CGAP

National Survey and Segmentation of Smallholder Households in Tanzania

Understanding Their Demand for Financial, Agricultural, and Digital Solutions

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ACKNOWLEDGMENTS

A. INTRODUCTION AND KEY FINDINGS

Introduction

Tanzania is a democratic republic of 44 million people with an average annual gross domestic product (GDP) growth rate of 6 percent to 7 percent over the past decade. Agricultural development is key to attaining the United Nation's Sustainable Development Goals by 2030 and is the mainstay of the economy, contributing over 27 percent of GDP and employing 78 percent of the labor force.[1] Tanzania is largely self-sufficient in its main staple crop, maize, though it still faces shortfalls in some years due to weather variability.

Smallholder farmers in Tanzania face a range of challenges, including obtaining and paying for quality seeds, fertilizer, and pesticide, and transporting goods to market along run down road networks. Compounding this is a lack of post-harvest storage facilities for crops and, if available, their prohibitive cost. Both the public and private sector in Tanzania have made significant investments in the country's financial infrastructure in recent years, but the provision of credit, insurance, and payments facilities for smallholders is still lacking.

Mobile money services are a powerful tool to bring the unbanked and those using only informal financial services into the formal financial sector. They transform a mobile phone from a communications tool into a channel for low-cost financial services such as payments, transfers, insurance, credit, and savings. Mobile money is established and maturing in Tanzania overall, serving new business areas and enabling a wider range of digital payments, including among some smallholder households.

In close collaboration with the Financial Sector Deepening Trust–Tanzania (FSDT), CGAP conducted a nationally representative survey of smallholder households between August and September 2015.[2] This study sought to develop a comprehensive map of the many activities, interests, aspirations, barriers, and pressures facing smallholder families. The questionnaire also explored nonagricultural household activities, financial practices and interests, and challenges and aspirations of these households.

This report shares the findings, observations, and insights from the national survey of smallholder households in Tanzania. It begins with an overview of the research approach, core program objectives, research questions, preliminary phases of development, and topics included in the questionnaire. It then profiles smallholder farmers in Tanzania, including their household demographics, farmographics, decision-making processes, self-identification and characterization of their identity, and motivations to do their work.

This comprehensive exploration of the lives of smallholder households sought to answer the following three questions:

- What does the community of practice need to know or do to support smallholder households build more resilient and productive livelihoods?

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1   USAID, Economic Growth and Trade (https://www.usaid.gov/tanzania/economic-growth-and-trade)

2   A total of 3,503 households were selected for the survey in Tanzania, of which 3,020 were found to be occupied during data collection. Of these, 2,993 were successfully interviewed, yielding a household response rate of 99.1 percent. In the interviewed households 5,935 eligible household members were identified for the multiple respondent questionnaire. Completed interviews were conducted with 5,034 of them thus yielding a response rate of 84.8 percent for the Multiple Respondent questionnaire. Among the 2,993 eligible household members selected for the Single Respondent questionnaire, 2,795 were successfully interviewed, corresponding to a response rate of 93.4 percent.

- How can financial mechanisms respond to the relevant needs and desires of smallholder households?

- What types of market strategies and approaches can cultivate uptake and use of financial mechanisms?

The report examines how smallholder families manage their income and expenses and the issues they face that often lead to financial instability. It then describes financial inclusion in the smallholder sector, exploring household tools that are essential for financial inclusion, including mobile phones and national identification documents, as well as adoption of financial products, awareness, barriers, and interests. The sections that follow outline the five distinct segments of the smallholder population in Tanzania, mapping out groups of smallholder farmers that matter for fostering greater product adoption, and delving into their demand for various financial mechanisms. A full explanation of the research methodology and the user guide that accompanies the data set are included in Annex 1.

This report has three main goals:

1. Build the evidence base for those working in agricultural finance so that assumptions and/or isolated observations can be paired with known, reliable representative data about the population.

2. Connect financial service providers, mobile network operators, policy makers, funders and other stakeholders with the unique realities of smallholder farmers in Tanzania that could otherwise be overlooked, oversimplified, or erroneously generalized from other smallholder farmer markets.

3. Catalyze conversations about "what's next" for smallholder-centered strategies, products, and approaches that

facilitate agricultural and household finance.

Key characteristics of smallholder households In Tanzania

Smallholder farmers in Tanzania have a deeply committed, reciprocal relationship with their land and farm. Farmers prioritize, invest in, and cultivate their farming activities year in and year out. In return, agriculture provides their household with sustenance, income, even investments and growth opportunities. Agriculture is part of the identity of smallholder households, a point of pride, and a legacy for future generations. Many see a future in farming, and they look for opportunities to be more successful in their agricultural endeavors.

Smallholders know that working in agriculture is intensive, risky, uncertain, and challenging. Mitigating risk is top-of-mind for these farmers because they know doing so is essential to sustaining their livelihood, even if it comes at a cost. Because of these harsh realities, farmers may consider diversifying or opting for more steady income streams, if they ever present themselves, but a transition away from agricultural activities is more likely to be driven by need, not a dislike for farming. In short, most smallholder farmers enjoy and find great satisfaction in farming. However, new or potential farmers are more likely to diversify their skills and seek a livelihood that does not involve raising crops or livestock. Smallholders in Tanzania tend to be a more tenured, seasoned group that is devoted to farming. A few farmers are relatively young, suggesting that some attrition into a life outside of farming has already happened.

Smallholder households in Tanzania have six fundamental characteristics that can help the community of

practice foster greater productivity and resiliency:

- **Common dependence on agriculture.** Agriculture provides the main income stream into the household, and supports nearly all of the household activities. Most families consume what they grow, trade goods for other necessities, and sell their crops or livestock for income. Still, despite the various uses of their agricultural production, smallholder households often fall short of their monthly income needs. Most households live at or below the poverty line, and many live in extreme poverty. They work hard, have big aspirations, and take pride in their accomplishments.

- **Crop uniformity.** Smallholders in Tanzania tend to grow a limited number of crops, and maize is almost always one of them. This lack of diversity can be a significant risk because families end up depending on a single crop that is likely to be abundant in the marketplace and is priced low.

- **Seasoned, tenured population.** Tanzania's smallholder households are led by farmers who have worked in agriculture most of their lives. They tend to be older (40 and above). The proportion of younger smallholders (under 30) is much smaller, and there are relatively few newcomers in the agricultural sector.

- **Risky practices run counter to desires.** Smallholder households in Tanzania struggle to access funds to manage emergencies and do not have insurance or any other ways to mitigate risk. Their aspirations, however, reflect a financially astute, responsible, and prosperous mindset. Smallholder families in Tanzania want to save, and do so whenever possible. They want to insure their activities and have more options for mitigating risk. Their appetite for financial security is high, despite the lack of access to formal financial services and challenging circumstances.

- **Limited channels for new, relevant information.** Smallholders in Tanzania are an insulated group and largely depend on each other for agricultural and financial information. They do not turn to other people or groups that could offer more contemporary insights into agriculture or finance, mostly because they do not currently have access to these knowledgeable resources who are outside their social groups. Only a few smallholders are involved with any agricultural organizations; 10 percent are a member of a planting, weeding, and harvesting group and 1 percent are part of a producers' group. In addition, apart from mobile money, very few have connections with financial institutions that could offer knowledge and advice. Only 10 percent of smallholders in Tanzania, for example, personally have a bank account registered in their own name. For smallholders to access knowledgeable resources, they need to be able to tap into networking channels that are new to them, and these channels need to be able to provide accurate information to farmers in a format/language that is not intimidating and that they can easily understand.

- **Smallholder farmers are not a monolithic group.** Smallholder households in Tanzania are diverse. Five main personas, or segments, that vary based on a collection of demographic and psychographic factors can be identified within this population—farming for sustenance, battling the elements, diversified and

pragmatic, options for growth, and strategic agricultural entrepreneurship. Some of these segments struggle more than others, have fewer resources, are more vulnerable, and depend more heavily on what their land will yield, without much to preserve or increase that yield. For example, of the five segments of smallholder households in Tanzania, the diversified and pragmatic segment has persevered through very difficult times, but its experiences have eroded positive sentiments toward farming and farmers in this segment would find a life outside of agriculture appealing. Other segments of smallholder households in Tanzania have had great success in agriculture and intend to expand their agricultural activities. They could lead smallholder farmers into a more digital, diversified world of modern farming in Tanzania.

Smallholder households in Tanzania and financial mechanisms

Smallholder farmers in Tanzania are exposed to, aware of, and interested in financial tools, both in general and as they relate to their agricultural activities. The large majority can envision a mobile phone as a banking tool, as well as an agricultural tool. They want access to credit, savings, and loan products that currently are out of reach. They exhibit positive financial practices, in that they save for what they can and anticipate expenditures before they occur.

There are also positive signs of digital readiness within the population of smallholder households in Tanzania. Many have an acceptable form of identification for opening an account, have their own or a household mobile phone, and use SMS text or advanced functions of mobile phones. Nearly half (49 percent) are financially included, primarily through

mobile money. No other formal channel contributes as much to access to financial inclusion as does mobile money among smallholder families in Tanzania.

There are also signs of a digital ecosystem taking hold within the population. Half of smallholder farmers have mobile money accounts and, within that group, some are using those accounts for more than basic purposes. Data from the survey shows that some smallholders are using mobile money accounts for savings, money transfer between accounts, merchant payments, and payments for services. There are signs of active use, and a keen desire to do more with a mobile money account.

The digital financial services that smallholder farmers in Tanzania want most are those that enable them to live the life they aspire to have—helping them afford agricultural or household essentials, mitigate risk, and plan for the future. They want to purchase inputs on credit or have a savings plan to attain them. They want to have access to resources that help them improve their agricultural practices. They want a payment plan for school fees and to save for medical expenses, a financial shock that can devastate their household.

Financial inclusion has yet to reach the most vulnerable smallholders in a meaningful way. There remain segments of smallholder households in Tanzania that struggle day-to-day, rely on their agricultural output for sustenance, lack financial service tools, even informal ones, and stand to gain a great deal from access to even basic financial mechanisms.

Recommendations for building strategies and approaches

Five areas emerge from this study that need to be addressed to cultivate the uptake and expansion of relevant financial

mechanisms among smallholder households in Tanzania.

- **Continue to invest in building a digital ecosystem for farmers.** Efforts to expand digital financial services to all Tanzanians have included smallholder farmers, albeit at a lower rate than the general population. Half of smallholders in Tanzania are financially included, mostly through mobile money, and some are using their digital accounts for more than just basic transfers. A good foundation is now in place to expand and deepen the use of mobile money among smallholder farmers. The hard work of introducing the concept of digital financial services and getting consumers started has already begun for portions of the population. Stakeholders have the opportunity to continue this momentum, especially to retain and educate the relatively few young smallholders in Tanzania. This is particularly important because mobile money is the most likely avenue to financial inclusion for most smallholders in Tanzania.

- **Empathize with life desires and circumstances.** Most smallholder farmers do not want to leave agriculture and instead want to expand and improve their agricultural practices. They want to move away from risky financial practices and behaviors and find ways to build greater economic stability, but many smallholders feel excluded from mechanisms that can help them do just that. They feel they do not have the right type of identification, a mobile phone, or enough money to open an account, and sometimes smallholder farmers just are not aware that these mechanisms are relevant to them. To drive product use, service providers can appeal to the pride that smallholders take in their agricultural activities and the vision they have for their future, emphasizing the relevance of their products to their challenges and aspirations.

- **Build on the inherent appeal of and desire for financial mechanisms.** Smallholder households are keenly aware of the importance of positive financial practices, such as saving, investing, staying on budget, and planning. They try, within their means and resources, to plan or save for the essentials in life and agriculture, even if circumstances limit their ability to save for unexpected events or emergencies. Financial service providers do not have to convince smallholder farmers in Tanzania that they should plan, save, or invest in their future. They do have to provide a realistic means for doing so.

- **Bundle products to meet both immediate and long-term needs.** This research tested potential dual-mode products that combined both short- and long-term benefits to farmers. Loans that include insurance, loans that include banking or savings accounts, mobile money accounts that include savings, and other bundled products can go a long way in appealing to the immediate needs and establishing a desirable long-term practice among smallholder households in Tanzania. Furthermore, smallholders do not want their hard labor squandered due to bad weather or pests; they want access to insurance and convenient, reliable information to mitigate those risks.

- **Target messaging and initiatives based on where smallholders are on their financial inclusion journey.** The household economics, outlook on life, and life experiences, including education, of smallholders affect their uptake of financial mechanisms. About half of smallholder households in Tanzania are already

financially included and many are ready for more advanced financial services versus those at the beginning of this journey.
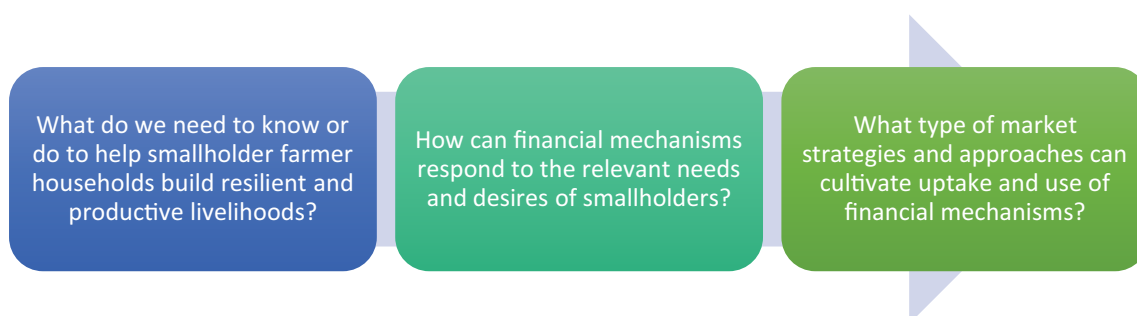
Smallholder family households' circumstances and the surrounding ecosystem in Tanzania may mean they struggle day in and day out, live below the poverty line, and are vulnerable to the harsh realities of farming. Their mindset, however, suggests commitment, diligence, and a desire for a prosperous future.

