0.02
Whether household has a bicycle, motorcycle, or car												
Yes	0.00										0.00	
No	-7.75	0.01									-35.86	0.00
None					0.00							
One					5.11	0.14						
Two or More					16.13	0.05						
Constant												
Constant	65.23	0.00	38.34	0.00	-12.89	0.36	-22.30	0.57	30.98	0.23	135.13	0.01
R-Square	29%		17%		23%		6%		8%		19%	
No of Observations	1,084		2,506		2,059		1,159		1,714		2,091	

**TABLE A3.4. MULTIPLE REGRESSION RESULTS USING AVERAGE MONTHLY INCOME AS DEPENDENT VARIABLE (NATIONAL SURVEYS DATA):
KEY INDEPENDENT VARIABLE - MOBILE MONEY ACCOUNT**

VARIABLES	MOZAMBIQUE		UGANDA		TANZANIA		CÔTE D'IVOIRE		NIGERIA		BANGLADESH	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Mobile Money Account	19.80	0.17	24.53	0.00	17.09	0.00	40.17	0.00	19.93	0.82	37.19	0.00
Age												
Age Below 30	0.00		0.00		0.00		0.00		0.00		0.00	
Age 31 to 45	11.51	0.00	7.74	0.03	4.09	0.41	22.97	0.06	14.76	0.12	9.72	0.21
Age 46 to 60	15.63	0.00	12.39	0.00	3.63	0.51	28.90	0.05	37.54	0.00	31.74	0.00
Age Above 60	25.98	0.02	9.10	0.05	6.79	0.32	20.95	0.30	20.06	0.13	19.22	0.07
Total number of household members	0.94	0.26	2.36	0.00	4.74	0.00	2.75	0.16	7.98	0.00	12.91	0.00
Gender												
Female	0.00		0.00		0.00		-10.45	0.65	0.00		0.00	
Male	4.48	0.31	6.64	0.11	0.67	0.93	0.00		10.09	0.61	-7.07	0.55
Marital Status												
Single/Never married	0.00		0.00		0.00		0.00		0.00		0.00	
Married	-10.60	0.10	1.73	0.97	2.13	0.77	8.78	0.64	-25.14	0.11	-33.56	0.21
Divorced/separated	-18.18	0.02	-17.40	0.01	1.27	0.89	7.83	0.86	-59.81	0.00	-65.86	0.05
Widowed	-21.98	0.00	-11.32	0.11	8.67	0.37	-18.34	0.62	-37.55	0.17	-22.89	0.47
Living together/cohabiting	-8.67	0.17	0.16	0.40	-10.97	0.38	1.96	0.93	-75.47	0.00		
Education												
No Schooling and Pre-Primary	0.00		0.00		0.00		0.00		0.00		0.00	
Some Primary and Primary School	-1.36	0.88	11.95	0.00	18.47	0.09	98.90	0.01	45.90	0.00	-22.29	0.45
Secondary School	24.25	0.02	79.17	0.00	49.25	0.00	93.25	0.01	71.99	0.00	-11.31	0.71
Post-Secondary and Graduates	43.49	0.00			98.42	0.00	155.63	0.00	110.96	0.00	26.61	0.40

VARIABLES	MOZAMBIQUE		UGANDA		TANZANIA		CÔTE D'IVOIRE		NIGERIA		BANGLADESH	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Urban/Rural												
Urban	0.00		0.00		-25.09	0.00	-64.18	0.00	-11.20	0.35	0.00	
Rural	-25.65	0.00	-15.00	0.00	0.00		0.00		0.00		-20.71	0.13
Region												
North	0.00											
Center	-0.39	0.91										
South	34.05	0.00										
Central			0.00									
Eastern			-9.45	0.01								
Northern			-31.26	0.00								
Western			-9.11	0.00								
Border					0.00							
Coastal					25.61	0.00						
Inland					7.31	0.09						
Lake					3.70	0.44						
Zanzibar					58.27	0.00						
Foret Est							0.00					
Foret Ouest							24.26	0.02				
Savane							12.48	0.31				
Barisal											0.00	
Chittagong											43.37	0.00
Dhaka											40.63	0.00
Khulna											-9.85	0.29
Rajshahi											-13.75	0.32
Rangpur											-19.28	0.05
Sylhet											42.84	0.00

VARIABLES	MOZAMBIQUE		UGANDA		TANZANIA		CÔTE D'IVOIRE		NIGERIA		BANGLADESH	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Income Source												
Agricultural income	0.00		0.00		0.00		0.00		0.00		0.00	
Earning Wages	20.25	0.00	22.59	0.00	27.68	0.00	31.24	0.08	-11.66	0.41	31.92	0.00
Grants, subsidies, or non-refundables	10.18	0.22	-5.38	0.17	5.77	0.59	-40.19	0.16	63.63	0.23	87.51	0.00
Others	8.63	0.35	10.42	0.46	-11.58	0.09	22.50	0.44	201.31	0.18	16.29	0.16
Self-employment	9.10	0.06	13.28	0.00	22.48	0.00	-0.89	0.97	-1.19	0.92	22.87	0.03
Whether household has a bicycle, motorcycle, or car												
Yes	0.00										0.00	
No	-9.75	0.01									-36.13	0.00
None					0.00							
One					5.06	0.14						
Two or More					16.09	0.05						
Constant												
Constant	67.49	0.00	42.33	0.00	-13.61	0.34	-24.11	0.54	32.18	0.20	144.86	0.00
R-Square												
R-Square	25%		16%		23%		6%		8%		19%	
No of Observations												
No of Observations	1,084		2,506		2,059		1,159		1,714		2,091	

**TABLE A3.5. MULTIPLE REGRESSION RESULTS USING AVERAGE MONTHLY INCOME AS DEPENDENT VARIABLE (NATIONAL SURVEYS DATA):
KEY INDEPENDENT VARIABLE - MFI ACCOUNT**

VARIABLES	MOZAMBIQUE		UGANDA		TANZANIA		CÔTE D'IVOIRE		NIGERIA		BANGLADESH	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
MFI Account	23.13	0.00	35.58	0.00	16.38	0.02	8.63	0.61	-1.08	0.93	1.08	0.89
Age												
Age Below 30	0.00		0.00		0.00		0.00		0.00		0.00	
Age 31 to 45	10.71	0.01	7.12	0.05	5.13	0.30	20.64	0.10	14.99	0.13	10.52	0.19
Age 46 to 60	15.95	0.00	10.27	0.01	4.08	0.46	28.99	0.05	37.75	0.00	33.08	0.00
Age Above 60	24.13	0.02	5.94	0.18	5.24	0.45	24.75	0.22	20.11	0.13	20.71	0.05
Total number of household members	0.96	0.25	2.14	0.00	4.68	0.00	2.98	0.13	7.93	0.00	12.85	0.00
Gender												
Female	0.00		0.00		0.00		-8.68	0.71	0.00		0.00	
Male	4.19	0.34	5.99	0.11	0.15	0.98	0.00		10.25	0.61	-7.54	0.53
Marital Status												
Single/Never married	0.00		0.00		0.00		0.00		0.00		0.00	
Married	-10.42	0.11	3.03	0.97	-0.37	0.96	9.16	0.63	-24.94	0.11	-36.05	0.20
Divorced/separated	-16.86	0.04	-17.07	0.01	-3.57	0.69	9.61	0.84	-59.72	0.00	-64.07	0.05
Widowed	-19.77	0.01	-10.82	0.11	5.61	0.57	-19.59	0.60	-37.30	0.17	-25.91	0.43
Living together/cohabiting	-6.73	0.29	0.65	0.40	-13.34	0.29	2.25	0.92	-74.74	0.00		
Education												
No Schooling and Pre-Primary	0.00		0.00		0.00		0.00		0.00		0.00	
Some Primary and Primary School	-0.97	0.91	13.41	0.00	16.85	0.11	108.35	0.00	45.88	0.00	-19.99	0.51
Secondary School	24.49	0.02	80.85	0.00	50.73	0.00	110.82	0.00	71.95	0.00	-6.19	0.84
Post-Secondary and Graduates	43.26	0.00			100.43	0.00	178.90	0.00	111.59	0.00	32.68	0.31

VARIABLES	MOZAMBIQUE		UGANDA		TANZANIA		CÔTE D'IVOIRE		NIGERIA		BANGLADESH	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Urban/Rural												
Urban	0.00		0.00		-26.65	0.00	-73.93	0.00	-11.27	0.35	0.00	
Rural	-27.02	0.00	-16.15	0.00	0.00		0.00		0.00		-25.46	0.06
Region												
North	0.00											
Center	-1.88	0.62										
South	34.39	0.00										
Central			0.00									
Eastern			-11.66	0.01								
Northern			-34.98	0.00								
Western			-14.23	0.00								
Border					0.00							
Coastal					26.47	0.00						
Inland					6.69	0.12						
Lake					2.08	0.66						
Zanzibar					51.27	0.00						
Foret Est							0.00					
Foret Ouest							23.31	0.03				
Savane							11.92	0.34				
Barisal											0.00	
Chittagong											49.09	0.00
Dhaka											42.44	0.00
Khulna											-11.88	0.21
Rajshahi											-6.48	0.65
Rangpur											-18.59	0.06
Sylhet											42.26	0.00

VARIABLES	MOZAMBIQUE		UGANDA		TANZANIA		CÔTE D'IVOIRE		NIGERIA		BANGLADESH	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Income Source												
Agricultural income	0.00		0.00		0.00		0.00		0.00		0.00	
Earning Wages	19.10	0.00	23.40	0.00	30.19	0.00	35.05	0.05	-10.86	0.45	36.72	0.00
Grants, subsidies, or non-refundables	8.46	0.31	-4.12	0.17	8.03	0.47	-41.95	0.14	63.57	0.23	87.33	0.00
Others	9.41	0.30	9.97	0.46	-9.62	0.14	22.34	0.45	201.22	0.18	19.38	0.12
Self-employment	6.92	0.16	13.06	0.00	25.85	0.00	-1.37	0.95	-1.14	0.92	27.66	0.01
Whether household has a bicycle, motorcycle, or car												
Yes	0.00										0.00	
No	-8.90	0.01									-39.39	0.00
None					0.00							
One					5.73	0.10						
Two or More					18.41	0.03						
Constant												
Constant	67.27	0.00	49.57	0.00	-3.24	0.81	-23.17	0.56	32.01	0.21	153.70	0.00
R-Square	26%		15%		22%		5%		8%		18%	
No of Observations	1,084		2,506		2,059		1,159		1,714		2,091	

**TABLE A3.6. MULTIPLE REGRESSION RESULTS USING AVERAGE MONTHLY INCOME AS DEPENDENT VARIABLE (NATIONAL SURVEYS DATA):
KEY INDEPENDENT VARIABLE - CURRENTLY HAVING SAVINGS PLAN**

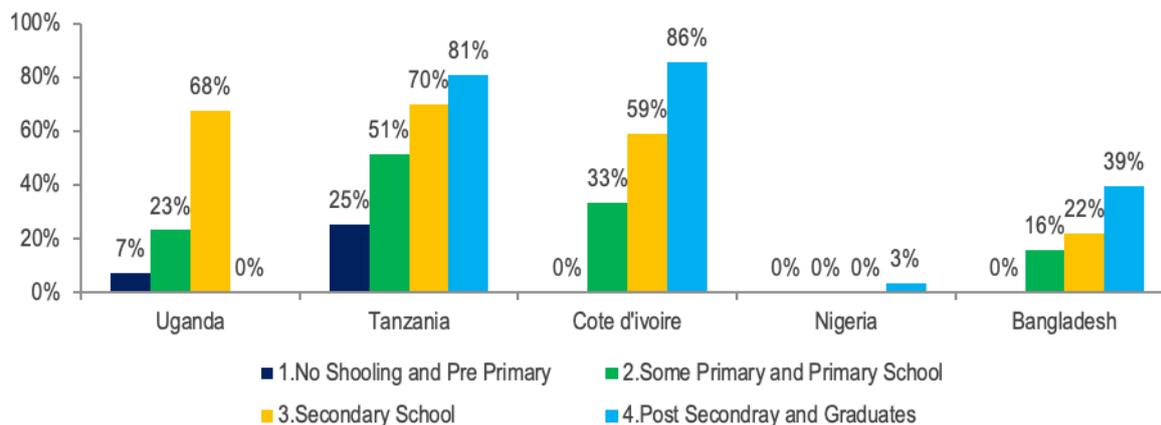
VARIABLES	MOZAMBIQUE		UGANDA		TANZANIA		CÔTE D'IVOIRE		NIGERIA		BANGLADESH	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Currently have savings plan	10.92	0.06	32.03	0.00	6.67	0.33	83.91	0.03	-5.83	0.59	-1.03	0.89
Age												
Age Below 30	0.00		0.00		0.00		0.00		0.00		0.00	
Age 31 to 45	11.18	0.00	8.24	0.02	4.84	0.30	17.45	0.16	16.59	0.07	9.05	0.24
Age 46 to 60	15.34	0.00	12.53	0.00	3.63	0.49	26.85	0.06	38.09	0.00	30.47	0.00
Age Above 60	25.21	0.02	8.56	0.06	4.94	0.45	20.86	0.30	22.18	0.08	17.92	0.09
Total number of household members	1.05	0.20	2.35	0.00	4.73	0.00	2.58	0.20	7.98	0.00	12.40	0.00
Gender												
Female	0.00		0.00		0.00		-7.68	0.73	0.00		0.00	
Male	4.12	0.35	6.37	0.11	-0.99	0.88	0.00		10.44	0.59	1.10	0.93
Marital Status												
Single/Never married	0.00		0.00		0.00		0.00		0.00		0.00	
Married	-10.24	0.11	0.84	0.97	-1.29	0.86	10.34	0.59	-25.17	0.10	-32.71	0.23
Divorced/separated	-16.28	0.04	-19.95	0.01	-6.99	0.42	14.43	0.76	-60.53	0.00	-61.78	0.05
Widowed	-20.37	0.01	-12.10	0.11	4.86	0.61	-13.73	0.71	-37.21	0.17	-17.55	0.59
Living together/cohabiting	-7.70	0.22	-1.04	0.40	-13.74	0.24	0.05	1.00	-73.73	0.00		
Education												
No Schooling and Pre-Primary	0.00		0.00		0.00		0.00		0.00		0.00	
Some Primary and Primary School	-0.90	0.92	15.15	0.00	16.64	0.06	62.63	0.13	44.62	0.00	-19.82	0.48
Secondary School	24.63	0.02	90.45	0.00	51.76	0.00	67.42	0.12	70.76	0.00	-7.65	0.79
Post-Secondary and Graduates	45.33	0.00			104.07	0.00	137.56	0.00	109.66	0.00	33.23	0.28