B. ABOUT THE PROJECT

Working to build the evidence base on smallholder farming households, CGAP sought to explore in more detail the financial and agricultural lives of smallholder households in Tanzania. This research project began with a comprehensive attitudinal and behavioral research program in January 2015. It consisted of a survey with an accompanying household listing and a segmentation. The research sought to answer three key questions.

What do we need to know or do to help smallholder farmer households build resilient and productive livelihoods?	How can financial mechanisms respond to the relevant needs and desires of smallholders?	What type of market strategies and approaches can cultivate uptake and use of financial mechanisms?

Existing Research and Stakeholder Discussions. Building on other household surveys in sub-Saharan Africa (e.g., agricultural censuses, Living Standards Measurement Study, FinScope, AgFiMS), as well as the 2013 CGAP global segmentation,[3] the methodology and survey instrument were designed to answer several questions about smallholder households in Tanzania:[4]

- **Understanding and segmenting smallholder households.** What are the key characteristics of the smallholder sector at the national level (e.g., demographics, poverty status, hectares, crops and livestock, level of intensification, market relationships)? What segments of smallholder households emerge?

- **Attitudes and perceptions of smallholder households.** How do smallholder households perceive their agricultural activities (e.g., a subsistence activity, business), and do household members, especially youth, see a future in farming? On the financial side, what is the level of comfort with digital financial services and other channels and service providers?

- **Opportunities to improve financial inclusion for each segment of smallholder households.** What financial mechanisms does each segment of smallholder households demand, through the lens of customer needs (crop storage, transfer, build, secure, etc.) as well as products (e.g., credit, deposit, insurance)? What informal and formal suite of financial mechanisms does each segment currently use and where are opportunities to add value with new services and/or delivery channels?

The first months of the project included a series of deep-dives into the existing research in the smallholder space to determine what questions had already been asked, identify their findings, and

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3 See Christen, Robert Peck, and Jamie Anderson. 2013. "Segmentation of Smallholder Households: Meeting the Range of Financial Needs in Agricultural Families." Focus Note 85. Washington, D.C.: CGAP, April.

4 CGAP retained the services of InterMedia to manage the survey in partnership with Ipsos Tanzania. Additional national surveys and segmentations of the smallholder sector, led by CGAP, are also underway in Côte d'Ivoire and Bangladesh. A national survey and segmentation of smallholders was released in Mozambique in March 2016 and in Uganda in April 2016.

determine how to drive our objectives to complement and expand on them. Several sources were consulted in the process, including IFC, Dalberg, Finmark Trust, AgFiMS, FinScope, FAO, GIZ, IFAD, and the World Bank. The secondary research inspired a series of questions that informed discussions with stakeholders.

FSDT plays a central role in advancing financial inclusion in Tanzania, and CGAP and FSDT collaborated closely in this research with smallholder households. This coordination was important to inform the research, and its results will contribute to FSDT's market research and developing strategy. Several additional stakeholders and organizations also contributed valuable insights and considerations into the design of the research project as key informants, and took part in an informal technical working group to review and guide the research. Some of these key organizations included the Agricultural Council of Tanzania, Bank of Tanzania, the Bill & Melinda Gates Foundation, CARE, International Fund for Agricultural Development, One Acre Fund, and Vodacom. World Bank Group colleagues and the Living Standards Measurement Survey (LSMS) team also provided valuable insights and expertise.

The extensive secondary research and discussions with stakeholders identified a gap in information about the actual needs, desires, and perceptions of smallholder households. There seemed to be significant amounts of data and insight into the habits of smallholder households in Tanzania that examined either their agricultural activities or tracked their financial lives, but nothing to date had taken a more comprehensive view of the smallholder household at the national level. This research project also sought to connect the agricultural data to the financial data to dissect the interactions and intersections between the two.

Identifying Target Group of Smallholder Households. Discussions with stakeholders in sub-Saharan Africa and extensive desk research concluded there is no clear agreement on the characteristics that define a smallholder, due in part to the heterogeneity of this client group.[5] As a result of both of these lines of investigation, a matrix was developed of each of the key criteria that could be used to distinguish smallholder households from other households (see Table 1).

The desk research also found a range of definitions of a smallholder household

TABLE 1. Key criteria in defining smallholder households

Key Criteria	Considerations
Market orientation	Subsistence vs. market-oriented vs. hybrid
Landholding size	Threshold
Labor input	Family vs. hired
Income	Shared income from farming, multiple sources
Farming system	Technology, irrigation
Farm management responsibility	Owner, influence over how to farm
Capacity	Storage, management, administration
Legal aspects	Formal vs. informal
Level of organization	Member of group—producer, supply chain, service provider

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5   Defining Smallholders: Suggestions for a RSB Smallholder Definitions; Roundtable on Sustainable Biomaterials; October 2013.

across countries, reflecting the variations in their agricultural sectors. Some governments define smallholders solely by their landholding size. The range differed greatly across Asian and African countries, from a maximum of 2.5 hectares in India up to a maximum 46 hectares in Malaysia. Research shows that smallholder farmers in Tanzania dominate the agricultural sector, with average farm sizes being between 0.9 and 3.0 hectares; they cultivate 5.1 million hectares annually, of which 85 percent is food crops.[6] Smallholder farmers contribute to over 75 percent of total agricultural outputs in Tanzania, producing mainly for home consumption, and using traditional technologies. (Figure 1).[7]

A high watermark was developed to identify smallholder households in a way that was as inclusive as possible, without diluting or distorting the population representation. The identification measure used two key criteria—landholding size and livestock count—as the starting point for identifying the target group for sample selection. A series of self-identifying perception questions was also asked to ensure that each smallholder household selected for the study viewed agriculture as a meaningful part of the household's livelihood, income, and/or consumption.

Before the survey, a household listing exercise was conducted to identify potential households to include in the survey sample. The listing exercise targeted smallholder households with the following criteria outlined in Figure 1.

Listing Operation and Methodology. Working closely with the Tanzania Bureau of Statistics, InterMedia conducted a household listing operation in randomly selected enumeration areas (EAs) between 7 December 2015 and 20 January 2016 to construct a reliable sampling frame. The listing operation was implemented by Ipsos Tanzania, InterMedia's local field partner.

Then, using a stratified, multi-stage sample,[8] each region was classified into urban and rural areas based on the 2012 population census, and the sample was selected independently in each urban and rural stratum. The 212 EAs were randomly selected as primary sampling units with probability proportional to the number of households in the EAs. The Tanzania smallholder survey was the third survey in the series following the surveys in Mozambique and Uganda. Fieldwork in those two countries has experienced a lot of failed call backs where identified eligible households and household members could not be interviewed during the time allocated to fieldwork in each country. As a result, the final sample size fell slightly short of the target in Mozambique and Uganda. For this reason,

FIGURE 1. Listing criteria to identify relevant smallholder households

Household with up to 5 hectares OR Farmers who have less than 50 heads of cattle or 100 goats/sheep/pigs or 1,000 chickens	AND	Agriculture provides a meaningful contribution to the household livelihood, income, or consumption (self-identified)

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6   Rugumamu. "Empowering Smallholder Rice Farmers in Tanzania to Increase Productivity for Promoting Food Security in Eastern and Southern Africa." *Agriculture & Food Security,* 2014 (3):7.

7   Salami, Adeleke, Abdul B. Kamara, and Zuzana Brixiova. 2010. "Smallholder Agriculture in East Africa: Trends, Constraints and Opportunities." Working Papers Series N° 105 African Development Bank, Tunis, Tunisia.

8   The methodology and design are detailed in Annex 1.

in Tanzania the number of households selected in each EA was increased from 15 to 17 following the household listing operation in all sample EAs. A total of 3,503 households was selected for the survey, of which 3,020 were found to be occupied during data collection. Of these, 2,993 were successfully interviewed.

Questionnaire Design. The questionnaire design process began by using the secondary research and stakeholder discussions as core inputs into the measurements to shape the survey instrument. This process also involved defining the end goal of the research by doing the following:

■ Drawing from existing survey instruments

■ Considering the objectives and needs of the project

■ Accounti ng for stakeholder interests and feedback

■ Learning from the ongoing financial diaries in-country[9]

■ Building from a series of focus groups conducted early on in the study

These foundations led to a framework for the survey instrument for sharing across stakeholders, and to ensure the research captured all of the necessary elements of a smallholder household. The framework was built around the sections outlined in Table 2.

TABLE 2. Framework for the smallholder questionnaire

Section	Demographics	Household economics	Agricultural practices	Mobile phones	Financial services
Examples of topics covered	Relationship	Income	Land ownership	Use (own or borrow)	Formal institutions
	Marital status	Jobs	Crops grown	Types of phones	Less than formal institutions
	Age	Government payments	Livestock	Barriers	Informal financial service providers
	School attendance	Saving	Value chain	Habits	Importance
	Income	Investing	Market relationship	Products	Borrowing
	Decision-making	Emergency planning	Water		Products
	Financial situation	Risk mitigation	Labor		
	Progress out of Poverty Index (PPI)		Inputs		
			Storage		
			Coping		

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9   CGAP conducted financial diaries with smallholder households in Mbeya, Tanzania, which were implemented by Bankable Frontier Associates. This research was ongoing during the development and design of this national survey and segmentation of smallholder farming households in Tanzania.

Organization of the Survey. The questionnaire was divided into three parts, as indicated in Table 3, to capture the complexity of smallholder households. Certain questions were asked of all relevant individuals in the household, not just one household member.[10] It was designed in this way to capture the complete portrait of the smallholder household, as some members of a household may work on other agricultural activities independently, without the full comprehension of their involvement and responsibilities by members of the household.

The questionnaire was translated into Kiswahili and then pretested and validated to ensure the integrity of the questions and that they were in line with social and cultural customs.

Data collection took place from 6 February to 8 March 2016, using computer-assisted data collection tools that regularly yielded data for analysis and quality control to provide timely feedback to field staff. The Tanzania smallholder household survey was implemented by Ipsos Tanzania, InterMedia's local field partner.

TABLE 3. Design of smallholder questionnaires

	Household survey questionnaire	Multiple-respondent survey questionnaire	Single-respondent survey questionnaire
Target respondent(s)	Head of the household, spouse, or a knowledgeable adult	All household members over 15 years old who contributed to the household income or participated in its agricultural activities	One randomly selected adult in the household
Topics covered	• Basic information on all household members • Information about household assets and dwelling characteristics	• Demographics • Agricultural activities • Household economics	• Agricultural activities • Household economics • Mobile phones • Formal and informal financial tools

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10 The three questionnaires can be found in the user guide that accompanies the data set for this research.

C. FINDINGS[11]

1. SMALLHOLDER HOUSEHOLD DYNAMICS IN TANZANIA: WHO THEY ARE

Smallholder farmer households span the country, are mostly led by men, and reflect an aging population

The 2012 Tanzanian census divided the country into 30 regions; each region was then assigned to one of the following five zones for purposes of this nationally representative survey:

- Border zone: Ruvuma, Iringa, Mbeya, Rukwa, and Kigoma

- Coastal zone: Tanga, Pwani, Dar es Salaam, Lindi, and Mtwara

- Inland zone: Dodoma, Arusha, Kilimanjaro, Morogoro, Singida, Tabora, Manyara, Njombe, and Katavi

- Lake zone: Shinyanga, Kagera, Mwanza, Mara, Simiyu, and Geita

- Zanzibar zone: all regions within Zanzibar

Smallholder households span Tanzania's five zones, with a near equal distribution across Lake, Inland, Coastal, and Border regions. Just 2 percent of smallholder households are located in Zanzibar, reflecting its more contained size (Figure 2).

A man is close to three times as likely to be the head of a smallholder farming household in Tanzania as is a woman (74 percent men vs. 26 percent women) (Figure 3). While smallholder households are male-dominated, women play an important, if not critical, decision-making role in its agricultural activities.

The Tanzanian smallholder population reflects a more mature, older generation, where heads of households are more likely to be aged 50 or older (41 percent) than they are to be under 40 (36 percent). In fact, close to two-thirds of the population are over the age of 40 (64 percent).

With just over one-tenth of smallholders in Tanzania under the age of 30 (Figure 4), there is a relatively small presence of the "next generation" of farming within the existing population.

FIGURE 2. Regional Zone

Zanzibar 1%
Border 24%
Lake 28%
Inland 25%
Coastal 22%
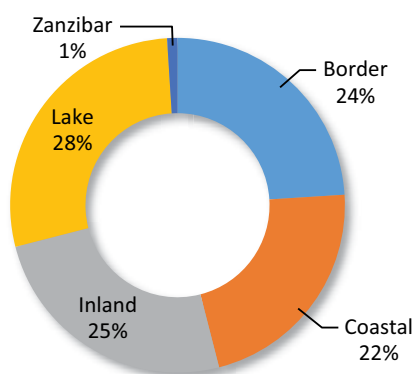
Sample: Smallholder households, n=2,993

FIGURE 3. Gender of head of household

Female 26%
Male 74%
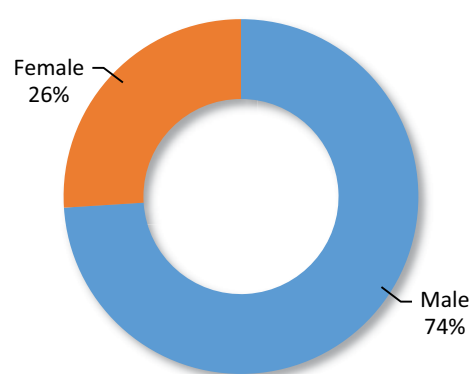
Sample: Smallholder households, n=2,993

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11 Graphs and tables in the main body of the report include references to the unweighted base size and, therefore, at times, will not look proportional to graphs that show subsets of other graphs. Due to rounding, not all percentages in charts total 100.

FIGURE 4. Age of head of household

Sample: Smallholder households, n=2,993

FIGURE 5. Highest education attended by head of household
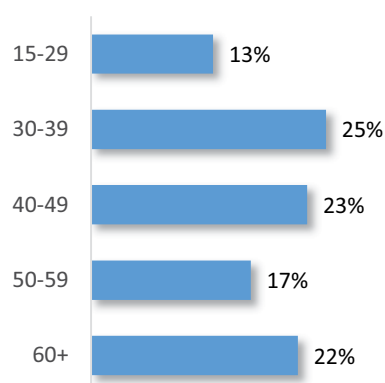
Sample: Smallholder households, n=2,993

Smallholder heads of households typically have at least a primary education, and most completed primary school (Figure 5). Twenty-three percent have never attended school. Education beyond primary school is rare among smallholder heads of households in Tanzania. Only 9 percent advanced through secondary school, and 2 percent received a higher education. There is a sharp gender difference in education levels (Figure 6); almost twice as many women than men have never attended school.

Three-quarters of smallholder household heads in Tanzania are married

or cohabiting, and about one-fifth are divorced, separated, or widowed (Figure 7). The gender of the head of household differs by marital status; men lead married homes, while women lead divorced homes, and are nearly as likely to lead single homes (Figure 8).

The household size and composition varies across smallholder households in Tanzania. There are very small households of just one person (6 percent), as well as those with eight or more people (14 percent) (Figure 9).[12] While the median household size is five, and the mode[13]

FIGURE 6. Highest education attended by gender of head of household

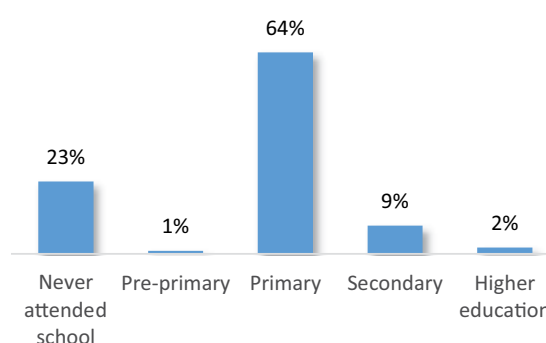■ Primary or higher ■ Pre-primary ■ Never attended school
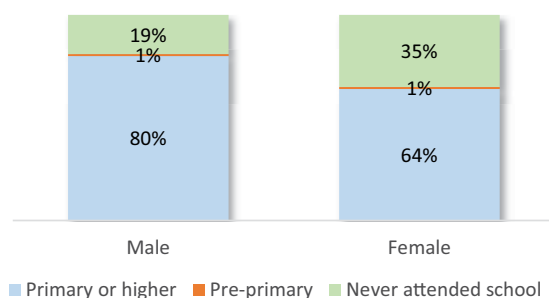
Sample: Smallholder households, n=2,993

FIGURE 7. Marital status of head of household
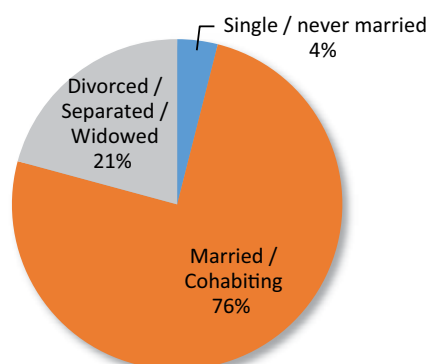
Sample: Smallholder households, n=2,993

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12 For the purposes of this survey, "household" was defined as a group of related or unrelated persons who live together in the same dwelling unit, eat together from the same pot, and share most household expenses. Visiting relatives and domestic workers are not considered members of a household and are, therefore, not be included in this study. The listing manual in the user guide seems to contradict this: "Note, however, that domestic servants and other workers living and eating in the same household should be included as household members."

13 Mode depicts the most common household size.

FIGURE 8. Marital status by gender of head of household

Male head of household   Female head of household

Sample: Smallholder households, n=2,993

FIGURE 9. Number of people in household

One	6%
Two	11%
Three	14%
Four	17%
Five	17%
Six	14%
Seven	8%
Eight or more	14%

Sample: Smallholder households, n=2,993

is four, the presence of smallholder households with double that number may point to the general fluidity of circumstances and family life and the importance of risk mitigation. This fluidity could be positive (e.g., a new breadwinner arrives to contribute to the household), and also could present challenges (e.g., the very young and very old who need special care and are not in a position to contribute financially to the household).

A large household size is also significant because a majority of households fall below the poverty line[14] (Figure 10). Smallholder farming households live without much of a cushion to absorb additional expenses.

Roughly two-fifths of all smallholder households typically do not have enough money for food, and another two-fifths

have money only for food and clothes (Figure 12). This is mainly because smallholder households farm for subsistence, and the little money earned from selling what they grow goes to buying the food that is not available or things to cook the food with, further relegating other basic needs and luxuries.

Smallholder farmers' outlook on life and their agricultural work is in stark contrast to their household circumstances. Despite limited means and economic vulnerability, most report they have aspirations for a better life (94 percent) and are looking for opportunities to improve their current situation (88 percent) (Figure 13). This suggests a proactive rather than a reactive approach to their lives. Fewer farming households in Tanzania take a more passive approach,

FIGURE 10. Poverty status of household

Above poverty line 15%

Below poverty line 85%
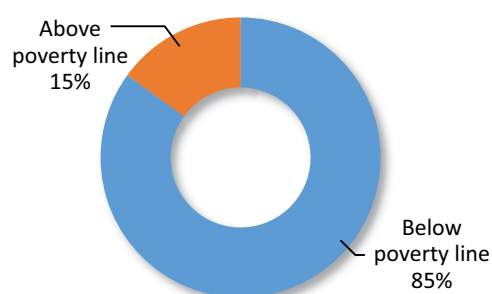
Sample: Smallholder households, n=2,993

FIGURE 11. Extreme poverty status of household

Above poverty line: >$2.50/day 15%

Poor: $1.25–$2.50/day 30%

Extreme poor: <$1.25/day 55%
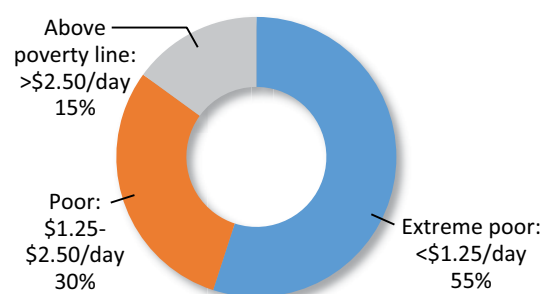
Sample: Smallholder households, n=2,993

14 From Progress out of Poverty Index 2013, Grameen Foundation (http://www.progressoutofpoverty.org/).

FIGURE 12. Household's current financial situation (self-assessed)
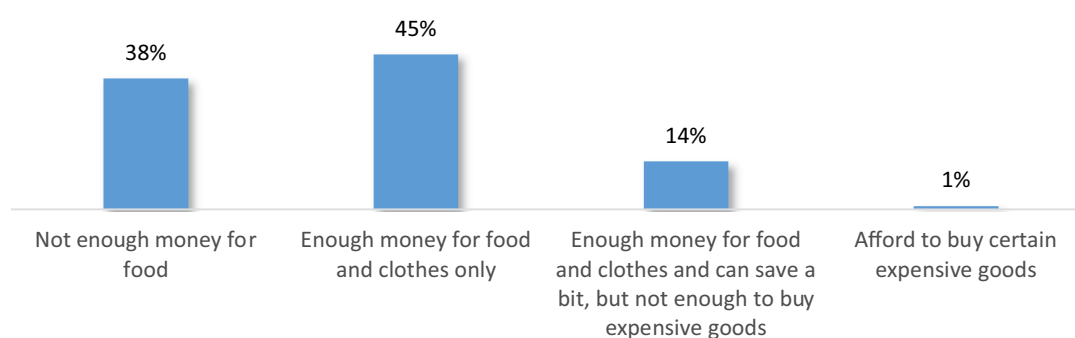
Sample: Smallholder households, n=2,993

believing it is not wise to plan too far ahead because their luck might factor more heavily into future outcomes than their own planning (74 percent).

There is also an absence of impulsivity within smallholder farmers in Tanzania. Only three in 10 (31 percent) self-identify with the statement "I am impulsive," and 15 percent feel they say things without thinking them through. Instead, we see a more deliberate, thoughtful population that carefully considers their lives, actions, and livelihoods.

Farm as income, a source for subsistence and trade

Smallholder farmers in Tanzania typically individually own their plots of land, either through a lease or certificate, or under customary law. Half (49 percent) own by lease or certificate. The size of this group makes them good candidates for financial services, especially loans, because they have documentation of assets to borrow against. Roughly two-fifths of these farms fall under customary law (Table 4), which means there is usually no official documentation of ownership. State- and communally owned farms are in the minority, and are mostly concentrated in the Dar es Salaam region.

Land tends to be in small plots.[15] Roughly half of smallholder households in Tanzania own less than one hectare of land,

FIGURE 13. Do you agree or disagree with the following statements?
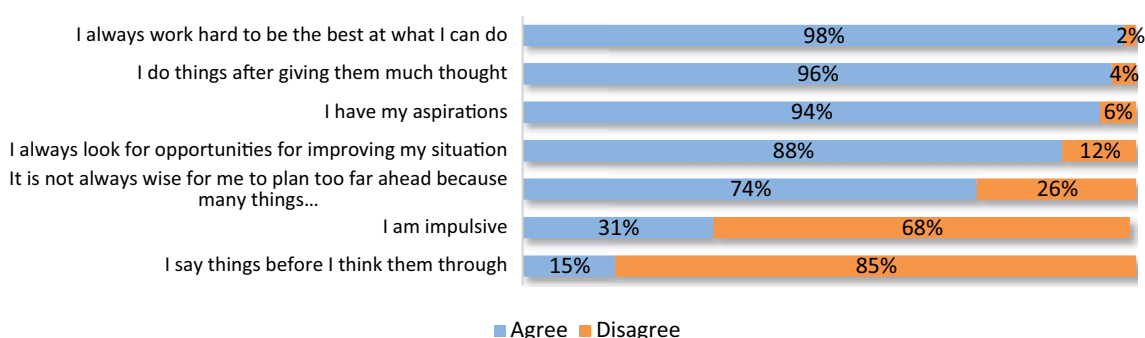
Sample: Smallholder farmers, n=2,795

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15 Land size is a difficult to measure accurately. Many recent examinations of land measurement say that using farmer estimates of land size usually lead to errors. Carletto, Gourlay, Winters. "From Guesstimates to GPSstimates," World Bank, July 2013 (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/07/30/000158349_20130730084245/Rendered/PDF/WPS6550.pdf). The goal in this body of work is to rely specifically on what farmers perceive to be their own land size to better understand their way of thinking and processing agricultural and household decision-making.

TABLE 4. **What is the form of ownership of your land?**

	Total	Mbeya	Dar	Morogoro	Kagera	Mwanza
Individual ownership with lease or certificate	49%	34%	57%	39%	45%	54%
Individual ownership under customary law	44%	61%	25%	54%	51%	38%
Communal (resources are shared)	2%	4%	2%	0%	0%	0%
State ownership	2%	1%	7%	4%	0%	0%
Other	3%	0%	9%	3%	2%	3%
Don't know	0%	0%	0%	0%	1%	5%

Sample: Smallholder farmers who participate in agricultural activities, n=4,742

and the same applies to those who rent (Figure 14). The mean size of owned land (80 percent) is 2.06 hectares and that of rented land (68 percent) is 1.69 hectares.

Smallholder families in Tanzania primarily grow food and staple crops (as opposed to cash crops), and there is a collection of commonly grown crops. Sixty-three percent of smallholders grow only staple crops, while only 1 percent grow only cash crops. Thirty-seven percent of smallholders grow both types. Maize is the most commonly grown staple crop, followed distantly by beans, cassava, sweet potatoes, and rice (Figure 15). Only small percentages grow cash crops, which tend to be sunflower, sim sim (i.e., sesame), coffee, cotton, cashew nut, and sugar cane (Figure 16).

Most households use their crops in multiple ways, including consumption. Consuming crops rates the highest of the three main uses (consuming, selling, or trading), among food or staple crops and even among some cash crops (Figures 17 and 18). The worrying trend is the dependency on a single crop either for consumption or for sale. It shows

FIGURE 14. **How many hectares (ha) of agricultural land do you own?**

Rented (3,466)   Owned (n=4,110)
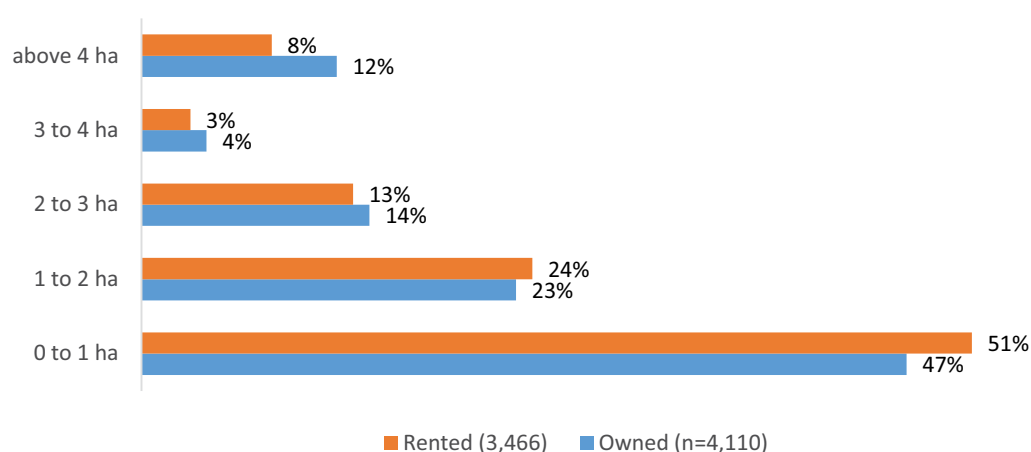
Sample: Smallholder households reported land n = 4,742

FIGURE 15. Which of the following crops do you grow? Food and Staple Crops

Crop	%
Maize	90%
Beans	44%
Cassava	37%
Sweet potatoes	28%
Rice	29%
Groundnuts	26%
Bananas	14%
Sorghum	11%
Pigeon pea	10%
Amaranth	8%
Tomatoes	9%
Millet	4%
Irish potatoes	4%
Orange	3%
Onions	3%
Cabbage	3%
Cowpea	2%
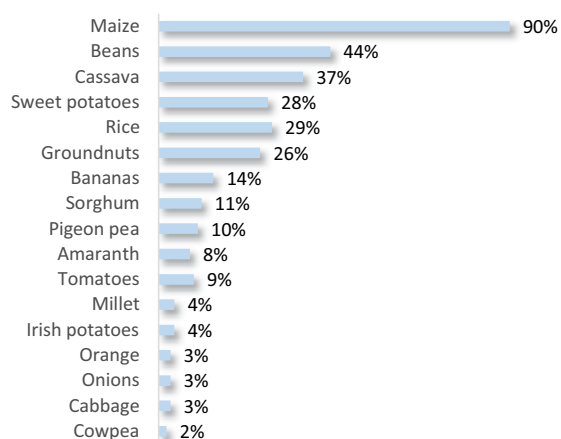
Sample: Smallholder farmers who participate in agricultural activities, n=4,742