VARIABLES	MOZAMBIQUE		UGANDA		TANZANIA		CÔTE D'IVOIRE		NIGERIA		BANGLADESH	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Urban/Rural												
Urban	0.00		0.00		-26.24	0.00	-74.97	0.00	-11.40	0.32	0.00	
Rural	-25.51	0.00	-17.32	0.00	0.00		0.00		0.00		-24.01	0.07
Region												
North	0.00											
Center	0.28	0.94										
South	34.96	0.00										
Central			0.00									
Eastern			-12.87	0.01								
Northern			-37.92	0.00								
Western			-13.33	0.00								
Border					0.00							
Coastal					26.04	0.00						
Inland					7.87	0.07						
Lake					4.66	0.31						
Zanzibar					52.43	0.00						
Foret Est							0.00					
Foret Ouest							21.64	0.04				
Savane							13.22	0.28				
Barisal											0.00	
Chittagong											50.94	0.00
Dhaka											42.28	0.00
Khulna											-12.51	0.19
Rajshahi											-7.58	0.59
Rangpur											-19.70	0.05
Sylhet											40.80	0.00

VARIABLES	MOZAMBIQUE		UGANDA		TANZANIA		CÔTE D'IVOIRE		NIGERIA		BANGLADESH	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Income Source												
Agricultural income	0.00		0.00		0.00		0.00		0.00		0.00	
Earning Wages	19.82	0.00	26.20	0.00	29.27	0.00	32.01	0.05	-9.09	0.52	34.16	0.00
Grants, subsidies, or non-refundables	9.24	0.25	-5.16	0.17	8.59	0.42	-45.60	0.08	55.86	0.26	100.10	0.00
Others	9.04	0.33	10.58	0.46	-9.22	0.15	24.22	0.41	200.71	0.18	20.87	0.09
Self-employment	8.24	0.09	17.13	0.00	27.83	0.00	-3.72	0.86	-0.64	0.95	27.36	0.01
Whether household has a bicycle, motorcycle, or car												
Yes	0.00										0.00	
No	-9.36	0.01									-40.92	0.00
None					0.00							
One					5.06	0.13						
Two or More					19.23	0.02						
Constant												
Constant	64.10	0.00	48.77	0.00	-1.29	0.91	23.73	0.60	31.82	0.20	146.52	0.00
R-Square	25%		15%		22%		6%		8%		19%	
No of Observations	1,084		2,506		2,206		1,177		1,787		2,138	

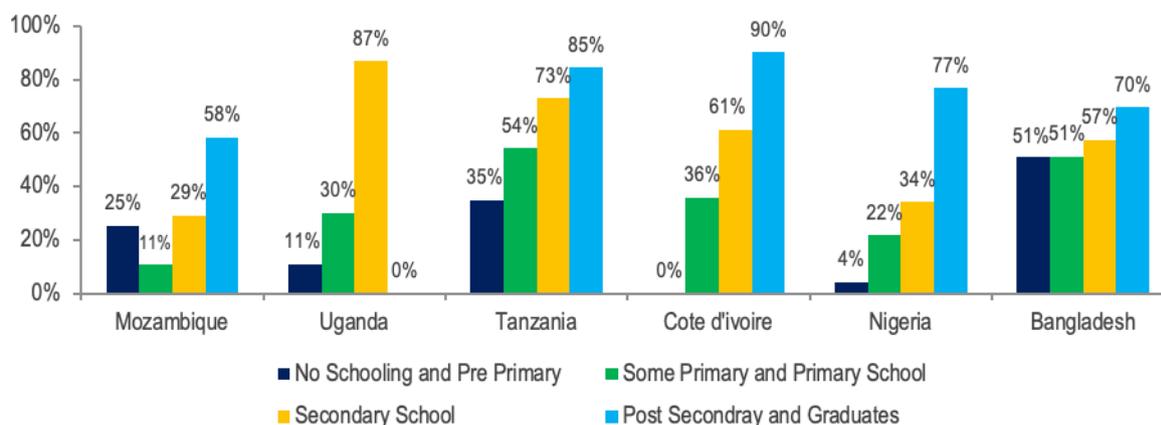
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

FIGURE A3.8: NATIONAL SURVEY DATA OF LEVELS OF EDUCATION FOR USERS OF MOBILE MONEY



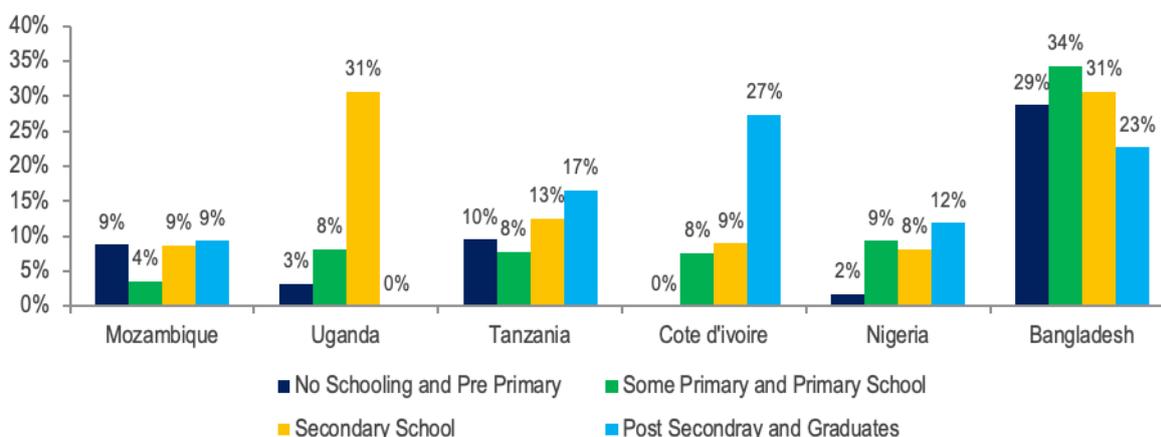
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

FIGURE A3.9: NATIONAL SURVEY DATA OF LEVELS OF EDUCATION FOR USERS OF FORMAL BANKING



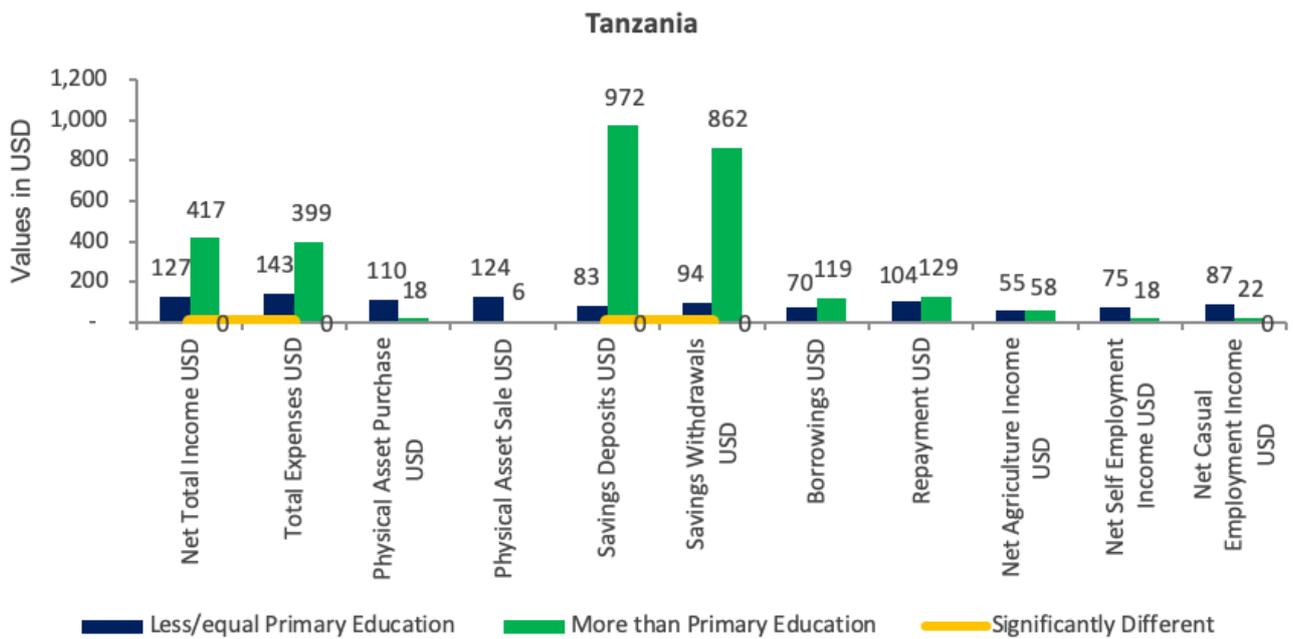
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

FIGURE A3.10: NATIONAL SURVEY DATA OF LEVELS OF EDUCATION FOR USERS OF MFI/SACCO/VLS/POS



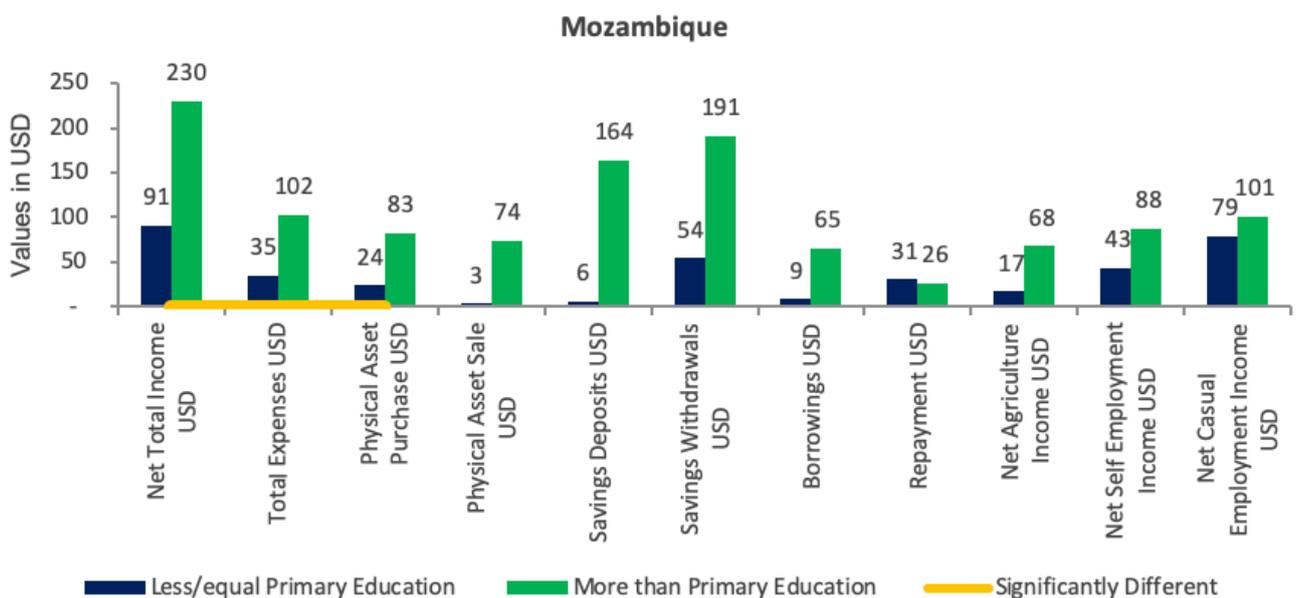
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