FIGURE 16. Which of the following crops do you grow? Cash Crops

Crop	%
Sunflower	16%
Sim sim	9%
Coffee	5%
Cotton	4%
Sugar cane	3%
Cashew nut	4%
Coconut	2%
Palm oil	1%
Tobacco	1%
Pyretherum	0%
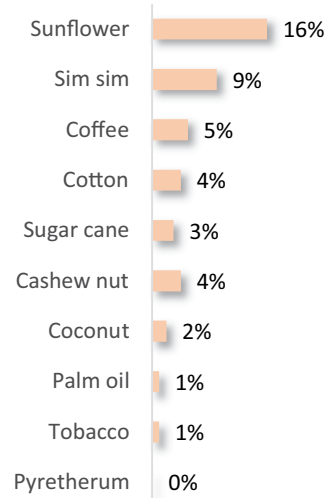
Sample: Smallholder farmers who participate in agricultural activities, n=4,742

FIGURE 17. Food crop by percentage of consumption, sale, or trade
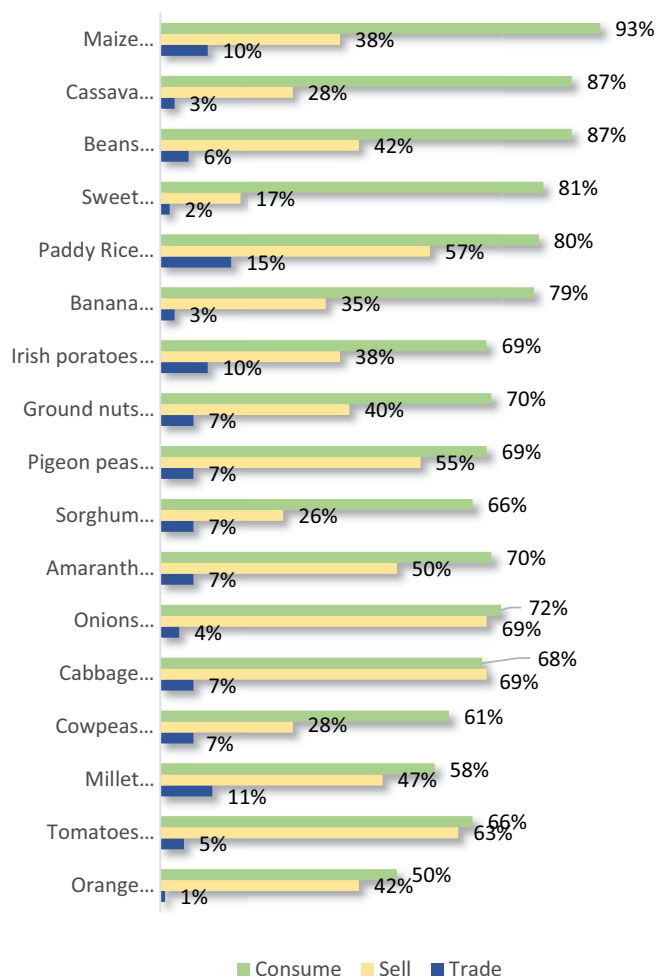
Crop	Consume	Sell	Trade
Maize...	93%	38%	10%
Cassava...	87%	28%	3%
Beans...	87%	42%	6%
Sweet...	81%	17%	2%
Paddy Rice...	80%	57%	15%
Banana...	79%	35%	3%
Irish poratoes...	69%	38%	10%
Ground nuts...	70%	40%	7%
Pigeon peas...	69%	55%	7%
Sorghum...	66%	26%	7%
Amaranth...	70%	50%	7%
Onions...	72%	69%	4%
Cabbage...	68%	69%	7%
Cowpeas...	61%	28%	7%
Millet...	58%	47%	11%
Tomatoes...	66%	63%	5%
Orange...	50%	42%	1%

■ Consume ■ Sell ■ Trade

Sample: Smallholder farmers who participate in agricultural activities n=4,742
Multiple responses allowed
(% of people who grow each crop)

FIGURE 18. Cash-crop type by percentage of consumption, sale, or trade

Pyretherum (n=20)
- Consume: 0%
- Sell: 100%
- Trade: 17%

Cotton (n=248)
- Consume: 4%
- Sell: 97%
- Trade: 5%

Tobacco (n=62)
- Consume: 3%
- Sell: 93%
- Trade: 1%

Coffee (n=247)
- Consume: 12%
- Sell: 92%
- Trade: 3%

Cashew nut (n=198)
- Consume: 23%
- Sell: 81%
- Trade: 12%

Sim sim (n=427)
- Consume: 33%
- Sell: 81%
- Trade: 8%

Sunflower (n=747)
- Consume: 58%
- Sell: 70%
- Trade: 8%

Coconut (n=111)
- Consume: 63%
- Sell: 36%
- Trade: 2%

Sugarcane (n=173)
- Consume: 51%
- Sell: 30%
- Trade: 2%

Palm oil (n=42)
- Consume: 62%
- Sell: 30%
- Trade: 3%

Legend: ■ Consume ■ Sell ■ Trade
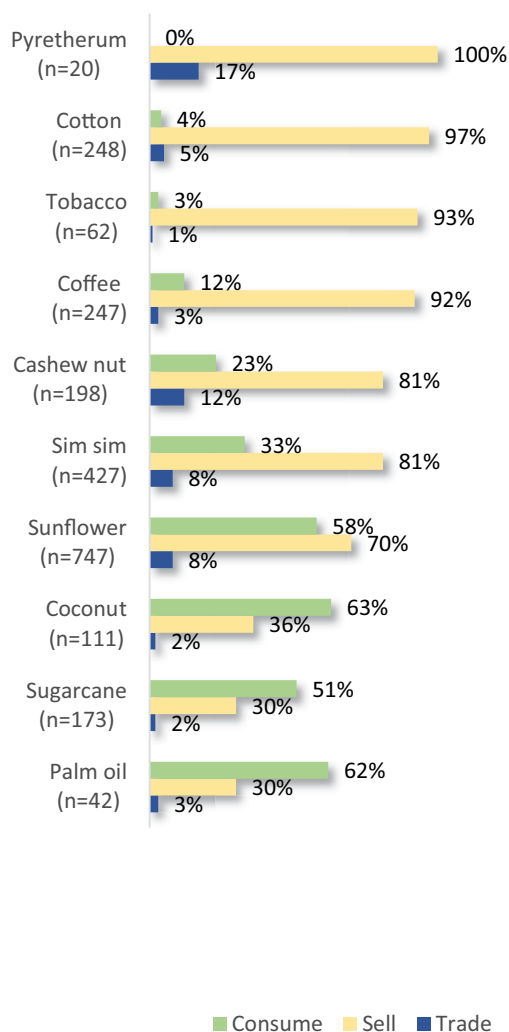
Sample: Smallholder farmers who participate in agricultural activities
Multiple responses allowed
(% of people who grow each crop)

FIGURE 19. Number of crops grown for consumption

- More than 1: 78%
- 1 crop: 21%
- Do not consume what they grow: 1%
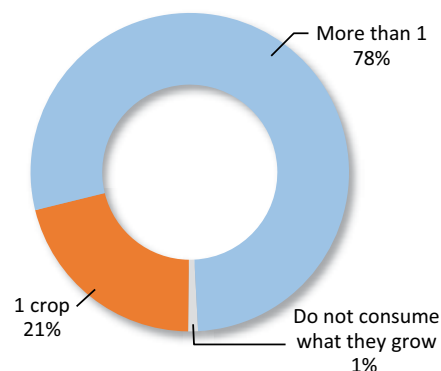
Sample: Smallholder farmers who grow crops, n=4,726

that, in the event of any shock, families will be deeply affected (Figures 19, 20, and 21).

Households also engage in some combination of selling, consuming, or trading their crops, with selling and consuming the most common combination:

- 62 percent of smallholders grow crops to sell and consume

- 17 percent grow crops to sell, trade, and consume

- 1 percent grow crops to trade and consume

- 0.2 percent of smallholders grow crops to trade and sell

FIGURE 20. Number of crops grown for selling

- More than 1: 49%
- 1 crop: 32%
- Do not sell what they grow: 19%
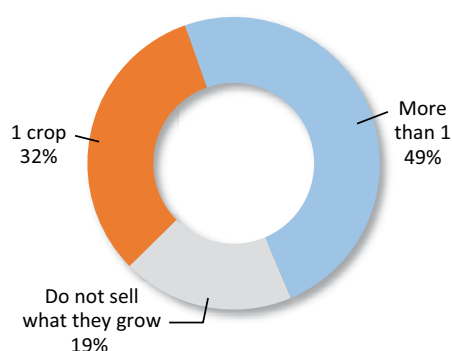
Sample: Smallholder farmers who grow crops, n=4,726

FIGURE 21. Number of crops grown for trading

- 1 crop: 11%
- More than 1: 8%
- Do not trade what they grow: 81%
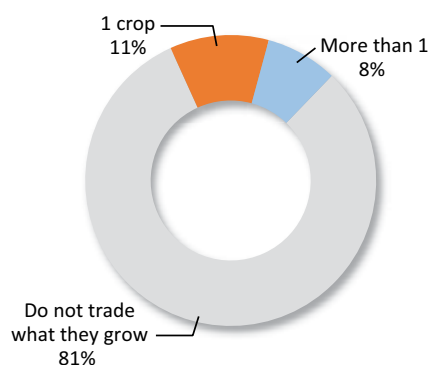
Sample: Smallholder farmers who grow crops, n=4,726

FIGURE 22. Which of the following crops that you grow is the most important to you and your family?

Crop	Percentage
Maize	62%
Paddy	10%
Cassava	9%
Beans	4%
Banana	3%
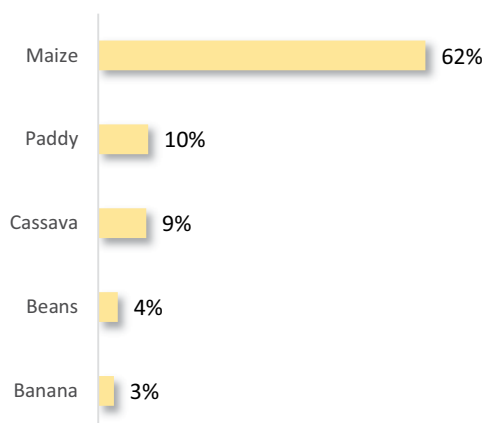
Sample: Smallholder farmers participating in agriculture who grow at least one crop, n = 4,726

CGAP's National Survey of Smallholder Households in Mozambique[16] also explored crop choice and use. In Mozambique, there tends to be just a few select crops that are of utmost importance to smallholder farmers. Most smallholder households in Mozambique grow maize (88 percent); the next most common crop grown is a distant second, cassava (55 percent), followed by beans (47 percent). Maize growers consider it their most important crop (66 percent); no other crop comes close to the importance of maize. Only 10 percent of cassava growers consider it their most important crop, coming in second to maize.

Tanzania shows a different dynamic, with much less crop diversity. In Tanzania, maize stands out as the most important crop for smallholders (Figure 22). The over-dependency on maize is also seen in terms of consumption and as a source of revenue (Table 5). Many smallholder farmers grow maize because it is easier to store, convert to food, and sell than other crops.

Half of smallholder farmers in Tanzania raise livestock of any kind (Figure 23),

TABLE 5. Which of the following crops that you grow do you consume the most/get the most money from selling?

	Consumption (n=4,702)*	Selling (n=3,803)
Maize	65%	19%
Cassava	**10%**	**5%**
Paddy	8%	14%
Beans	**4%**	**9%**
Banana	4%	2%
Sweet potatoes	**1%**	**1%**
Sunflower	1%	8%
Sorghum	**1%**	**0%**
Amaranth	1%	1%
Groundnuts	**1%**	**4%**
Sim sim	0%	5%
Coffee	N/A	4%
Cotton	0%	4%
Pigeon peas	0%	4%

*Responses ranked by consumption and later by sales

Sample: Smallholder farmers who grow crops (% of smallholder farmers participating in agriculture who grow and consume/sell at least one crop)

FIGURE 23. Do you have any livestock, herds, other farm animals, or poultry?
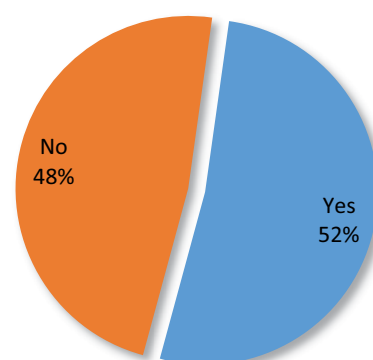
Response	Percentage
No	48%
Yes	52%

Sample: Smallholder farmers who participate in agricultural activities, n=4,742

16 http://www.cgap.org/publications/national-survey-segmentation-smallholder-households-mozambique

TABLE 6. Which of the following do you rear?

Chickens—broilers	48%
Indigenous goats	39%
Indigenous cattle	32%
Chickens—layers	24%
Pigs	13%
Sheep	11%
Cattle—dairy	8%
Goats—meat	5%
Cattle—beef	1%
Bees (number of hives or boxes)	1%
Goats—dairy	1%
Fish (number of ponds)	0%

Sample: Smallholder farmers who have any livestock, herds, other farm animals or poultry, n=2,585
Multiple responses allowed

and those who raise livestock do so for both consumption and for sale. Chicken (broilers) are the most common form of livestock, followed by indigenous goats, indigenous cattle, and chicken (layers) (Table 6). The majority of those who rear chicken (broilers) also do so for consumption (Figure 24). In some cases, households are five to seven times more likely to rear an animal for income than for consumption. They are close to three times more likely to rear indigenous cattle and chicken for income than consumption.

FIGURE 24. Which of the following do you rear and get income/consume?
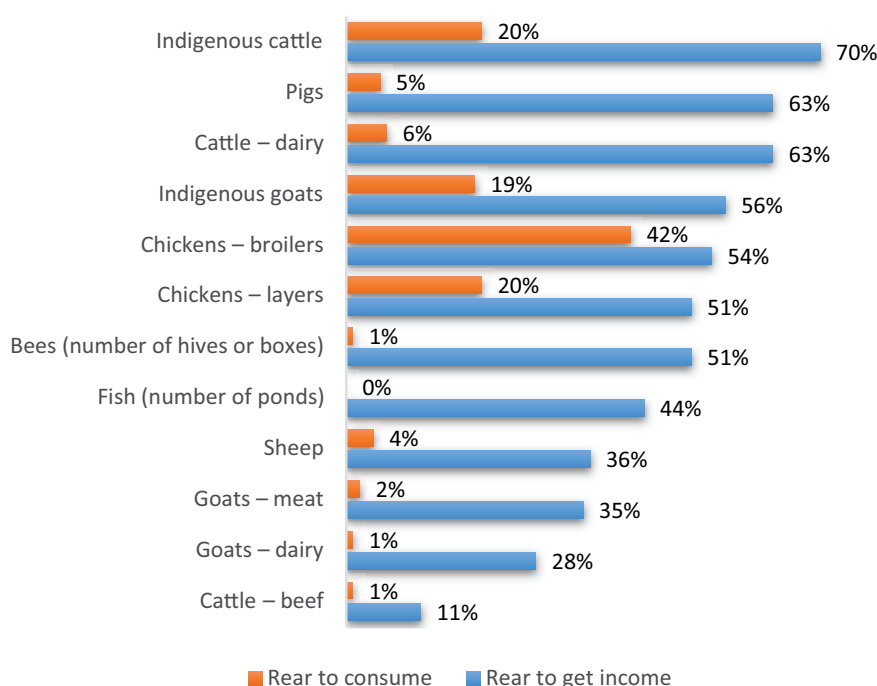
Sample: Smallholder farmers who have any livestock, herds, other farm animals or poultry, n=2,585
Multiple responses allowed

FIGURE 25. Agricultural decision making

	Both	Wife/girlfriend	Husband/boyfriend	Another family member	Not applicable/Don't know
When to harvest	46%	20%	23%	4%	7%
What to plant	45%	19%	24%	4%	8%
Quantity of crops to sell	44%	18%	23%	3%	12%
When and where to sell crops	43%	17%	24%	3%	12%
Purchase of farm inputs	40%	19%	27%	4%	10%
Where to borrow money	39%	17%	25%	3%	16%
When to sell livestock	34%	12%	18%	3%	33%
Quantity of livestock to sell	33%	12%	18%	3%	33%

Sample: Smallholder households, n=2,993

Women have a significant role in decision making

Men head nearly three-quarters of smallholder households in Tanzania (Figure 4), yet agricultural decision-making more frequently occurs between a husband and a wife than by the husband alone. In every agricultural decision-making category, decisions are made jointly more frequently than they are made independently, by either gender (Figure 25). The most frequently made joint decisions concern harvesting, planting, and crop sale.

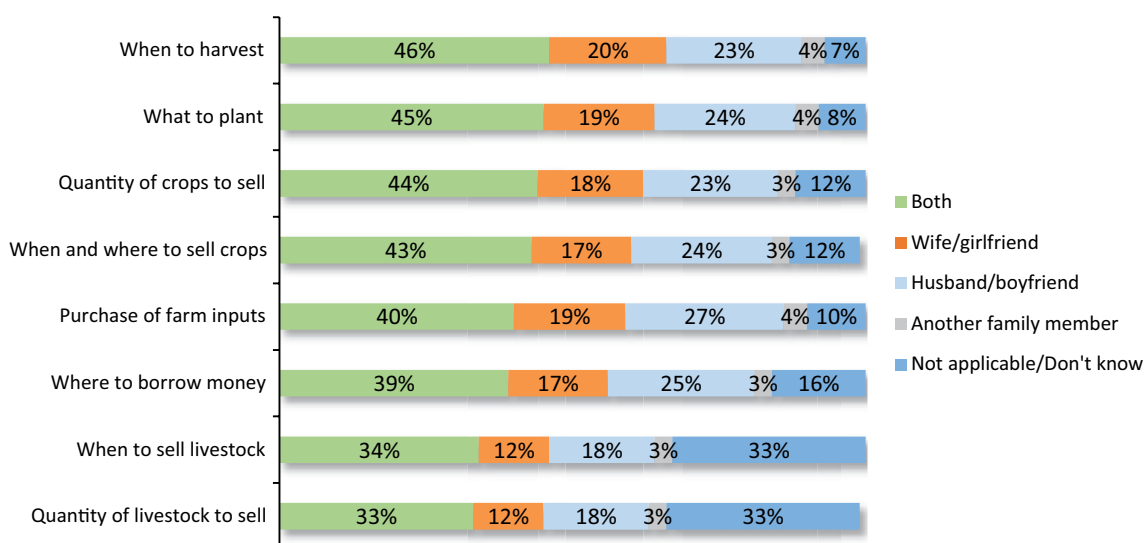There are fewer cases of joint decision-making around purchasing inputs and livestock, even though it is still a male–female decision in a plurality of homes. In cases where decisions are not jointly made, it is more likely that men make the decisions in these matters.

Dedicated to agriculture and looking to expand their activities

Tenure and farming experience lead smallholder farming households in Tanzania. The majority of the heads of households leading smallholder families

in Tanzania have been farming for more than 10 years (Figure 26). Relatively few newcomers to farming lead smallholder households; 3 percent have been farming under two years and 18 percent for two to five years.

In terms of the length of time that smallholders have been farming, it is mostly the youngest generation (under 29 years old) that is newer to farming. Relatively few individuals adopted farming as a livelihood later in life (Figure 27).

Consistent across smallholder households in Tanzania, farming emerges as a life choice and part of an identity,

FIGURE 26. How many years have you been farming?
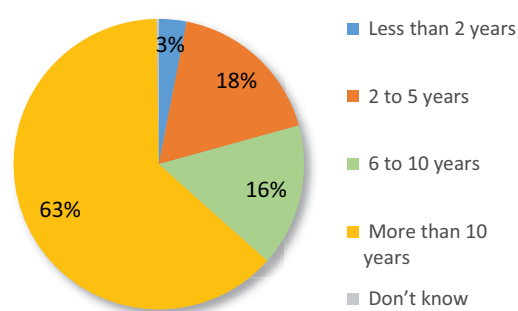
- Less than 2 years — 3%
- 2 to 5 years — 18%
- 6 to 10 years — 16%
- More than 10 years — 63%
- Don't know

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

FIGURE 27. How many years have you been farming? By age of respondent
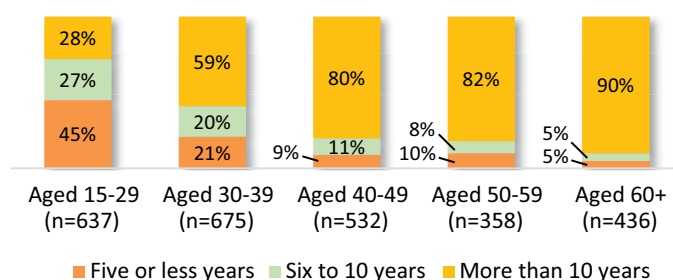
Sample: Smallholder farmers, n=2,638
(% of smallholder farmers who participate in household's agricultural activities and in each age category)

FIGURE 28. Do you intend to keep working in agriculture?
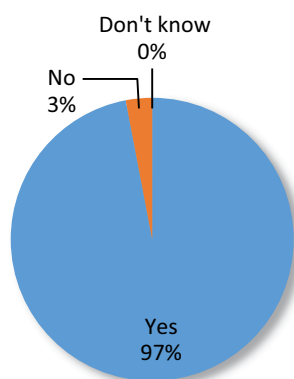
Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

which can give some insights into the motivations of this population, despite its dire financial state. Ninety-seven percent of smallholder farmers intend to keep working in agriculture (Figure 28). This intent is consistent across tenure in farming and both genders. In fact, roughly eight in 10 of the newest smallholder farmers (farming less than two years) believe they will continue farming (Figure 29). Their dedication to agriculture is high despite their financial situations (Figure 30). Nearly all (97 percent) of those who self-report they "don't have enough money for food" (even though it might be the farm that feeds the family) want to continue working in agriculture.

Agriculture is not only what feeds the household, it is a livelihood that smallholders enjoy. Nearly all agree with the statement "I enjoy agriculture" (93 percent). A large majority of

FIGURE 29. Do you intend to keep working in agriculture? By number of years in farming
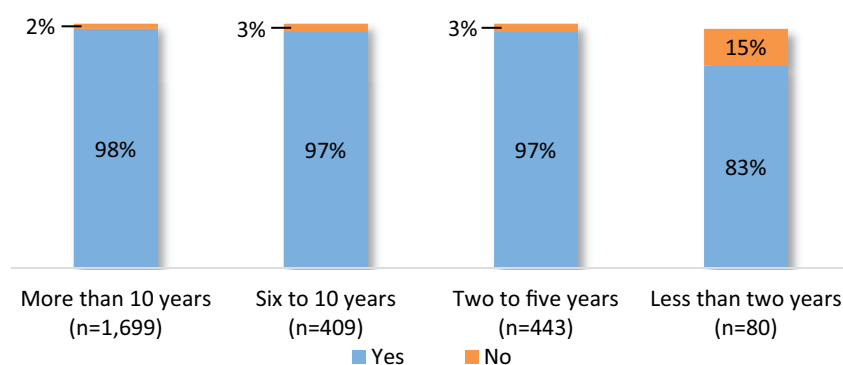
Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

FIGURE 30. Do you intend to keep working in agriculture? By household's current financial situation (self-assessed)

| 98% | 97% | 96% | 89% |
| We have enough money for food and clothes only | We don't have enough money for food | We have enough money for food and clothes and can save a bit, but not enough to buy expensive goods | We can afford to buy certain expensive goods |

■ Yes, intend to continue working in farming

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

smallholders want to expand their work (94 percent), and many (67 percent) are satisfied with what they have achieved (Figure 31). Four in five think of agriculture as the legacy they leave their children. Almost a similar amount want their children to continue in agriculture (74 percent), although the age and tenure distribution suggest that the children have left the farm. Agriculture is hard work, and smallholders know the realities (Figure 31).

Farming realities introduce a three-way clash for smallholders: dedication and commitment meet high-risk, dire financial circumstances, prompting openness to alternative livelihoods

Smallholders have mixed feelings about their future aspirations. They profess a strong commitment to agriculture, enjoy the work, and want to expand. At the same time, most (88 percent) work to make ends meet, and would take full-time employment if the opportunity arose (Figure 31). They might not want to leave agriculture, but they know that there might be other ways to make a living.

The youngest generation of farming household heads in Tanzania (ages 15–29) show even more interest in full-time employment outside of farming. Close to 90 percent would take full-time employment if offered (Figure 32); just over four in 10 feel they would not want to do any other type of work but farming.

A similar clash emerged from the national survey of smallholder households

FIGURE 31. Do you agree or disagree with the following statements?
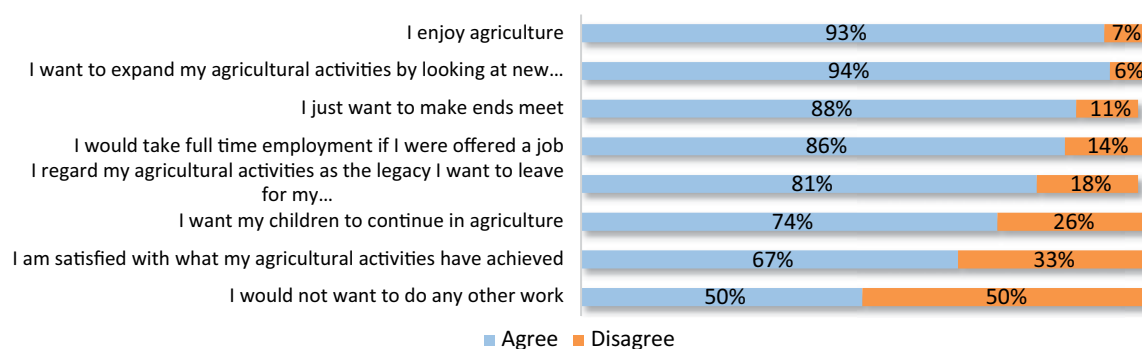
	Agree	Disagree
I enjoy agriculture	93%	7%
I want to expand my agricultural activities by looking at new…	94%	6%
I just want to make ends meet	88%	11%
I would take full time employment if I were offered a job	86%	14%
I regard my agricultural activities as the legacy I want to leave for my…	81%	18%
I want my children to continue in agriculture	74%	26%
I am satisfied with what my agricultural activities have achieved	67%	33%
I would not want to do any other work	50%	50%

■ Agree ■ Disagree

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

FIGURE 32. Do you agree or disagree with the following statements?

	Agree	Disagree
I would take full-time employement if I were offered a job	89%	11%
I am satisfied with what my agriculture activities have achieved	61%	39%
I would not want to do any other kind of work	45%	55%

■ Agree ■ Disagree
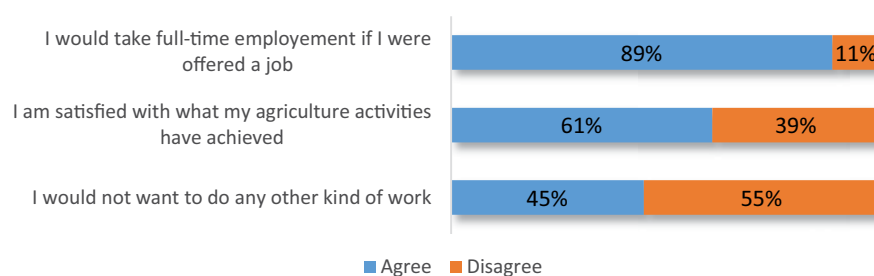
Sample: Smallholder farmers aged 15-29 who participate in household's agricultural activities, n=637

in Uganda.[17] Smallholder farmers large-ly want to remain in farming, but the stark realities of their limited resources and agriculture's abundant risks force some of them to think about life outside of farming, even if they have no other skills.