FIGURE A3.11: SMALLHOLDER DIARIES DATA OF AVERAGE TRANSACTION VALUES FOR MORE VS LESS EDUCATED INDIVIDUALS IN TANZANIA



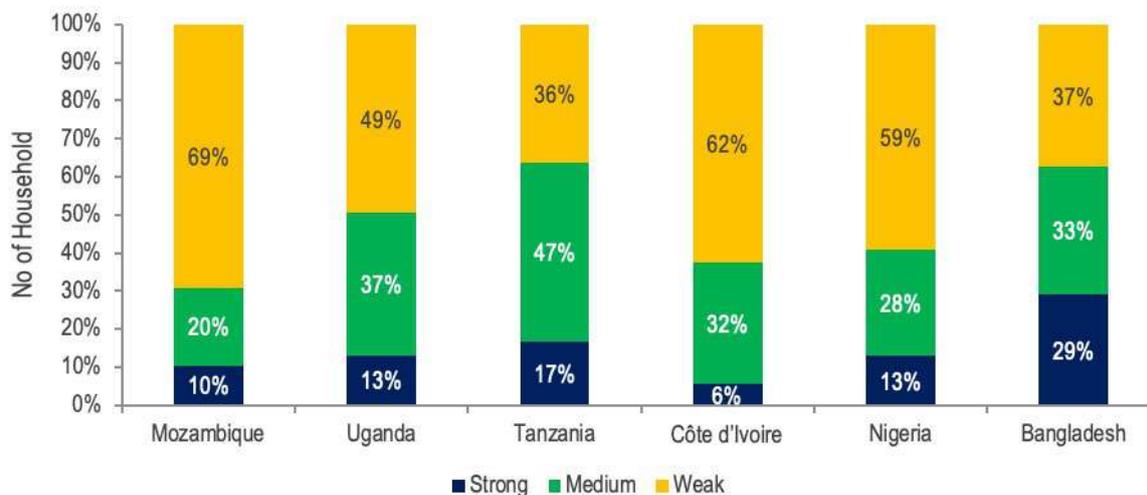
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.12: SMALLHOLDER DIARIES DATA OF AVERAGE TRANSACTION VALUES FOR MORE VS LESS EDUCATED INDIVIDUALS IN MOZAMBIQUE



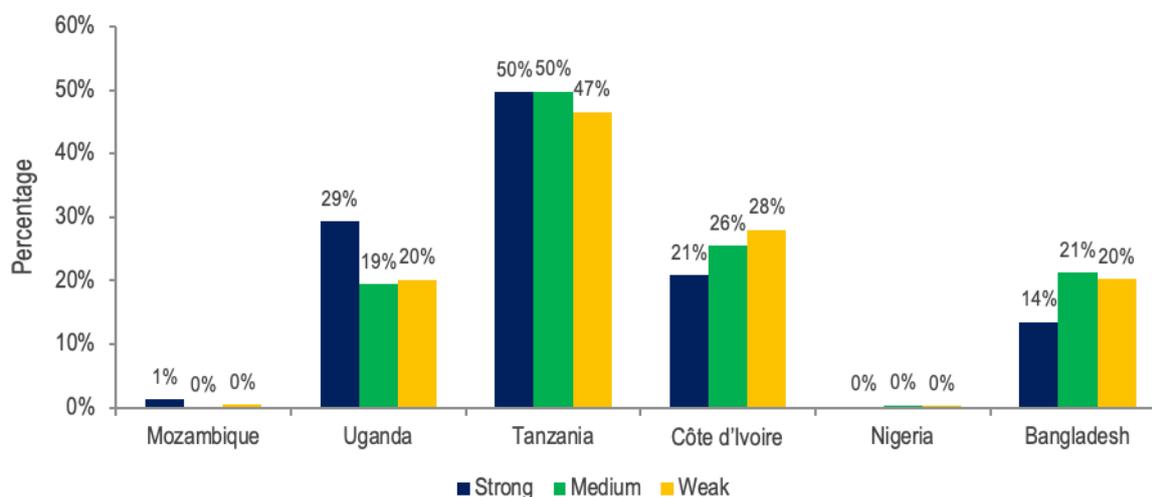
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.13: PERCENTAGE OF SMALLHOLDER HOUSEHOLDS THAT HAVE STRONG, MEDIUM AND WEAK LINKAGE WITH VALUE CHAINS BY COUNTRY (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

FIGURE A3.14: MOBILE MONEY USAGE OF HOUSEHOLDS WITH STRONG, MEDIUM AND WEAK LINKAGES TO VALUE CHAINS ACROSS COUNTRIES (NATIONAL SURVEYS)



SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

TABLE A3.7: PROBIT REGRESSION MODEL ON USAGE OF INFORMAL FINANCIAL SERVICES USING NATIONAL SURVEY DATA

Independent variables	Mozambique	Uganda	Tanzania	Côte d'Ivoire	Nigeria	Bangladesh
Age Group						
1 (Less than 30)	0.00	0.00	0.00	0.00	0.00	0.00
2 (31-45)	0.04	0.07	**	0.12	***	0.01
3 (46-60)	0.03	0.20	***	0.07	***	0.00
4 (More than 61)	0.11	0.10	*	0.05	-0.06	**
Household's average monthly income						
Income	0.00	***	0.00	0.00	*	0.00
Household size						
Household members	0.00	0.00	-0.01	***	0.00	0.00
Gender						
Male	0.00	0.00	0.00	0.00	0.00	0.00
Female	0.02	0.06	**	0.07	***	0.06
Household Head Education Status						
No Schooling and Pre-Primary	0.00		0.00			
Primary School	0.20	***	0.03			
Secondary School	0.22	***	0.07			
Post-secondary and Graduates	0.28	***	-0.02			
Household's Largest Source of Income						
Agricultural income	0.00	0.00	0.00	0.00	0.00	0.00
Grants, subsidies, or non-refundables from family/friends	0.05	-0.14	**	-0.01	-0.04	-0.07
Self-employment	0.05	-0.03	0.10	***	0.05	0.01
Earning Wages	0.06	0.07	0.03	0.01	-0.05	-0.02
Others	-0.05	-0.03	0.04	0.13	*	0.00
Residence in Urban/Rural						
Urban	0.00	0.00	-0.05	***	0.02	0.00
Rural	-0.11	-0.02	0.00	0.00	0.00	0.06

* EDUCATION COEFFICIENTS WERE MISSING FOR UGANDA, CÔTE D'IVOIRE, NIGERIA AND BANGLADESH

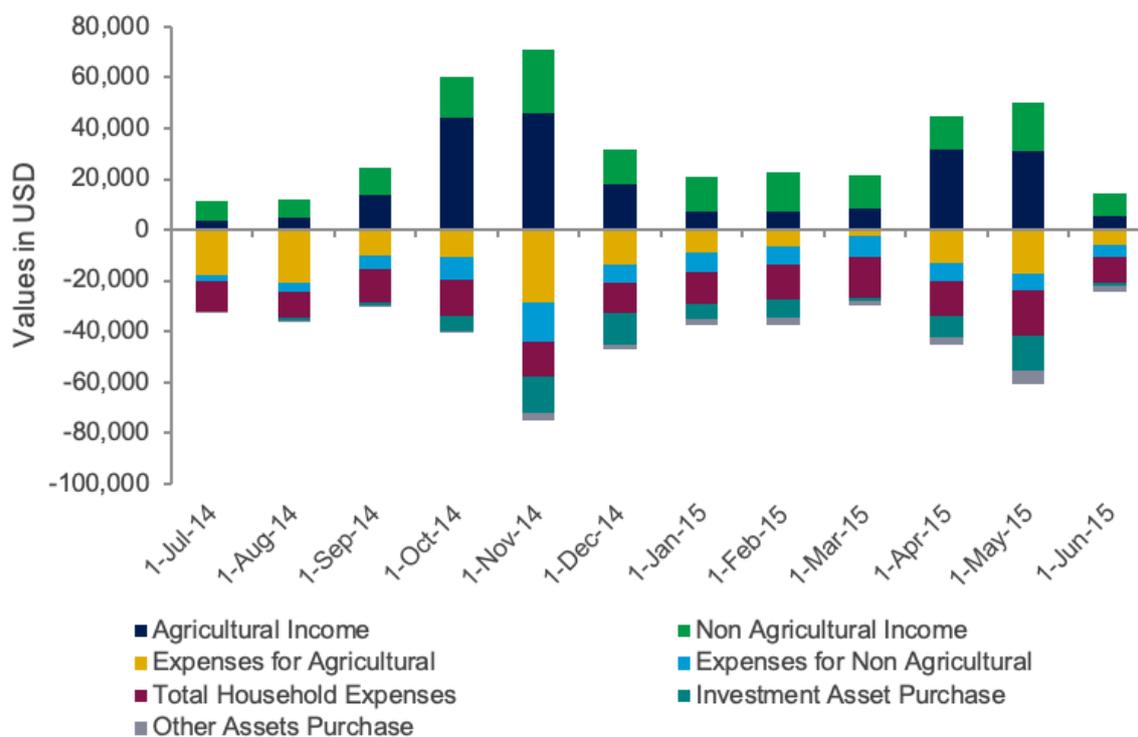
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

TABLE A3.8: DEPENDENT AND INDEPENDENT VARIABLES FOR THE PROBIT REGRESSION MODEL USING NATIONAL SURVEY DATA

Dependent variable	Independent variables (demographic & socio-economic)
Usage of informal financial services (yes/no)	Age
	Urban/Rural
	Total number of household members
	Gender
	Whether household has a bicycle, motorcycle, or car
	Marital Status
	Education
Income Source	
Region (country specific)	

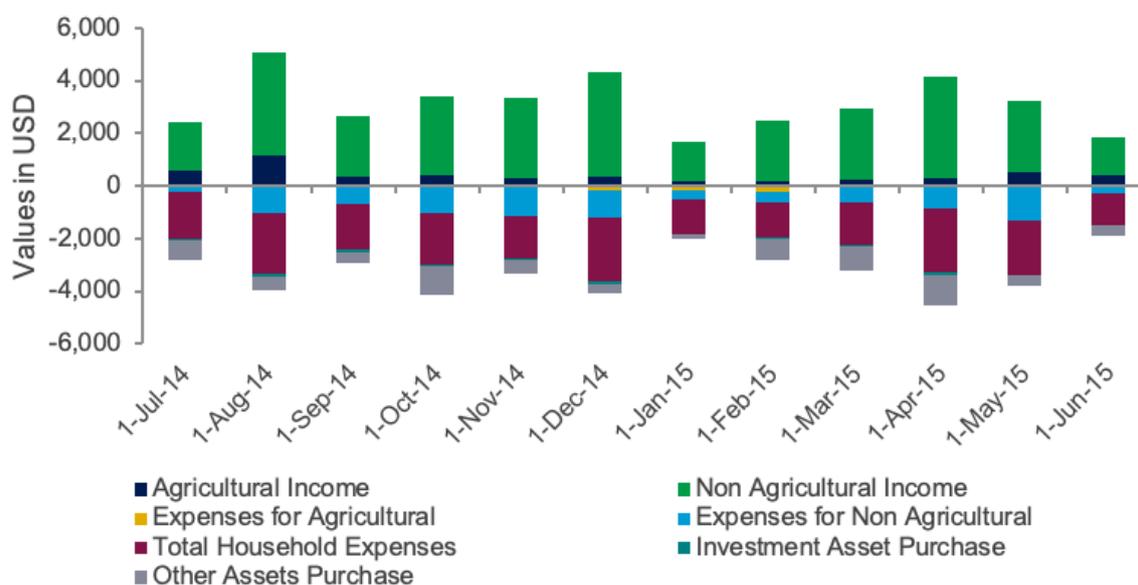
Annex for Questions in Section 2

FIGURE A3.15: SMALLHOLDER DIARIES DATA ON INCOME AND EXPENSE TRANSACTIONS IN PAKISTAN



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.16: SMALLHOLDER DIARIES DATA ON INCOME AND EXPENSE TRANSACTIONS IN MOZAMBIQUE