Uganda's smallholder farming pop-ulation is a lot younger than that of Tanzania. The relatively limited number of young smallholder farmers in Tan-zania exacerbates the threat of this clash, especially since most of Tanzani-an's smallholder farmers have at least a primary school education. Observing these realities, coupled with the rela-tively small number of young farmers (12 percent), could mean further flight from agriculture, inducing a negative impact on the future of the industry in Tanzania.

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17 http://www.cgap.org/publications/national-survey-and-segmentation-smallholder-households-uganda

2. SMALLHOLDER HOUSEHOLD DYNAMICS IN TANZANIA: INCOME AND EXPENSES

### Farming activities determine household income

Smallholder households in Tanzania indicate that they generate most of their income from growing and selling crops. It is likely that smallholder households also undertake other activities to supplement their income, including making and selling goods. In addition to agriculture, smallholder households in Tanzania earn income through other jobs, including a retail or manufacturing business, occasional jobs, or some type of business service. Roughly one-fifth of smallholders in Tanzania receive remittances from family and friends.

Eight in 10 smallholder farmers in Tanzania say that farming is their primary job (i.e., where they spend the most of their time); 19 percent point to labor, their own business, or something else as their primary employment (Figure 33). Looking more closely at their sources of income, 68 percent of smallholders grow crops to sell, and 21 percent rear livestock to sell (Figure 34).

Smallholders in Tanzania who contribute to their household incomes consistently shared that growing and selling crops are their most important, most reliable, and most enjoyable income-generating activities (Table 7). By comparing these three perspectives, data show that a large portion of smallholder farmers in Tanzania equate the most important income source with the one they like getting the most and with the one that is the most reliable. Running their own businesses in either retail or manufacturing, or working as some type of service provider, seems important to Tanzanian smallholders, although generally only a tenth engage in this type of work. Another point to note is that raising livestock to earn additional income is not common in Tanzania, perhaps leaving room for growth potential as an alternative income-generating activity.

FIGURE 33. What is your primary job?

- Farmer
- Laborer
- Business owner
- Professional (e.g. doctor, teacher)
- Shop owner
- Other
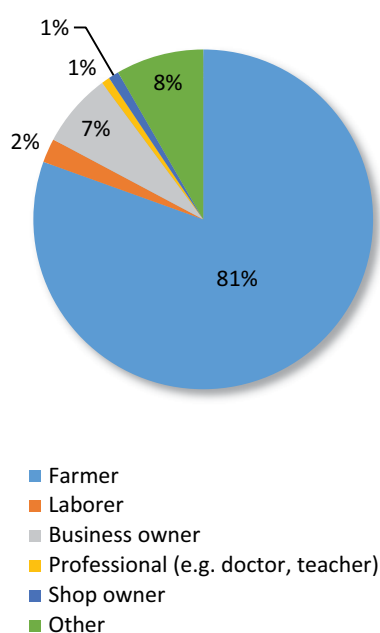
Sample: Smallholder farmers, n=5,034

FIGURE 34. Do you generate income from any of the following sources?

Source	%
Growing something and selling it, such as crops, fruits, or vegetables	68%
Rearing livestock, poultry, fish, or bees and selling it or its byproducts	21%
Running own business in retail or manufacturing	18%
Earning wages from occasional job	11%
Getting money from family or friends	8%
Running own business by providing services	8%
Earning wages or salary from regular job	7%
Getting a grant, pension, or subsidy of some sort	1%
Other	9%
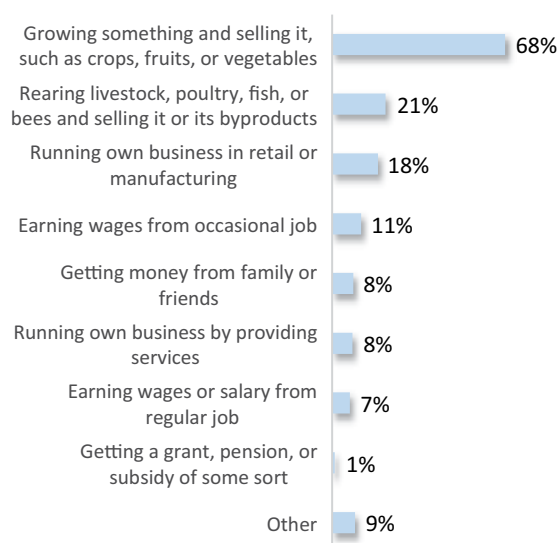
Sample: Smallholder farmers, n=5,034
Multiple responses allowed

TABLE 7. Which of the following income sources is. . .?

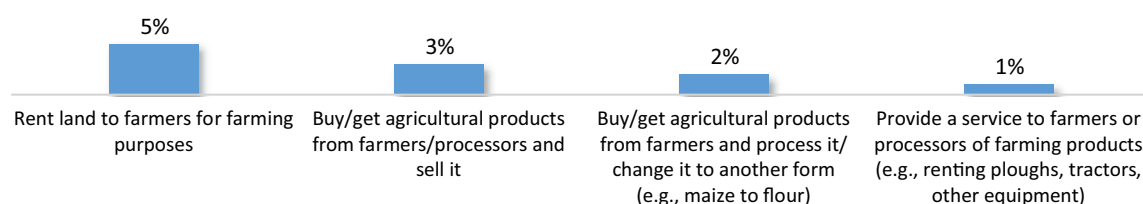| Income sources	Most important	Like getting the most	Most reliable
Growing something and selling it, such as crops, fruits, or vegetables	59%	59%	59%
Running own business in retail or manufacturing (selling or making goods)	10%	10%	10%
Earning wages from occasional job	7%	7%	7%
Other	6%	6%	6%
Earning wages or salary from regular job	4%	4%	4%
Rearing livestock, poultry, fish, or bees and selling it	5%	5%	4%
Running own business by providing services	5%	5%	5%
Getting money from family or friends	4%	3%	3%
Getting a grant, pension, or subsidy of some sort	1%	1%	1%
Don't know	0%	0%	0%

Sample: Smallholder farmers, n=5,034

Aside from crop production, very few smallholder households in Tanzania earn income from other agricultural activities or sources (Figure 35). Five percent rent land, and very small percentages of farmers are involved in supplementing their income by providing services to farmers or agricultural processors, buying products for resale, or processing crops into other products for sale.

More broadly, beyond agriculture, only 1 percent of smallholder households in Tanzania receive payments from the government (e.g., pension, disability, welfare) (Figure 36). This low level of government transfers to smallholders may be because most of them may not have had formal employment or would not have been contributing to the Tanzania National Social Security fund. Of the few smallholders who do receive these payments, half pick them up in cash and in person and just over two-fifths receive it via direct deposit to a bank account (Figure 37). Comparatively, the 2015 nationally representative Financial Inclusion Insights survey of Tanzanian adults showed that 8 percent of Tanzanians with an active bank account receive government payments through a bank, and 2 percent through mobile money.[18]

FIGURE 35. Are there any other ways that you get income?

5%	3%	2%	1%
Rent land to farmers for farming purposes	Buy/get agricultural products from farmers/processors and sell it	Buy/get agricultural products from farmers and process it/ change it to another form (e.g., maize to flour)	Provide a service to farmers or processors of farming products (e.g., renting ploughs, tractors, other equipment)

Sample: Smallholder farmers, n=5,034
Multiple responses allowed

18 InterMedia Tanzania Financial Inclusion Insights (FII) Tracker survey Wave 3 (N=3,001, 15+), July–August 2015.

FIGURE 36. Do you receive income from any of the following?

Occasional sale of my belongings	47%
Occasional paid assignments, labor for hire	13%
Remittances/monetary or other help from family or friends	12%
Government benefits (pension, disability, welfare, etc.)	1%
Other donor/NGO benefits	0%

Sample: Smallholder farmers, n=5,034
Multiple responses allowed

FIGURE 37. How do you usually get this government payment?

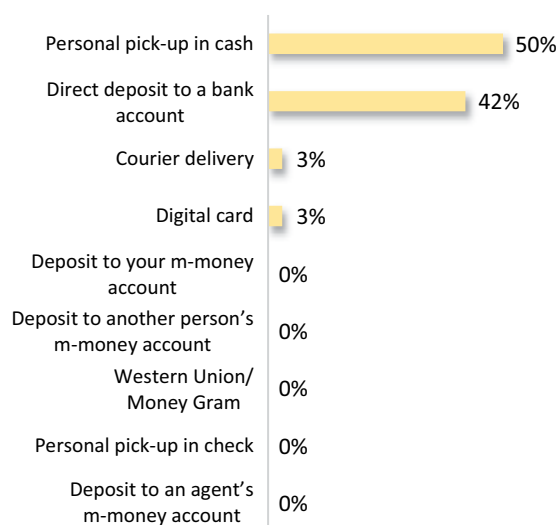|	
Personal pick-up in cash	50%
Direct deposit to a bank account	42%
Courier delivery	3%
Digital card	3%
Deposit to your m-money account	0%
Deposit to another person's m-money account	0%
Western Union/ Money Gram	0%
Personal pick-up in check	0%
Deposit to an agent's m-money account	0%

Sample: Smallholder farmers who receive income from government benefits, n=60
Multiple responses allowed

Self-reported expenses are within income, but smallholders still struggle to get by

Most (85 percent) of smallholder households in Tanzania live below the poverty line, earning under $2.50 a day or in extreme poverty, earning under $1.25 a day (Figures 11 and 12). Just over one-third of households said their expenses are below 50,000 TZS ($23) or less each month. Twenty-seven percent said they need between 50,001 and 100,000 TZS ($23 and $46), and 37 percent of smallholder households require 100,001 TZS ($45) or more per month to manage their households (Figure 38).
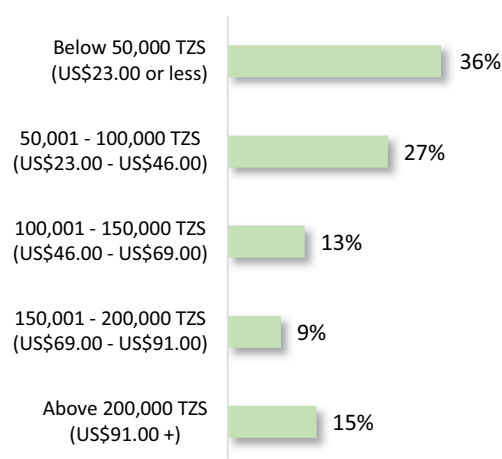
Household income among smallholder households in Tanzania usually surpasses expenses, leaving majorities of farming households in a slightly better financial situation month to month. This phenomenon should not be taken for granted. The national survey of smallholder households in Mozambique shows a different tendency: smallholder households barely break even each month and typically have to spend more than they earn in Mozambique.[19]

In Tanzania, more than three-quarters of smallholder households bring in more than what they need each month. Those

FIGURE 38. What is the minimum amount your household needs to survive per month (for personal expenses)? Quintile

Below 50,000 TZS (US$23.00 or less)	36%
50,001 - 100,000 TZS (US$23.00 - US$46.00)	27%
100,001 - 150,000 TZS (US$46.00 - US$69.00)	13%
150,001 - 200,000 TZS (US$69.00 - US$91.00)	9%
Above 200,000 TZS (US$91.00 +)	15%

Sample: Smallholder households who gave a minimum amount for households' survival n=2,959

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19 CGAP National Surveys & Segmentation of Smallholder Households in Mozambique, 2015–2016; http://www.cgap.org/publications/national-survey-segmentation-smallholder-households-mozambique

Figure 39. What is the minimum amount your household needs to survive per month (for personal expenses) and is your income sufficient?

	Don't make enough	Breaking even	Surplus
Below 50,000 TZS (US$23.00 or less)	48%	14%	38%
50,001 - 100,000 TZS (US$23.00 - US$46.00)	22%	14%	64%
100,001 - 150,000 TZS (US$46.00 - US$69.00)	9%	8%	83%
150,001 - 200,000 TZS (US$69.00 - US$91.00)	11%	7%	82%
Above 200,000 TZS (US$91.00 +)	6%	6%	88%

■ Don't make enough ■ Breaking even ■ Surplus
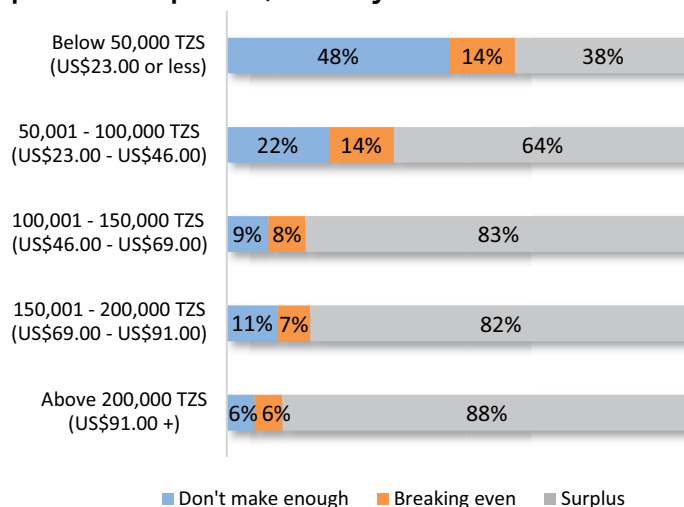
Sample: Smallholder households, n=2,887

that need more to survive, however, are more vulnerable to falling short each month. Three in 10 households requiring 200,001 TZS or more per month fall short. This is more than double the percentage of those earning between 50,001 and 100,000 TZS each month (Figure 39). While lower-income smallholder households in Tanzania are vulnerable, we see more budgeting within means, and a self-reported lower incidence of falling short. The self-reported data also suggest there is a little bit of extra money each month for the lower-income households that can be redirected into a financial account, potentially increasing this group's attractiveness as a consumer segment. Certainly, the experience of falling short is far more pronounced in the higher-income groups of smallholder households in Tanzania.