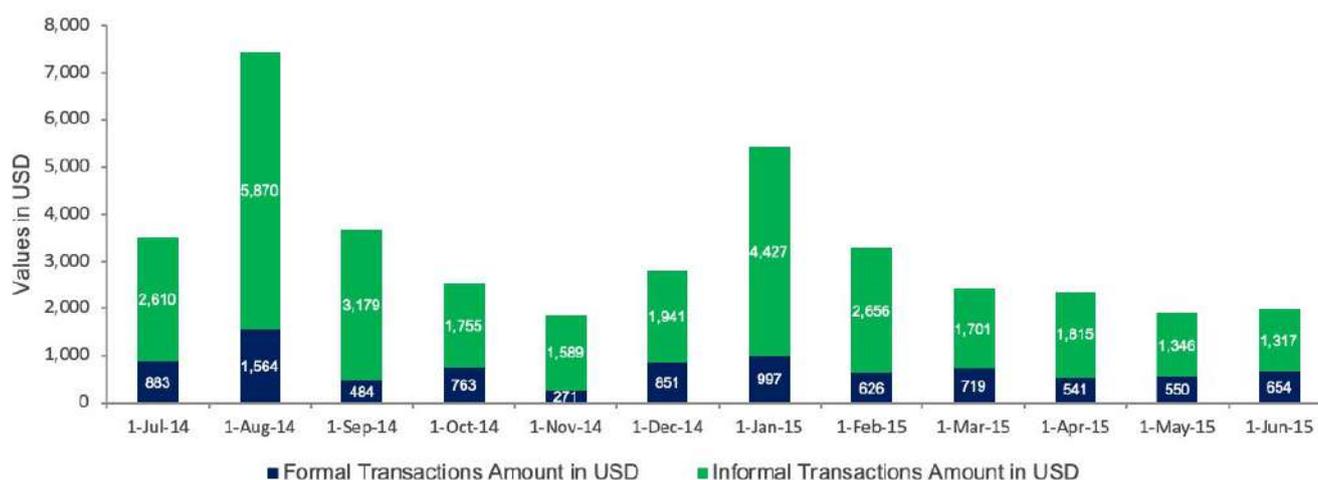


SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

TABLE A3.9: CATEGORIZATION OF FINANCIAL TRANSACTIONS BY FORMAL/INFORMAL

Informal financial transactions		Formal financial transactions
Savings	Saving in an ASCA	Mobile Money
	Use money guard	Checking or Savings Account
	Saving in a Rotating Savings Group	Formal insurance
	Private investment in someone else's business"	
Borrowing	Friends and family	Individual Loan from Institution
	Agent credit	Joint Liability Loan
	Informal Credit at a Store/Supplier credit	Tafu airtime credit
	Pawning	
	Moneylender Borrowing	
	Wage Advance from Employer	
	Loan from Employer	
	Borrowing from an Informal Group	
Layaway		
Lending	Act as money guard	
	Friends and Family: Lending	
	Credit Given to Clients	
Keeping money at home ¹⁰⁸		

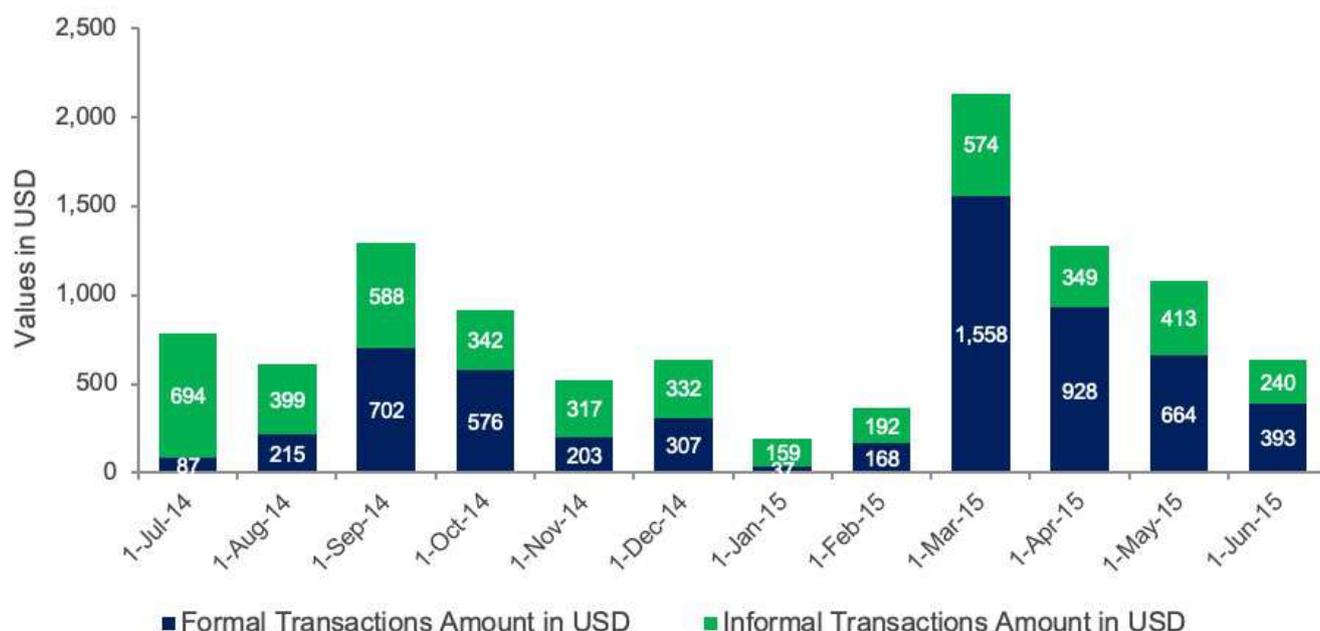
FIGURE A3.17: TOTAL VALUE OF FORMAL AND INFORMAL FINANCIAL TRANSACTIONS IN USD FOR TANZANIA (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

108 Please note that transactions which are categorised as *keeping money at home* have not been included under savings transactions. This is due to two reasons: 1) these transactions are deposited and withdrawn with a very high turnover rate. As such this does not seem to qualify as saving behaviour but more as very short-term storage of cash; and 2) the sum of these transactions is a multiple of the sum of all other transactions. As such this makes it difficult to analyse and present the difference between other transactions when including *keeping money at home*.

FIGURE A3.18: TOTAL VALUE OF FORMAL AND INFORMAL FINANCIAL TRANSACTIONS IN USD FOR MOZAMBIQUE (SMALLHOLDER DIARIES)



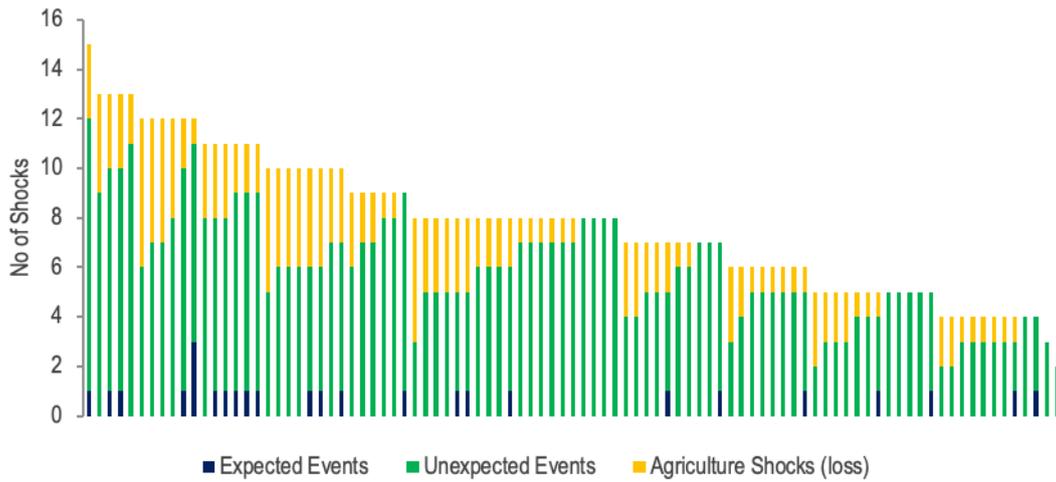
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

TABLE A3.10: CORRELATION BETWEEN AND INCOME NET INCOME AND BEHAVIORAL INDICATORS

Country	Variables	Net Agricultural Income	Net Non-Agricultural Income
Mozambique	Total Expense	0.37 ***	0.48 ***
	Total Deposits	0.01	0.26 ***
	Total Withdrawals	-0.04	0.09 **
	Total Borrowings	-0.03	0.07 **
	Total Repayments	0.01	0.21 ***
Tanzania	Total Expense	0.18 ***	0.23 ***
	Total Deposits	0.15 ***	0.31 ***
	Total Withdrawals	0.16 ***	0.15 ***
	Total Borrowings	-0.01	0.05
	Total Repayments	0.15 ***	0.14 ***
Pakistan	Total Expense	0.07 **	0.22 ***
	Total Deposits	0.53 ***	-0.07 **
	Total Withdrawals	-0.02	-0.17 ***
	Total Borrowings	-0.08 **	0.03
	Total Repayments	0.28 ***	0.15 ***

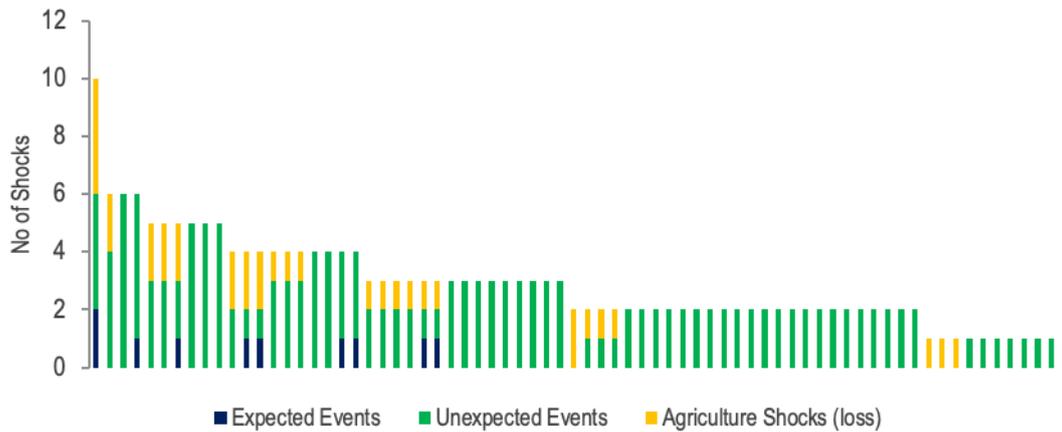
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.19: NUMBER OF EXPECTED, UNEXPECTED AND AGRICULTURAL SHOCKS SUMMED OVER THE YEAR BY INDIVIDUAL HOUSEHOLDS IN MOZAMBIQUE (SMALLHOLDER DIARIES)



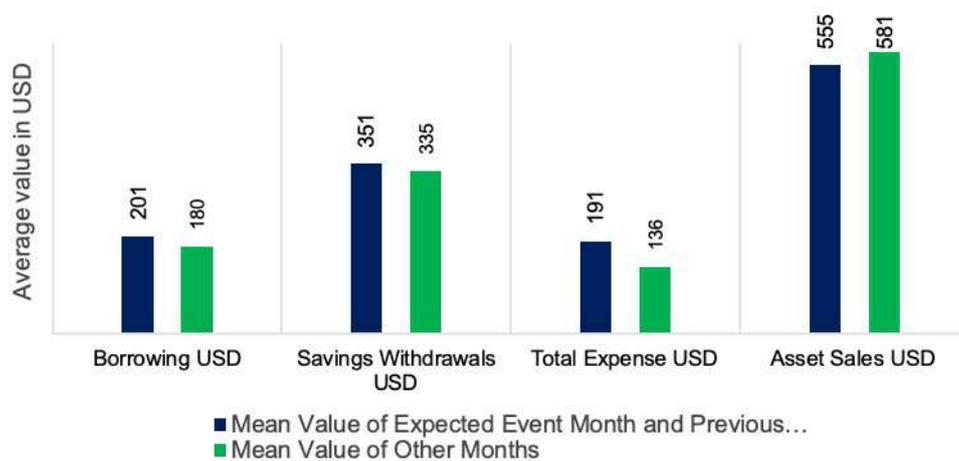
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.20: NUMBER OF EXPECTED, UNEXPECTED AND AGRICULTURAL SHOCKS SUMMED OVER THE YEAR BY INDIVIDUAL HOUSEHOLDS IN TANZANIA (SMALLHOLDER DIARIES)



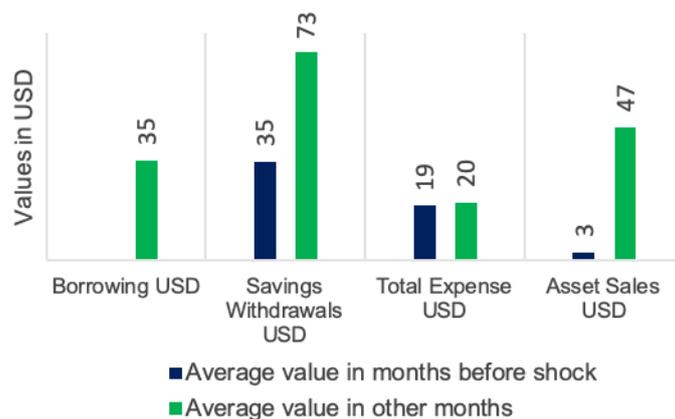
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.21: COMPARISON OF AVERAGE TRANSACTION VALUES IN MONTHS LEADING-UP TO EXPECTED EVENTS WITH REMAINING MONTHS IN PAKISTAN (SMALLHOLDER DIARIES)



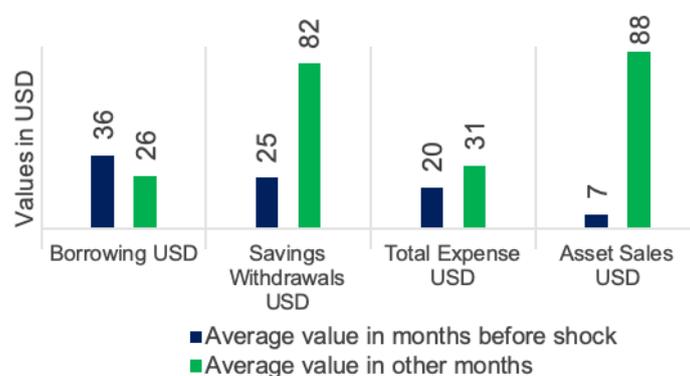
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.22: COMPARISON OF AVERAGE TRANSACTION VALUES IN MONTHS LEADING-UP TO EXPECTED EVENTS WITH REMAINING MONTHS IN MOZAMBIQUE (SMALLHOLDER DIARIES)



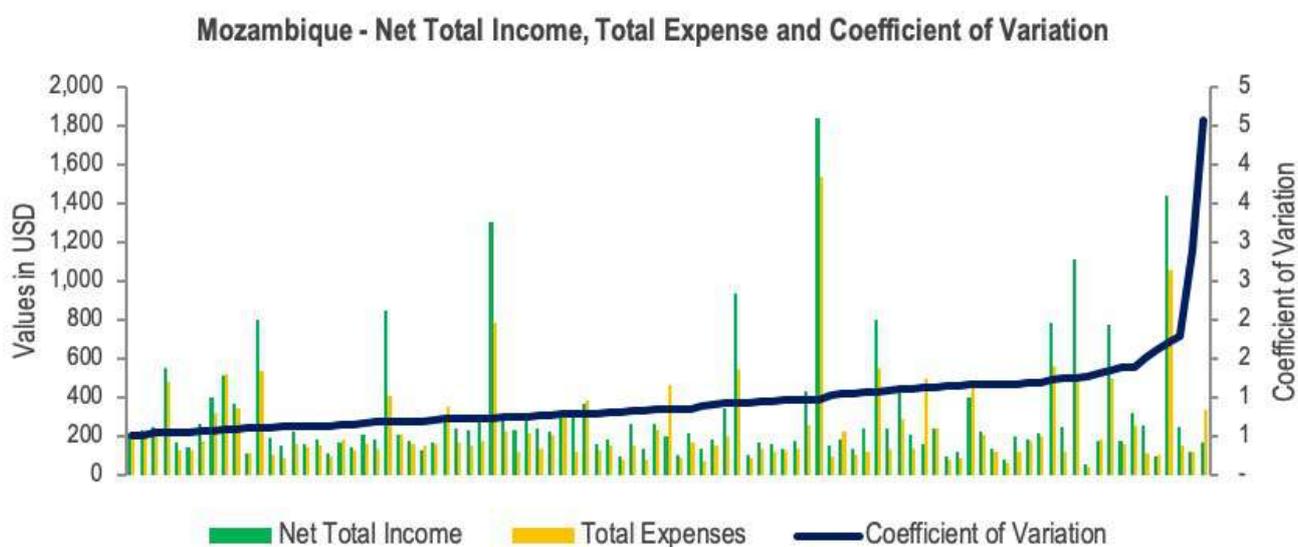
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.23: COMPARISON OF AVERAGE TRANSACTION VALUES IN MONTHS LEADING-UP TO EXPECTED EVENTS WITH REMAINING MONTHS IN TANZANIA (SMALLHOLDER DIARIES)



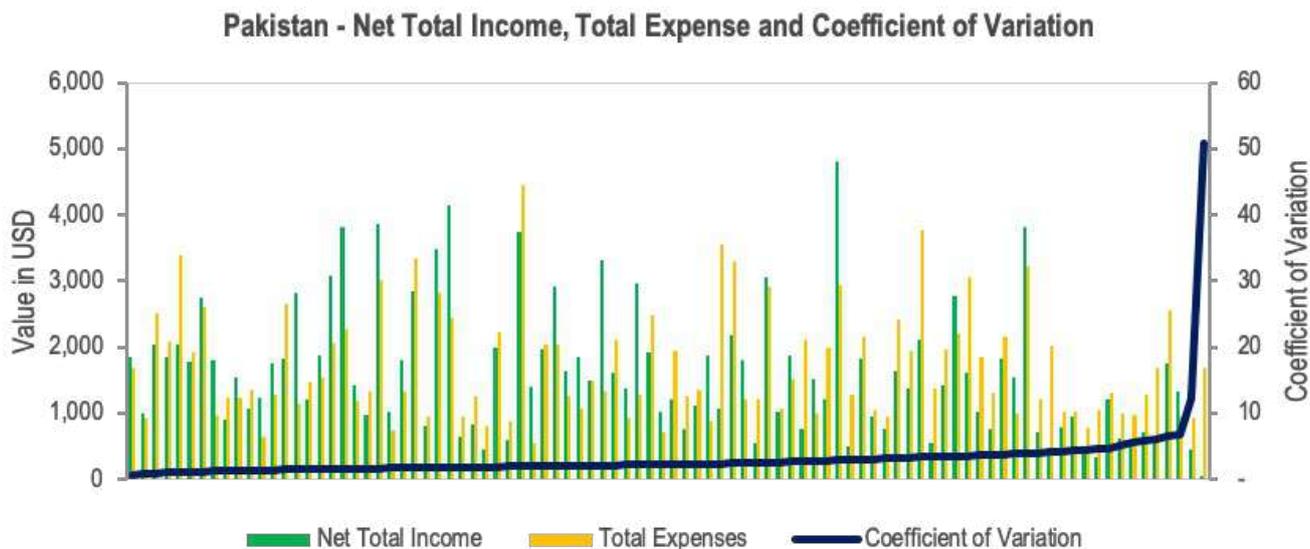
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.24 INCOME VOLATILITY VS AVERAGE NET TOTAL INCOME BY SMALLHOLDER HOUSEHOLDS IN MOZAMBIQUE USING SMALLHOLDER DIARIES DATA



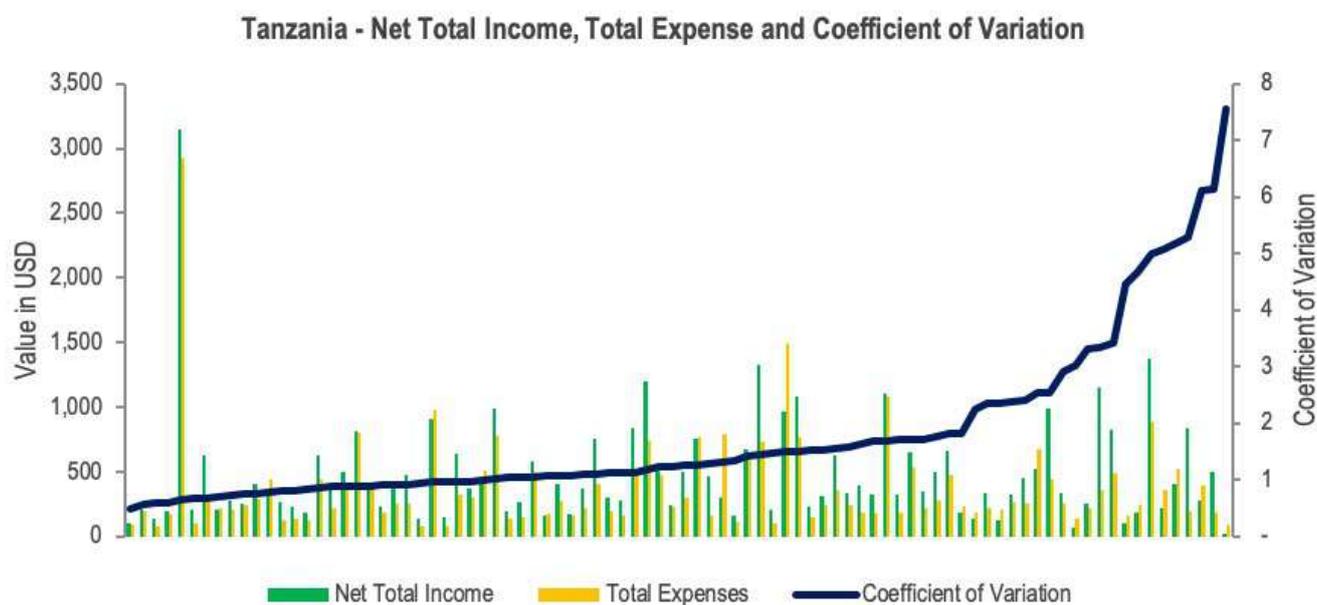
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.25 INCOME VOLATILITY VS AVERAGE NET TOTAL INCOME BY SMALLHOLDER HOUSEHOLDS IN PAKISTAN USING SMALLHOLDER DIARIES DATA



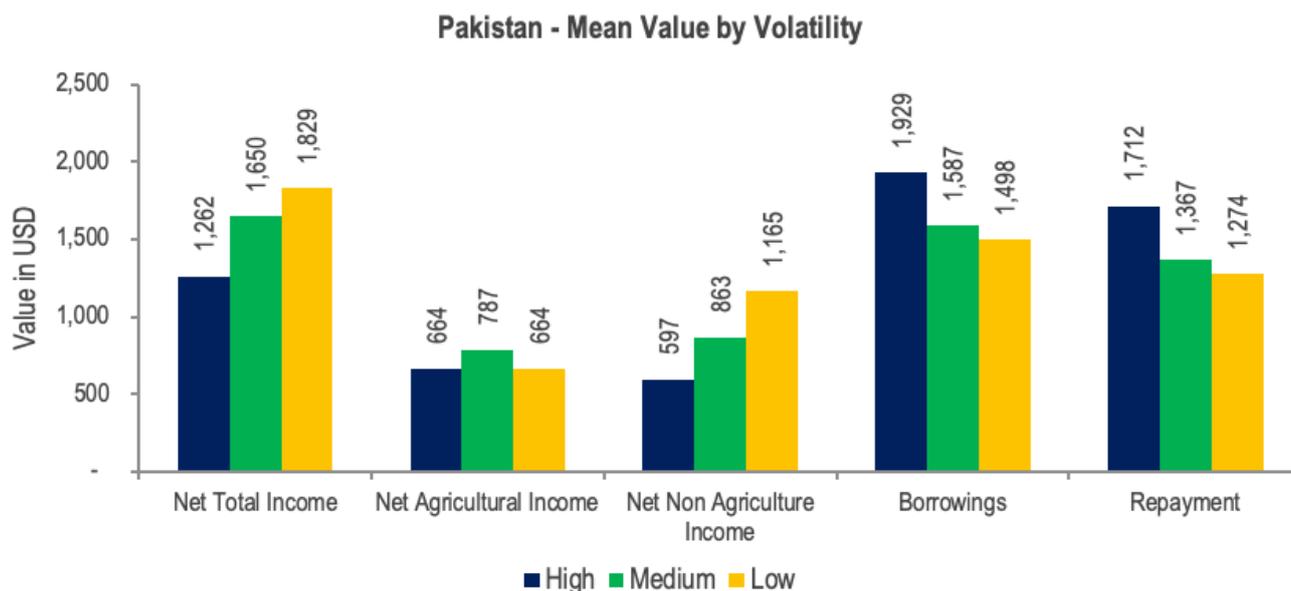
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.26 INCOME VOLATILITY VS AVERAGE NET TOTAL INCOME BY SMALLHOLDER HOUSEHOLDS IN TANZANIA USING SMALLHOLDER DIARIES DATA