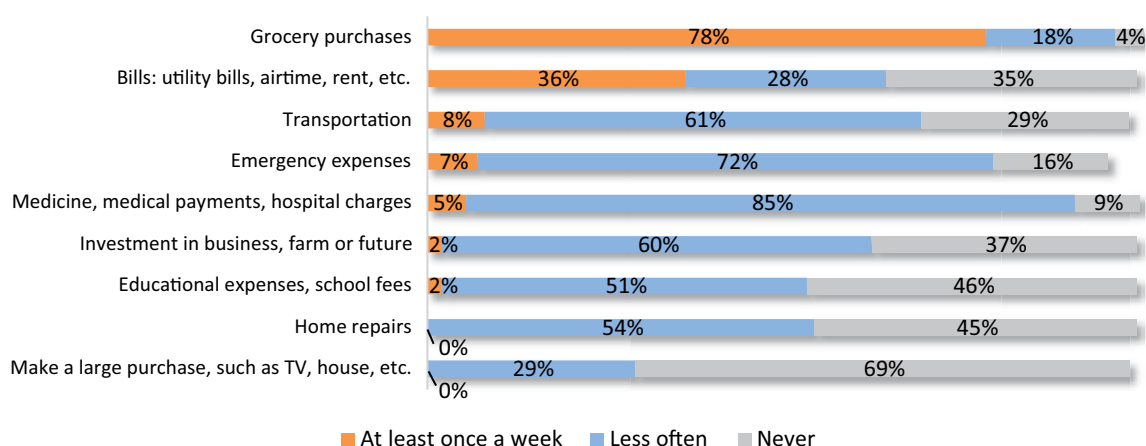## Traditional spending framework and prudent spending

Expenses for smallholder households in Tanzania reflect a traditional spending framework, where smaller expenses are incurred more regularly than larger expenses (Figure 40).[20] Grocery expenses are the most common, frequent expense for smallholders. They could potentially serve as a merchant channel for expanding the digital financial ecosystem, given how much of the population this touches.

Separate from grocery expenses, bills (including utilities, rent, or airtime) and transportation costs are incurred more often. Other, larger expenses such as investments, educational expenses, home repairs, or large purchases, are incurred infrequently, if at all.

The presence of a traditional spending framework among smallholder farmers in Tanzania is a characterizing factor for the country. This framework is not always present to the extent to which it is in Tanzania. In Mozambique, for example, smallholder households do not have smaller, regular expenses and instead focus their purchases on larger, infrequent expenditures.[21]

20 Expense question displayed in Figure 42 did not include agricultural inputs, such as seed and fertilizer, specifically, and instead focused on broad-based household needs. Farming was only specific as a part of investments.

FIGURE 40. How often do you make each of the following expenses?

Expense	At least once a week	Less often	Never
Grocery purchases	78%	18%	4%
Bills: utility bills, airtime, rent, etc.	36%	28%	35%
Transportation	8%	61%	29%
Emergency expenses	7%	72%	16%
Medicine, medical payments, hospital charges	5%	85%	9%
Investment in business, farm or future	2%	60%	37%
Educational expenses, school fees	2%	51%	46%
Home repairs	0%	54%	45%
Make a large purchase, such as TV, house, etc.	0%	29%	69%

■ At least once a week ■ Less often ■ Never

Sample: Smallholder households, n=5,034

Male and female smallholders in Tanzania generally exhibit similar frequency spending habits for expenses. In each expense category, the proportion of men and women that spent money on that expense at least once a week is within 1 percent (Table 8). A greater proportion of men, though, spend in all expense categories at least occasionally. There are also notable differences across geographic demographics. Compared to rural smallholders, a greater proportion of urban smallholders spend on all expense categories at least once per week. Additionally, a greater proportion of urban smallholders reported spending on all categories, at least occasionally, compared with rural smallholders (Table 8).

Transactions that one would expect to be made with some regularity, such as utility bills, were not made in the recent past. About 17 percent of smallholder households in Tanzania had paid utility bills in the 30 or 90 days prior. In the past 90 days, more than two-fifths had deposited money or withdrawn money, about a third had received money from family or friends, and a quarter had sent money to family members or friends (Figure 41).

Smallholder households in Tanzania have few resources, typically bring in limited funds, and are still obligated to pay school fees and household costs. Yet there were not a high frequency of transactions in the three months prior to this national survey of smallholder households. This suggests that smallholder families in Tanzania make extremely prudent decisions about what to spend and where to spend it, even if it means cutting back on necessities.

Risky money management practices with few options to mitigate an emergency

Smallholders in Tanzania find themselves in at-risk situations, despite their best intentions and actual desires. They recognize the importance of sound financial behaviors, such as saving money and preparing for unexpected events, but despite their best efforts, many have debts and/or expenses greater than their savings and income.

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21 Ibid.

TABLE 8. Expenses by demographics

Expense	At least once a week / Less often / Never											
	Gender						Setting					
	Male			Female			Rural			Urban		
Grocery purchases	77%	19%	4%	78%	18%	4%	76%	19%	5%	81%	16%	3%
Bills: utility bills, airtime, rent, etc.	41%	29%	29%	32%	27%	41%	31%	27%	41%	44%	31%	24%
Transportation	9%	65%	25%	8%	62%	33%	4%	63%	32%	15%	59%	25%
Emergency expenses	7%	74%	14%	7%	71%	17%	5%	74%	16%	11%	70%	16%
Medicine, medical payments, hospital charges	5%	86%	8%	6%	94%	10%	4%	86%	9%	7%	84%	9%
Investment in business, farm or future	2%	64%	33%	2%	56%	41%	1%	57%	40%	3%	64%	32%
Educational expenses, school fees	2%	53%	45%	2%	50%	47%	1%	48%	50%	3%	58%	38%
Hope repairs	1%	60%	38%	0%	49%	50%	0%	53%	46%	1%	56%	43%
Make a large purchase, such as a TV, house, etc.	0%	34%	64%	0%	25%	74%	0%	24%	75%	1%	40%	59%

Sample: Smallholder households, n=5,034
Due to rounding, percentages w/in demographic may not equal 100%.

FIGURE 41. Did you do the following activities AT LEAST ONCE in the past 30/90 days?
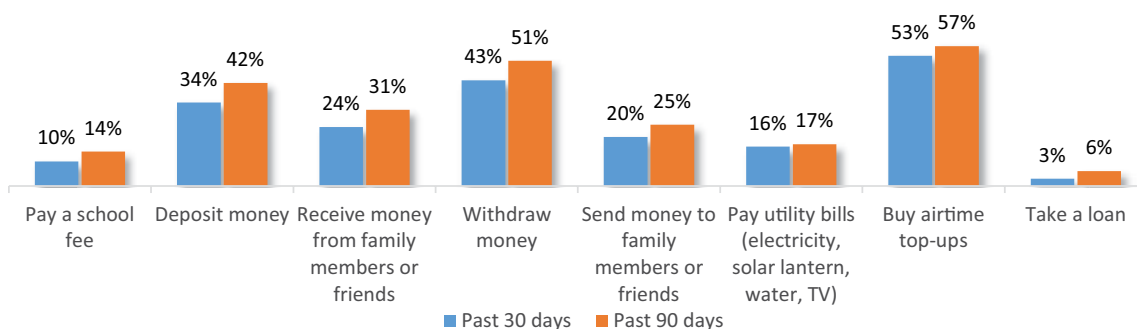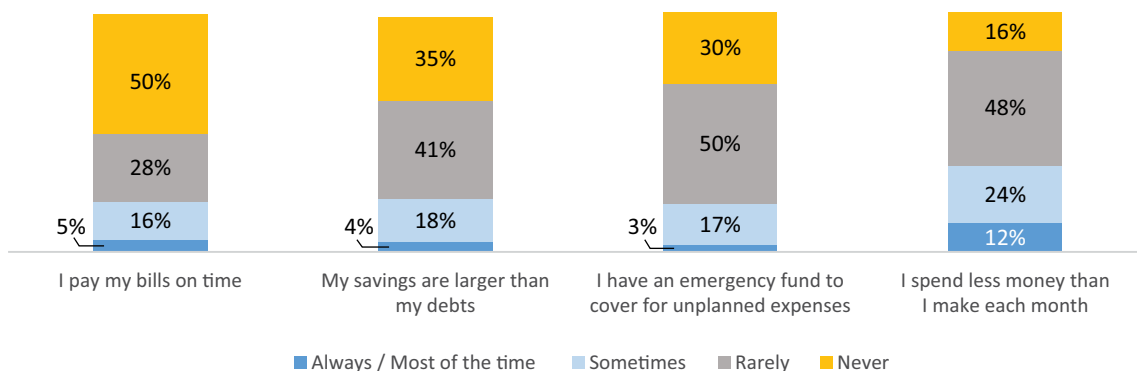

Sample: Smallholder farmers, n=2,795

Twelve percent of smallholders in Tanzania feel they always/most of the time spend more than they make. They also report that they often cannot pay their bills on time. This could support the theory that they make tough decisions about what to pay and what not to pay each month to live within their monthly incomes (Figure 42). The question may not be only about paying bills on time, but about what bills they pay, or would like to pay, on time but cannot.
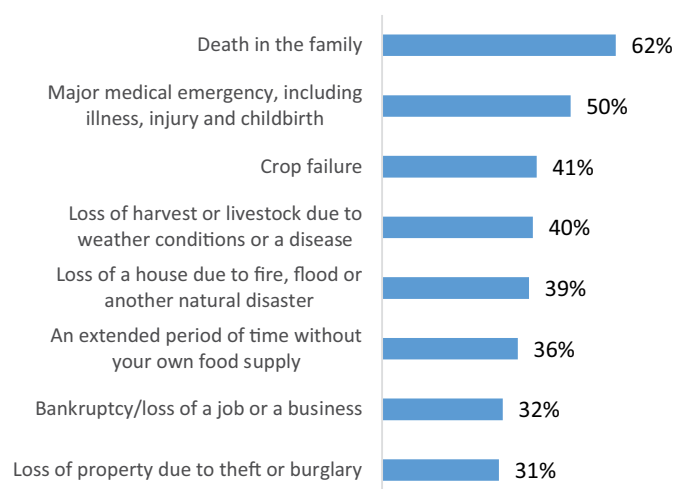
Few smallholders in Tanzania have an emergency fund. While saving occurs frequently, the amount saved is minimal. With minimal savings, their lack of creditworthiness reduces access to financial services and most importantly their ability to invest (Figure 42). Their inability to access resources and invest limits the options available to get out of poverty.

More than half of smallholder households in Tanzania have plans to manage unexpected expenses. The most common plan is to cope with a death in the family (62 percent). One in two smallholder households have a plan to cover expenses associated with a major medical emergency (Figure 43). Roughly two in five have a plan for expected crop failure, loss of harvest or livestock due to weather or disease, and loss of house due to fire, floods, or natural disasters. Just over a third have plans for how to face bankruptcy; close to a third for how to cope with job loss or an extended period without food.

FIGURE 42. How often does the following apply to you?

Sample: Smallholder farmers, n=2,795

FIGURE 43. Does your family have a plan to manage these unexpected expenses, which might result from the following?

Death in the family	62%
Major medical emergency, including illness, injury and childbirth	50%
Crop failure	41%
Loss of harvest or livestock due to weather conditions or a disease	40%
Loss of a house due to fire, flood or another natural disaster	39%
An extended period of time without your own food supply	36%
Bankruptcy/loss of a job or a business	32%
Loss of property due to theft or burglary	31%

"Yes" answers
Sample: Smallholder farmers, n=2,795

While most smallholders in Tanzania have not made explicit plans to manage a variety of unexpected expenses, they are exercising general fiscal preparedness. In the past year, most saved money (Table 9):

- 84 percent of smallholders report saving money with at least one mechanism

- 16 percent reporting saving with three or more mechanisms

- The average number of savings channels used among smallholders in Tanzania is 1.53

The savings channels used tend to be informal; only 8 percent of smallholders in Tanzania used a formal banking service,
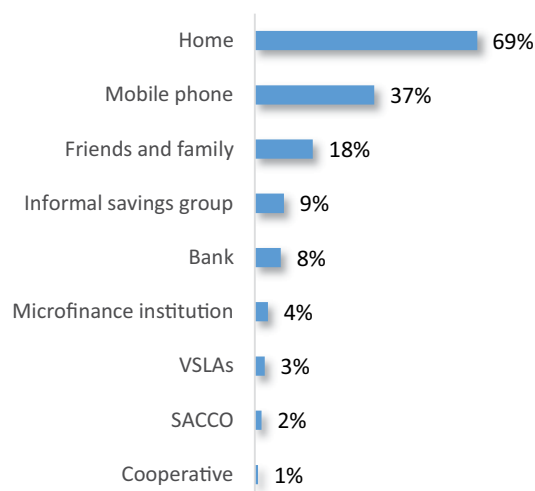
TABLE 9. Saving methods, by demographics

| Number of savings methods | Total | Gender | | Education* | |
		Men n=1,376	Women n=1,419	Attended n=2,140	Did not attend n=655
0	16%	14%	17%	14%	21%
1	40%	39%	41%	37%	49%
2	28%	30%	26%	30%	20%
3	12%	12%	11%	13%	5%
4	3%	3%	3%	3%	3%
5	1%	1%	1%	1%	1%
6	0%	0%	1%	0%	0%
7	0%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%

*Pearson = <0.0001
Sample: Smallholder farmers, n=2,795

FIGURE 44. In the past 12 months, have you saved money with any of the following groups?

Group	Percent
Home	69%
Mobile phone	37%
Friends and family	18%
Informal savings group	9%
Bank	8%
Microfinance institution	4%
VSLAs	3%
SACCO	2%
Cooperative	1%

"Yes" answers
Sample: Smallholder farmers, n=2,795

FIGURE 45. In the event of an emergency, could you get extra money through relatives sending money or by selling assets?
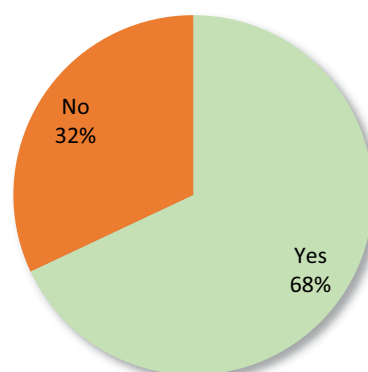
No 32%

Yes 68%

Sample: Smallholder farmers, n=2,795

compared to 69 percent that used at-home saving (Figure 44).