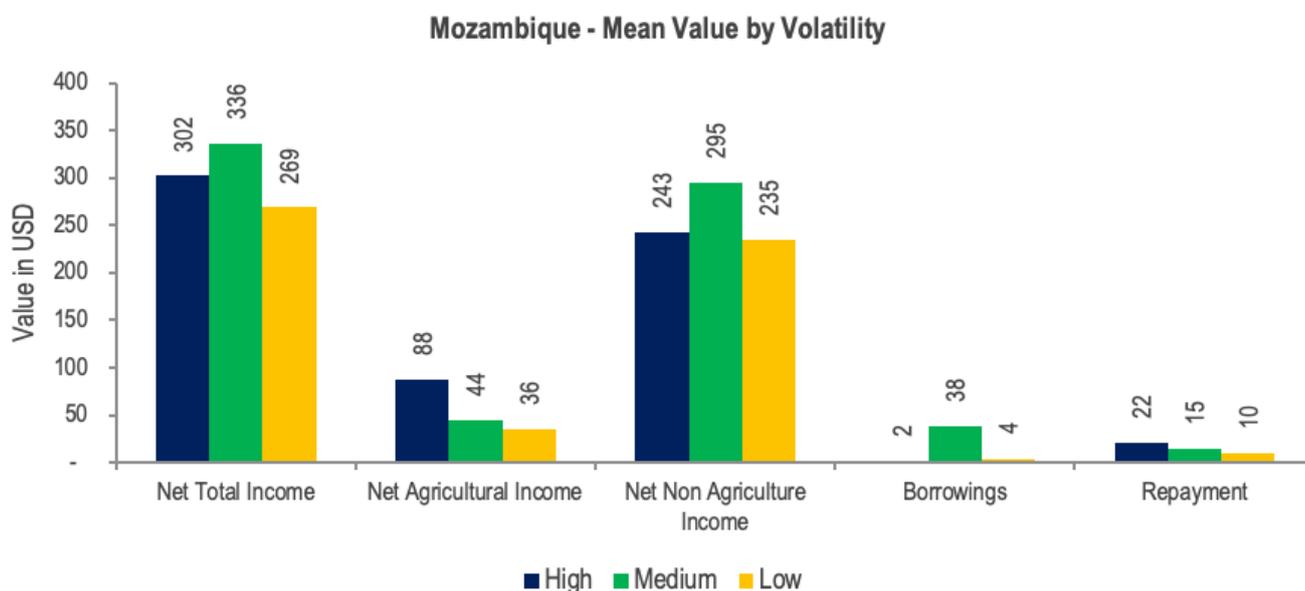
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.27: SMALLHOLDER FARMERS' AVERAGE INCOME, BORROWING AND SAVINGS TRANSACTION GROUPED BY HIGH, MEDIUM AND LOW-INCOME VOLATILITY (CV) IN PAKISTAN USING SMALLHOLDER DIARIES DATA



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.28: SMALLHOLDER FARMERS' AVERAGE INCOME, BORROWING AND SAVINGS TRANSACTION GROUPED BY HIGH, MEDIUM AND LOW-INCOME VOLATILITY (CV) IN MOZAMBIQUE USING SMALLHOLDER DIARIES DATA



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

TABLE A3.11: MEAN COMPARISON TESTS OF HIGH, MEDIUM AND LOW VOLATILITY HOUSEHOLDS IN MOZAMBIQUE

MOZAMBIQUE	MEAN		DIFFERENCE IN MEAN	P-VALUE
Net Total Income				
High Income Volatility vs Medium Income Volatility	964	919	45	0.92
Medium Income Volatility vs Low Income Volatility	919	752	167	0.31
High Income Volatility vs Low Income Volatility	964	752	212	0.16
Total Expense				
High Income Volatility vs Medium Income Volatility	713	691	22	0.94
Medium Income Volatility vs Low Income Volatility	691	585	106	0.23
High Income Volatility vs Low Income Volatility	713	585	128	0.13
Physical Asset Purchase				
High Income Volatility vs Medium Income Volatility	561	1,083	-522	0.10
High Income Volatility vs Low Income Volatility	561	422	139	0.82
Medium Income Volatility vs Low Income Volatility	1,083	422	661	0.02
Physical Asset Sales				
Medium Income Volatility vs Low Income Volatility	1,396	894	502	0.90
High Income Volatility vs Medium Income Volatility	2,016	1,396	621	0.85
High Income Volatility vs Low Income Volatility	2,016	894	1,123	0.61
Net Agriculture Income				
Medium Income Volatility vs Low Income Volatility	331	250	81	0.90
High Income Volatility vs Medium Income Volatility	735	331	404	0.14
High Income Volatility vs Low Income Volatility	735	250	485	0.06
Net Non-Agriculture Income				
High Income Volatility vs Medium Income Volatility	716	741	-25	0.96
High Income Volatility vs Low Income Volatility	716	613	103	0.51
Medium Income Volatility vs Low Income Volatility	741	613	128	0.35
Total Borrowings				
High Income Volatility vs Medium Income Volatility	7	98	-92	0.44
High Income Volatility vs Low Income Volatility	7	12	-5	1.00
Medium Income Volatility vs Low Income Volatility	98	12	86	0.48
Total Repayments				
High Income Volatility vs Medium Income Volatility	62	42	19	0.66
Medium Income Volatility vs Low Income Volatility	42	21	21	0.63
High Income Volatility vs Low Income Volatility	62	21	40	0.18
Total Withdrawals				
High Income Volatility vs Medium Income Volatility	62	204	-142	0.03
High Income Volatility vs Low Income Volatility	62	50	12	0.98
Medium Income Volatility vs Low Income Volatility	204	50	154	0.02
Total Deposits				
High Income Volatility vs Medium Income Volatility	68	240	-171	0.03
High Income Volatility vs Low Income Volatility	68	29	39	0.82
Medium Income Volatility vs Low Income Volatility	240	29	211	0.00

SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

TABLE A3.12: MEAN COMPARISON TESTS OF HIGH, MEDIUM AND LOW VOLATILITY HOUSEHOLDS IN TANZANIA

TANZANIA	MEAN		DIFFERENCE IN MEAN	P-VALUE
Net Total Income				
High Income Volatility vs Medium Income Volatility	71,354	76,000	-4,646	0.95
High Income Volatility vs Low Income Volatility	71,354	68,570	2,784	0.98
Medium Income Volatility vs Low Income Volatility	76,000	68,570	7,430	0.87
Total Expense				
High Income Volatility vs Medium Income Volatility	50,666	57,917	-7,251	0.56
High Income Volatility vs Low Income Volatility	50,666	54,925	-4,259	0.82
Medium Income Volatility vs Low Income Volatility	57,917	54,925	2,992	0.91
Physical Asset Purchase				
Medium Income Volatility vs Low Income Volatility	57,539	38,617	18,922	0.93
High Income Volatility vs Medium Income Volatility	218,896	57,539	161,357	0.00
High Income Volatility vs Low Income Volatility	218,896	38,617	180,279	0.00
Physical Asset Sales				
High Income Volatility vs Medium Income Volatility	186,417	156,900	29,517	0.94
Medium Income Volatility vs Low Income Volatility	156,900	59,500	97,400	0.67
High Income Volatility vs Low Income Volatility	186,417	59,500	126,917	0.51
Net Agriculture Income				
High Income Volatility vs Medium Income Volatility	83,951	53,755	30,196	0.37
Medium Income Volatility vs Low Income Volatility	53,755	23,508	30,247	0.40
High Income Volatility vs Low Income Volatility	83,951	23,508	60,443	0.03
Net Non-Agriculture Income				
High Income Volatility vs Low Income Volatility	17,803	51,905	-34,103	0.00
High Income Volatility vs Medium Income Volatility	17,803	40,691	-22,888	0.02
Medium Income Volatility vs Low Income Volatility	40,691	51,905	-11,215	0.41
Total Borrowings				
High Income Volatility vs Medium Income Volatility	16,560	16,421	139	1.00
Medium Income Volatility vs Low Income Volatility	16,421	5,572	10,849	0.00
High Income Volatility vs Low Income Volatility	16,560	5,572	10,988	0.00
Total Repayments				
High Income Volatility vs Medium Income Volatility	24,388	25,984	-1,596	0.92
High Income Volatility vs Low Income Volatility	24,388	12,087	12,302	0.01
Medium Income Volatility vs Low Income Volatility	25,984	12,087	13,898	0.00
Total Withdrawals				
Medium Income Volatility vs Low Income Volatility	10,272	21,711	-11,439	0.21
High Income Volatility vs Low Income Volatility	17,944	21,711	-3,767	0.85
High Income Volatility vs Medium Income Volatility	17,944	10,272	7,672	0.50
Total Deposits				
Medium Income Volatility vs Low Income Volatility	9,060	19,241	-10,181	0.27
High Income Volatility vs Low Income Volatility	9,079	19,241	-10,162	0.28
High Income Volatility vs Medium Income Volatility	9,079	9,060	19	1.00

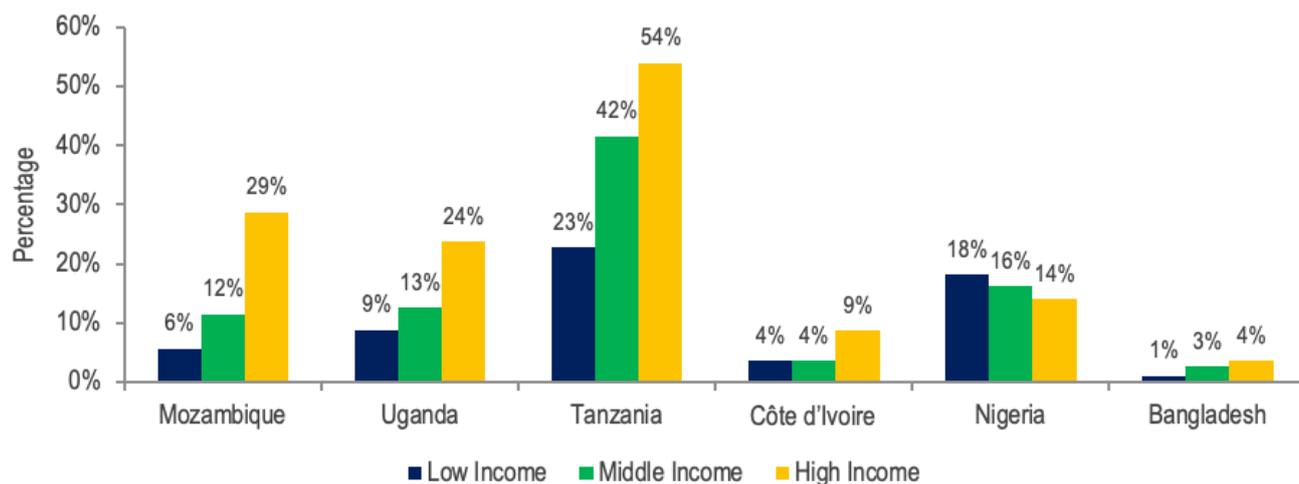
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

TABLE A3.13: MEAN COMPARISON TESTS OF HIGH, MEDIUM AND LOW VOLATILITY HOUSEHOLDS IN PAKISTAN

PAKISTAN	MEAN		DIFFERENCE IN MEAN	P-VALUE
Net Total Income				
High Income Volatility vs Low Income Volatility	10,611	15,424	-4,814	0.21
High Income Volatility vs Medium Income Volatility	10,611	14,027	-3,416	0.46
Medium Income Volatility vs Low Income Volatility	14,027	15,424	-1,398	0.88
Total Expense				
High Income Volatility vs Low Income Volatility	14,198	14,421	-223	0.98
Medium Income Volatility vs Low Income Volatility	14,214	14,421	-207	0.98
High Income Volatility vs Medium Income Volatility	14,198	14,214	-16	1.00
Physical Asset Purchase				
High Income Volatility vs Medium Income Volatility	28,138	98,738	-70,599	0.03
High Income Volatility vs Low Income Volatility	28,138	39,463	-11,325	0.89
Medium Income Volatility vs Low Income Volatility	98,738	39,463	59,274	0.07
Physical Asset Sales				
High Income Volatility vs Medium Income Volatility	44,296	96,143	-51,847	0.28
High Income Volatility vs Low Income Volatility	44,296	43,013	1,283	1.00
Medium Income Volatility vs Low Income Volatility	96,143	43,013	53,130	0.27
Net Agriculture Income				
High Income Volatility vs Medium Income Volatility	5,910	6,935	-1,025	0.93
High Income Volatility vs Low Income Volatility	5,910	6,018	-109	1.00
Medium Income Volatility vs Low Income Volatility	6,935	6,018	916	0.94
Net Non-Agriculture Income				
High Income Volatility vs Low Income Volatility	4,823	9,373	-4,550	0.00
Medium Income Volatility vs Low Income Volatility	7,050	9,373	-2,323	0.21
High Income Volatility vs Medium Income Volatility	4,823	7,050	-2,227	0.23
Total Borrowings				
Medium Income Volatility vs Low Income Volatility	12,967	12,046	921	0.94
High Income Volatility vs Medium Income Volatility	15,578	12,967	2,610	0.58
High Income Volatility vs Low Income Volatility	15,578	12,046	3,532	0.37
Total Repayments				
Medium Income Volatility vs Low Income Volatility	11,167	10,247	921	0.89
High Income Volatility vs Medium Income Volatility	13,826	11,167	2,659	0.38
High Income Volatility vs Low Income Volatility	13,826	10,247	3,579	0.17
Total Withdrawals				
High Income Volatility vs Medium Income Volatility	4,703	4,721	-18	1.00
High Income Volatility vs Low Income Volatility	4,703	1,911	2,792	0.08
Medium Income Volatility vs Low Income Volatility	4,721	1,911	2,810	0.09
Total Deposits				
High Income Volatility vs Medium Income Volatility	5,105	5,607	-502	0.95
High Income Volatility vs Low Income Volatility	5,105	2,557	2,548	0.24
Medium Income Volatility vs Low Income Volatility	5,607	2,557	3,050	0.13

SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.29: PERCENTAGE OF HOUSEHOLDS LIVING IN URBAN AREAS BY INCOME GROUP



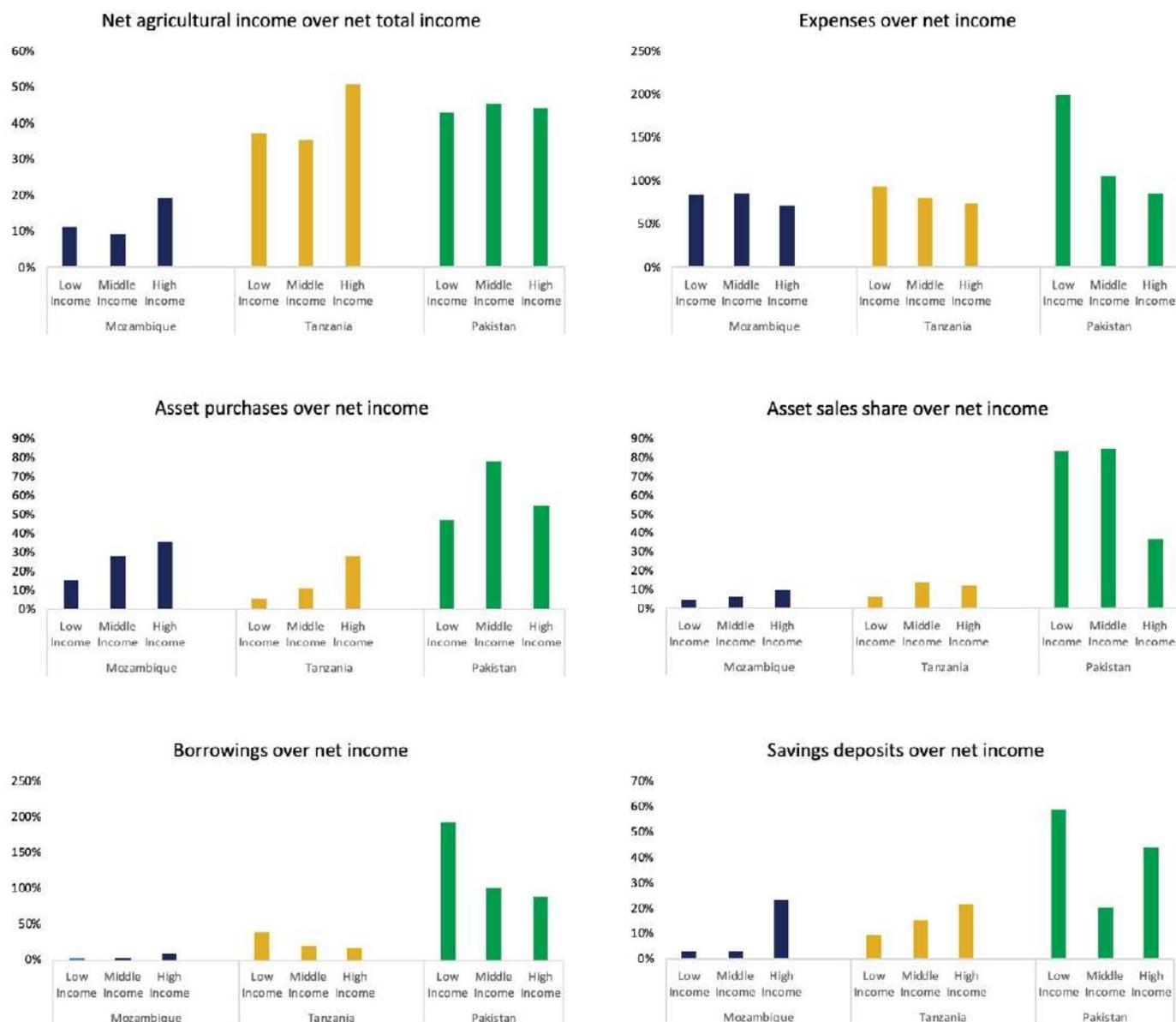
SOURCE: CGAP NATIONAL SURVEYS OF SMALLHOLDER HOUSEHOLDS, 2016 AND 2017.

FIGURE A3.30: BORROWINGS OVER NET TOTAL INCOME FOR DIFFERENT INCOME GROUPS (SMALLHOLDER DIARIES)



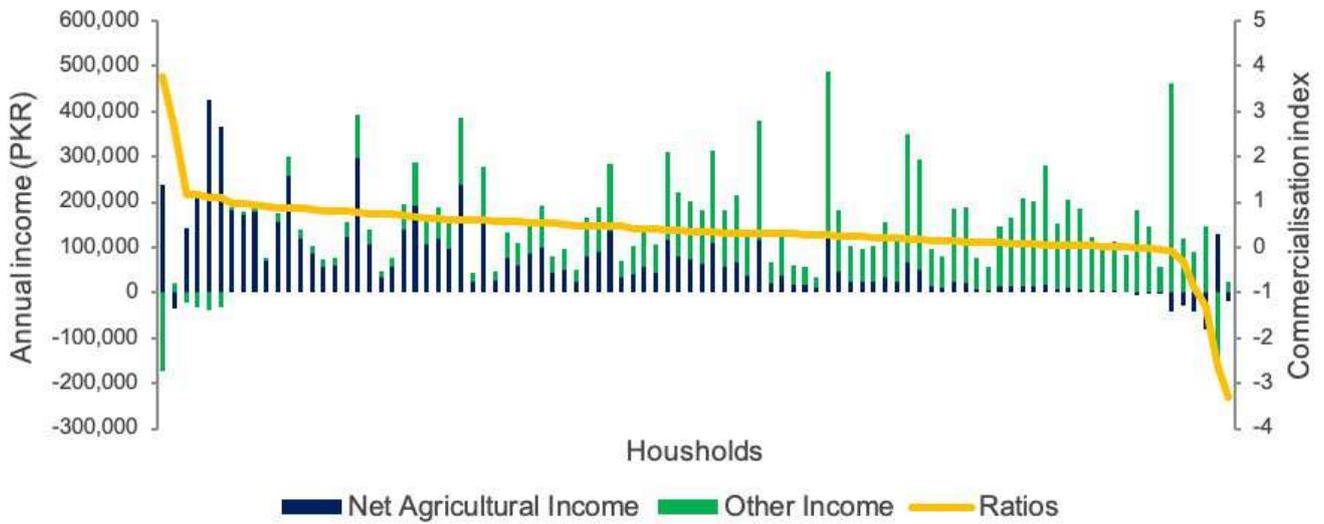
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.31: RELATIVE SIZE OF NET AGRICULTURAL INCOME, EXPENSES, ASSET PURCHASES/SALES, AND BORROWINGS AND SAVINGS WHEN COMPARED TO NET INCOME FOR DIFFERENT INCOME GROUPS (SMALLHOLDER DIARIES)



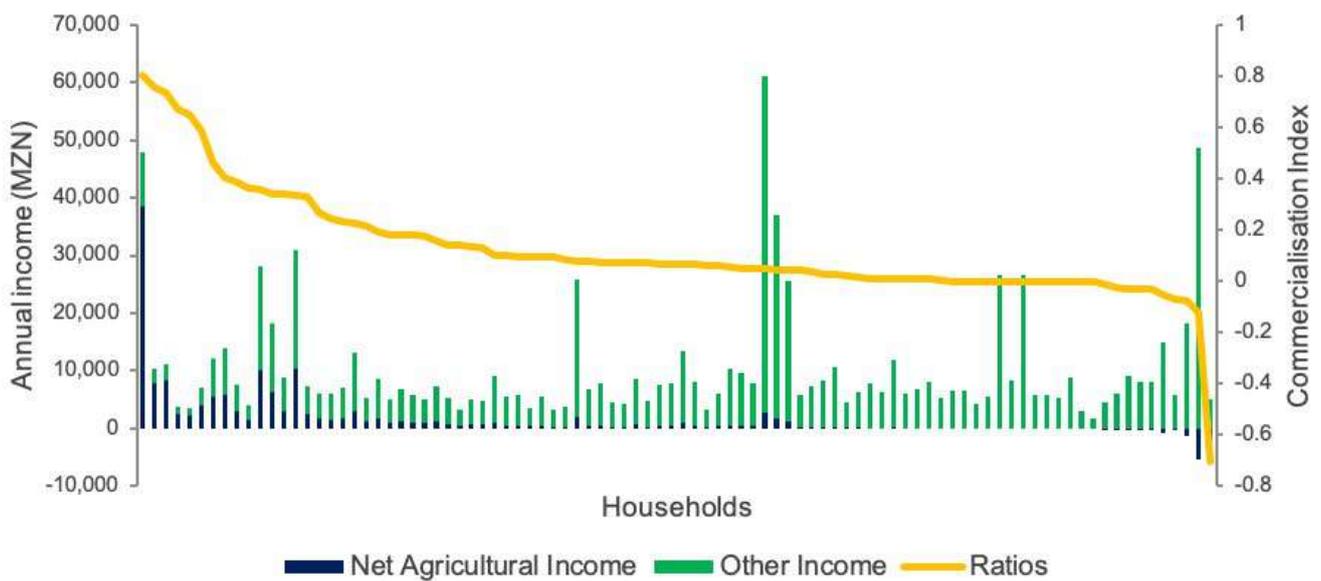
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.32: SMALLHOLDER DIARIES HOUSEHOLDS' TOTAL INCOME RANKED BY COMMERCIALIZATION INDEX FOR PAKISTAN



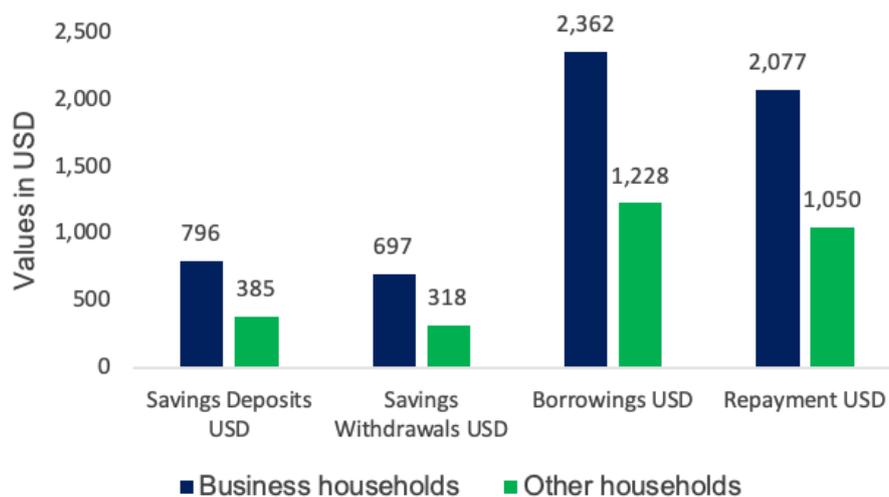
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.33: SMALLHOLDER DIARIES HOUSEHOLDS' TOTAL INCOME RANKED BY COMMERCIALIZATION INDEX FOR MOZAMBIQUE



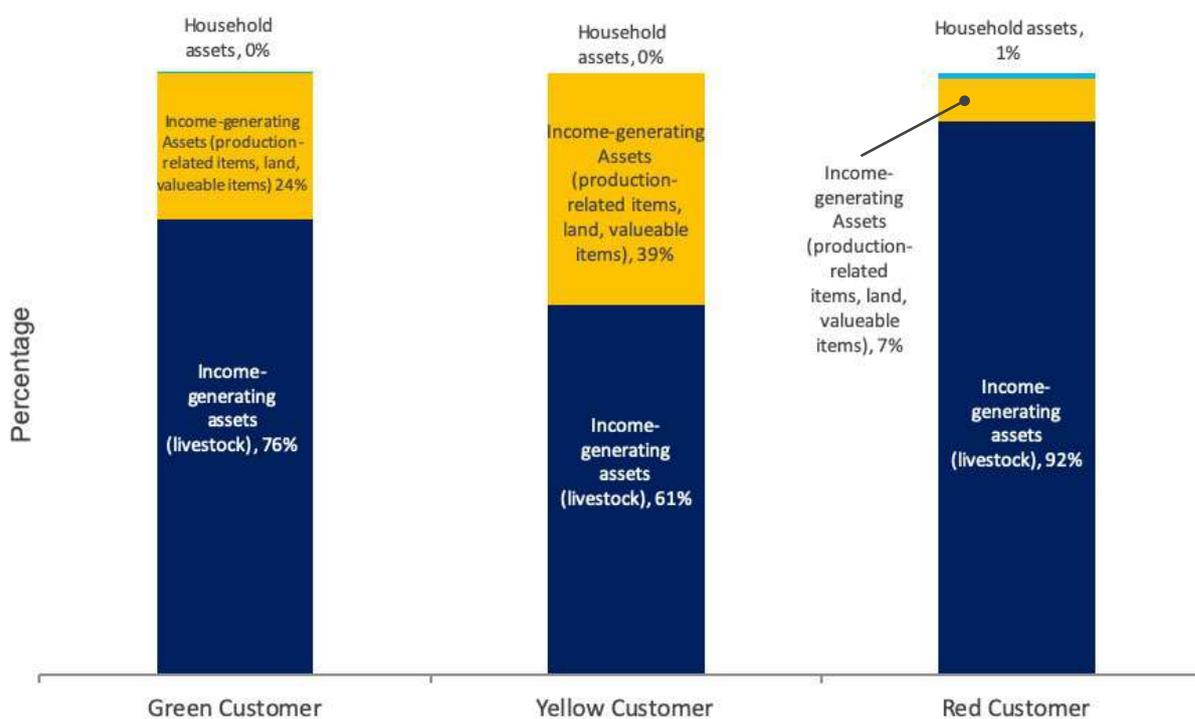
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.34: AVERAGE SAVINGS AND BORROWING TRANSACTIONS FOR BUSINESS AND OTHER HOUSEHOLDS IN PAKISTAN (SMALLHOLDER DIARIES)



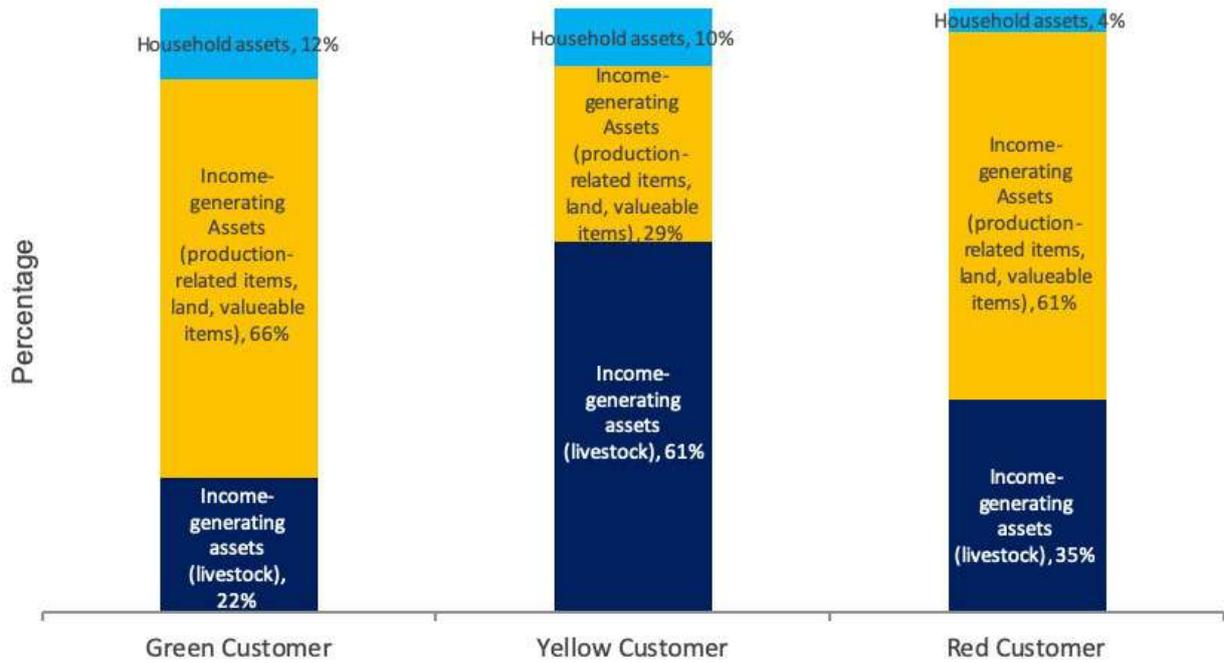
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.35: ASSET SALES DISAGGREGATED BY TYPE FOR GREEN, YELLOW AND RED CUSTOMERS IN PAKISTAN (SMALLHOLDER DIARIES)



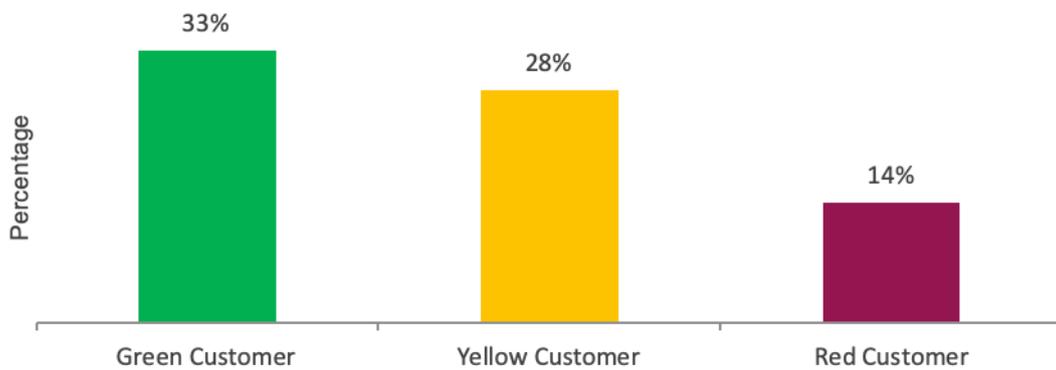
SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.36: ASSET PURCHASE DISAGGREGATED BY TYPE FOR GREEN, YELLOW AND RED CUSTOMERS IN PAKISTAN (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.

FIGURE A3.37: REPAYMENT OF FORMAL LOANS IN PERCENTAGE FOR GREEN, YELLOW AND RED CUSTOMER HOUSEHOLDS IN PAKISTAN (SMALLHOLDER DIARIES)



SOURCE: CGAP THE SMALLHOLDER DIARIES DATASETS, 2014 AND 2015.



Photo: Ayesha Vellani / CGAP

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Annex 4: Accompanying Notes

SECTION 11 :: ANNEX 4- ACCOMPANYING NOTES

Where possible, we have responded to clarifications within the body of the report. However, there are some comments that relate to a number of queries that we felt more appropriate to respond to outside the main report. We have summarized these below as a set of accompanying notes to help the reader understand the terms used, how the analysis was structured, and additional areas of research that were not feasible within the timeline for this assignment.

1. Definitions

Informal Account Classification - We used the definitions suggested by Intermedia for consistency across our analysis.

Rural and urban areas and query as to whether to distinguish peri-urban. There is no indication of peri-urban areas. The variable only distinguishes between rural and urban. Intermedia has defined rural/urban through national census data. Definitions can vary between countries. Intermedia may be able to provide more information on this issue.

Banked and unbanked (and why FINDEX criteria wasn't used to define banked and unbanked). We have used the definition that was chosen by Intermedia to keep research comparable to prior analysis of this data. This had been agreed with CGAP.

Formal accounts (Q1.11) Respondents have been classified into four groups. Informal account has been classified using F46 and F47. Formal account has been classified using bank account, MFI and others, mobile money. Using formal and informal, we have classified into four groups

- Respondent who using only formal account
- Respondent who using only informal account
- Respondent who using both formal and informal account
- Respondent who do not have any account

Income Source and query relating to whether this was used as a variable. Income source is included as a variable in the regression model. See discussion on 'Largest source of income as well as the Annex of this research question for the complete regression output.

Agricultural income: This is income from agricultural production. We have been using agricultural income or net agricultural income throughout.

Lag and Lead months: Lag are months before current month and leads are months after current month

Assets Taken to Repay: These assets are seized in lieu of loan repayments.

Agricultural shocks vs unexpected events: The data source is different for the two types of shocks. Unexpected shocks come through the events data set and no direct monetary value can be attributed to these. Agricultural shocks come through the crop tracker, where we can quantify the value of each agricultural shock. We therefore thought this was worth separating these out.

Income: How was income derived from survey data? There is a question on average monthly income of any given household in the household survey (D21). We have used this to segment the sample by income.

Income = Cash? In-kind? Both? The national survey question (D21) we have used as proxy for income is a bit ambiguous on this ('monthly income across all sources of money'). This would be a good point to clarify with Intermedia.

Insurance, savings and credit plans: According to Intermedia, the definitions that are suggested are only helpful for interpreting the data. Ultimately, however, the precise definition of a term is left to the interpretation of the survey respondent and will be specific to the local context. As you read the questionnaire there are certain modules where the respondent is prompted to consider formal institutions, such as banks, and other areas where the respondent is left to define the terms for themselves such that the subject behaviors could reference formal or informal or both.

- Saving plan: An arrangement that allows pooling aside funds to enable one to achieve long term goals.
- Investment plan: Placing funds in ventures based on one's future goals, time and priorities to allow them produce financial rewards over time.
- Insurance plan: An arrangement by which an individual, company or government provides protection against a possible eventuality in return for payment of a premium.

Small-scale households: There are certainly subsistence farmers within this segment at the lower end but also slightly better performing farmers which struggle less. This is why we deliberately chose not to call this segment subsistence farmers but Small-scale farmers to describe a group that opposed to commercializing farmers uses agriculture to feed the family – some more successfully than others. Commercializing farmers on the other hand are on another 'growth trajectory' as these consider farming more to be a business and invest additional resources in the production cycle. This behavior shows more growth potential which was one of the determining factors here to segment the two groups.

Segmentation Analysis – Commercial

Smallholders: I would suggest that commercial SHs in tight value chains are part of this segment. Note however that this segment is defined much more broadly and will include SHs that are in looser value chains as well. In terms of the recent country papers I would think we could summarize this segment as having characteristics of the Options for Growth and the Strategic

agricultural partnerships. Note however that this is just a broad conceptual link and that the two papers segment smallholders methodologically in different ways.

Income source - Majority of income: Here we have to work with what the surveys are offering. We have not used the 'identity question', or what is your primary job / activity you spend most time on (H6) To derive the livelihood strategy. Instead we have used question H2B on main source of income over the last 12 months. We therefore hope that the segmentation is picking-up on the source of the actual majority of their income.

2. Clarifications on methodology

- Queries were raised regarding the placement of Methodology, Statistical methods and research framework sections in the main section of the report. Having agreed the format of the report earlier on, we understood that it was valuable to include these sections in the main text to provide context to the reader and give them an understanding of how the analysis was drawn and why. However, depending on the audience targeted, it may be worth changing the format accordingly.
- Queries raised regarding the multicollinearity of some of our regressions and any caveats. We don't find much correlation between the independent variables in all models. So, we feel that there will not be an issue of multicollinearity.
- The Financial diaries data is organized in 15 columns. These do however pick-up on a large spectrum of different variables.
- We have not included 'keeping money at home' under the informal category.
- Note that the sum of all 'keeping cash at home' transactions is a multiple of all other transactions which makes it difficult to discuss and present differences in other forms of savings.
- The segmentation exercise allows us to quantify differences between the two groups of farmers and show where these are statistically significant.

- Rational for segmentation of smallholder farmers according to level of Commercialization: In Section 3 we particularly focused on investigating alternative ways of segmenting and analyzing smallholder families and their behavior. Firstly, to expand on the conventional definitions of smallholder commercialization by making use of the granularity of the diaries data. Second of all, we segmented households in new and alternative ways and see how this might be interesting for FSPs in terms of customer profiling. One example being that not all households might choose commercialization as their desired way out of poverty. While some do, others might want to focus more on waged employment or self-employment and are using agriculture only as another complementary income source. Households focusing on progressing their agri-business then might need a different financial product portfolio than households who are aiming for waged employment. As such we not only profiled households according to income but also alternative routes to pick-up on profiles by looking at expenditure, type of income mix, borrowing behavior, saving behavior, to create profiles of households that we can compare
- Suggestion to take question A28 in the scoring table out (Q1.9). We have taken this comment into account and excluded this question when designing the new commercialization index that is presented in the segmentation synthesis at the end of this paper. Revising this specific index definition however would take a substantial amount of additional work which can be discussed separately.
- Ward's clustering method is an alternative approach for performing cluster analysis.¹⁰⁹ Basically, it looks at cluster analysis as an analysis of variance problem, instead of using distance metrics or measures of association. This method involves an agglomerative clustering algorithm. It will start out at the leaves and work its way to the trunk, so to speak. It looks for groups of leaves that it forms into branches, the branches into limbs and eventually into the trunk. Ward's method starts out with n clusters of size 1 and continues until all the observations are included into one cluster. This method is most appropriate for quantitative variables, and not binary variables.

Based on the notion that clusters of multivariate observations should be approximately elliptical in shape, we assume that the data from each of the clusters will be realized in a multivariate distribution. Therefore, it would follow that they would fall into an elliptical shape when plotted in a p -dimensional scatter plot.

¹⁰⁹ See <https://online.stat.psu.edu/stat505/lesson/14/14.7>

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