Male smallholders in Tanzania typically save slightly more than female smallholders. More substantive differences emerge across levels of education: 79 percent of smallholders who did not attend school saved with at least one channel in the past 12 months, compared with 86 percent of smallholders who did attend school. This disparity increases when considering diversity of savings channels: 10 percent of smallholders who did not attend school used three or more savings channels, compared to the 18 percent who did attend school and used three or more channels.

Even with savings, options for liquidity are limited. The majority of smallholders in Tanzania think they can get extra money from relatives sending money or by selling some of their assets in the event of an emergency (Figure 45). Still, the possibility of coming up with a relatively small amount

of money—100,000 Tanzania shillings (approximately $45)[22]—in the next month causes some pause. Just about one-quarter said it was very possible (Figure 46). Nearly half of smallholders said it was either not possible to come up with this money in a month. For those who said it would be possible, they would most likely draw the money from family or friends, or draw the money from their limited savings.

FIGURE 46. Imagine that you have an emergency and you need to pay 100,000 shillings. How possible is it that you could come up with 100,000 shillings within the next month?

Very possible 21%

Not possible 49%

Somewhat possible 29%
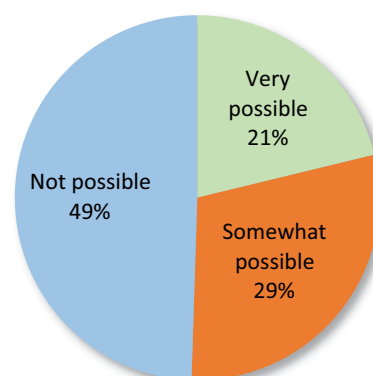
Sample: Smallholder farmers, n=2,795

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22 This amount was derived from the World Bank Global Findex question series, which tests whether respondents could come up with a nominal amount, set at 1/20th GNI per capita in local currency. Source: http://bit.ly/1QqNaHl.

FIGURE 47. In the past 12 months, have you experienced any events?

No, have not experienced an event 8%

Yes, experienced an event 92%
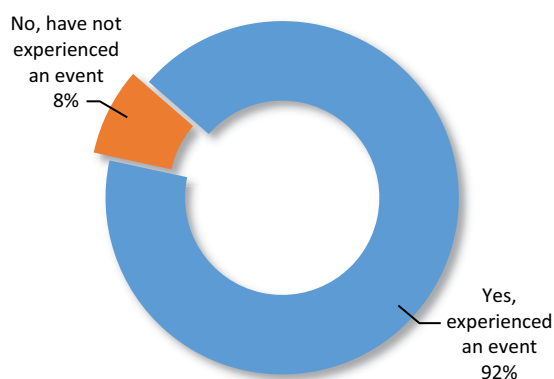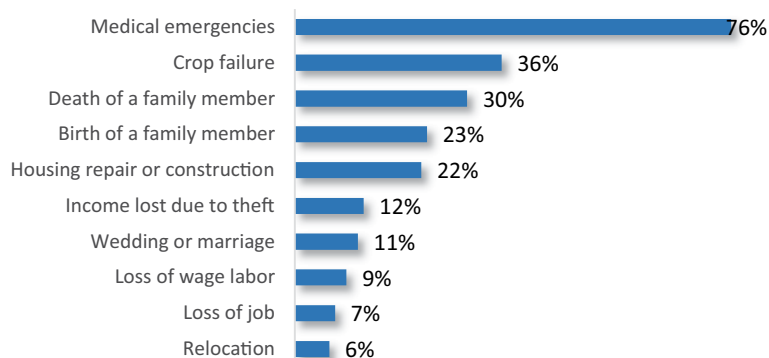
Sample: Smallholder farmers, n=2,795

Unable to cope with negative events that affect them

More than nine in 10 smallholders in Tanzania endured financial shocks and events in the year prior to this survey (Figure 47). A significant number of smallholders experienced multiple financial shocks over the past year. The most frequently reported event was a medical emergency, followed by crop failure and death in the family (Figure 48). The dependency on one particular crop, maize, makes the significance of crop failure much more daunting to smallholders. Increased crop diversity could reduce this vulnerability.
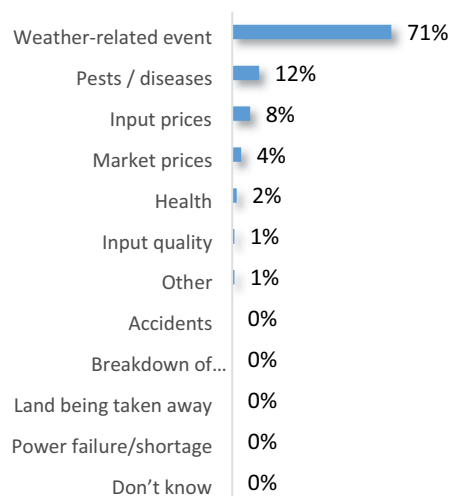
Smallholders in Tanzania feel weather poses the greatest risk to their household agricultural activities (Figure 49). In the past three years, more than three-quarters had their agricultural activities seriously affected by a weather-related event, while pests or diseases (Figure 50) affected more than two-thirds of smallholder farmers in Tanzania.

The five major regions of Tanzania face the same general types of events, but there are some regional nuances. Problems with pests or diseases are more prevalent in the Lake and Coastal regions. Weather is a major issue in Zanzibar and the Lake Region (Figure 51), which seems the most affected overall.

Across all experienced events, the majority of smallholders in Tanzania said they rely on their savings to cope. However, a significant proportion of smallholder farmers in Tanzania reported that they do not to do anything special to cope when shocks occur (Figure 52). Some reported having sold livestock to cope with price fluctuations. Smallholders consider livestock to be a reliable fallback, in case expected agricultural revenues fall short.

FIGURE 48. In the past 12 months, have you experienced any of these events?

Medical emergencies	76%
Crop failure	36%
Death of a family member	30%
Birth of a family member	23%
Housing repair or construction	22%
Income lost due to theft	12%
Wedding or marriage	11%
Loss of wage labor	9%
Loss of job	7%
Relocation	6%

Sample: Smallholder farmers, n=2,795
Multiple responses allowed

FIGURE 49. What poses the most significant risk to your agricultural activities?

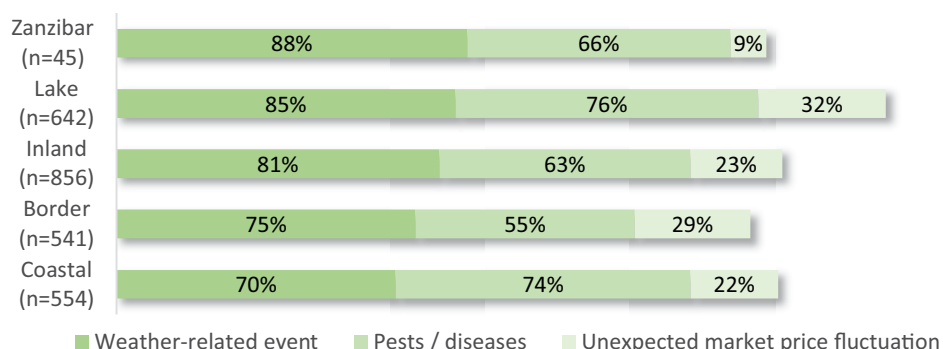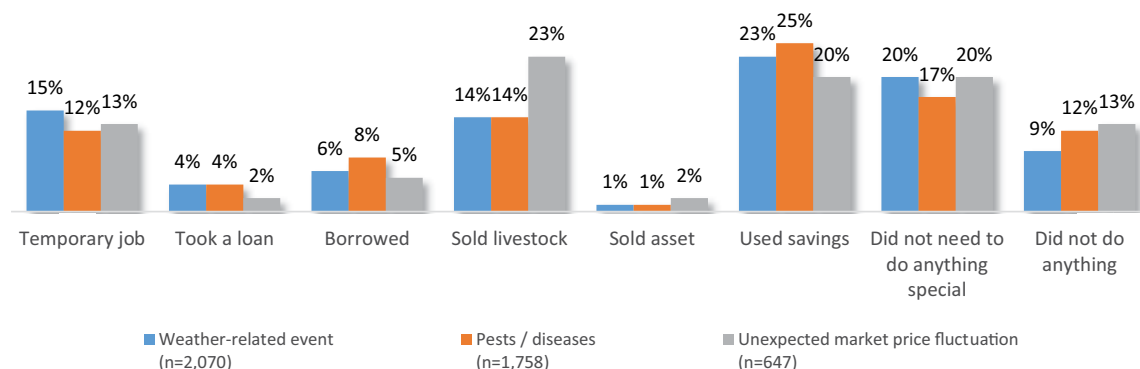|	
Weather-related event	71%
Pests / diseases	12%
Input prices	8%
Market prices	4%
Health	2%
Input quality	1%
Other	1%
Accidents	0%
Breakdown of...	0%
Land being taken away	0%
Power failure/shortage	0%
Don't know	0%

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

FIGURE 50. Have your agricultural activities been seriously affected by any of the following events in the past three years?

Weather-related event	79%
Pests / diseases	67%
Unexpected price fluctuation of inputs	32%
Unexpected price fluctuation in the...	27%
Health-related event	20%
Market downturn / crops or livestock...	14%
Breakdown of equipment	13%
Accident or theft	11%
Death in family	8%
Contracts not honored	1%
Political unrest or war	1%
Don't know	0%
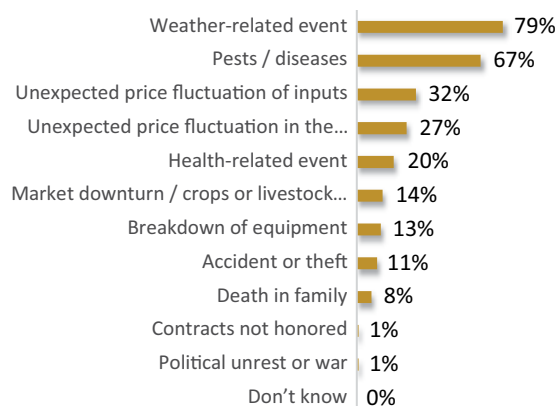
Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

FIGURE 51. Have your agricultural activities been seriously affected by any of the following events in the past three years?

Region	Weather-related event	Pests / diseases	Unexpected market price fluctuation
Zanzibar (n=45)	88%	66%	9%
Lake (n=642)	85%	76%	32%
Inland (n=856)	81%	63%	23%
Border (n=541)	75%	55%	29%
Coastal (n=554)	70%	74%	22%

Sample: Smallholder farmers who participate in household's agricultural activities in each region

FIGURE 52. How did you mainly cope when this happened?

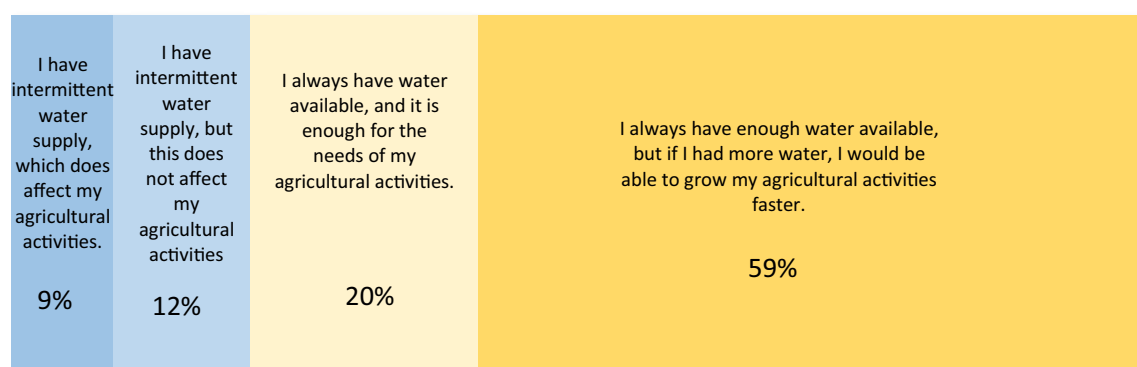|	Temporary job	Took a loan	Borrowed	Sold livestock	Sold asset	Used savings	Did not need to do anything special	Did not do anything
Weather-related event (n=2,070)	15%	4%	6%	14%	1%	23%	20%	9%
Pests / diseases (n=1,758)	12%	4%	8%	14%	1%	25%	17%	12%
Unexpected market price fluctuation (n=647)	13%	2%	5%	23%	2%	20%	20%	13%

Sample: Smallholder farmers who say their agricultural activities have been seriously affected by each category

Enough water supply, encouraging growth

A minimal portion of smallholder farmers in Tanzania finds their households' farming activities limited by the amount of available water. Just close to one in 10 report having less water than they need for their agricultural activities.

Close to six in 10 report access to a reliable water supply and enough water for their agricultural activities, but that they would like to have more water to expand their agricultural activities (Figure 53). Twenty percent have enough for their farms, and are able to satisfy the needs of their agricultural activities.

FIGURE 53. Which of the following best describes your water situation?

I have intermittent water supply, which does affect my agricultural activities.	I have intermittent water supply, but this does not affect my agricultural activities	I always have water available, and it is enough for the needs of my agricultural activities.	I always have enough water available, but if I had more water, I would be able to grow my agricultural activities faster.
9%	12%	20%	59%

Sample: Smallholder farmers who participate in household's agricultural activities, n=4,742

3. TOOLS FOR AGRICULTURAL RISK MITIGATION

Known importance, desire for risk mitigation

Smallholder farmers in Tanzania face the numerous agricultural risks considered routine and common to agriculture, and their life experiences have taught them to recognize these vulnerabilities. Drought, flood, and disease, along with lower-than-expected yield or insufficient crop storage, are known and real concerns that smallholders are working to avoid. The household depends heavily on its own agricultural output. Any one of its crops is likely to be consumed by the household, sold, and traded, and then any remainder is stored. Risk mitigation, using whatever means smallholders have at hand, is therefore critical, and smallholder households in Tanzania want to mitigate against risk even more than current circumstances allow.

Working to mitigate risks often involves planning as well as accessing resources, such as savings mechanisms, that may often be outside the reach of smallholders. To assess their ability to mitigate risk, the national survey of smallholder farmers in Tanzania assessed various tools that help foster the following:
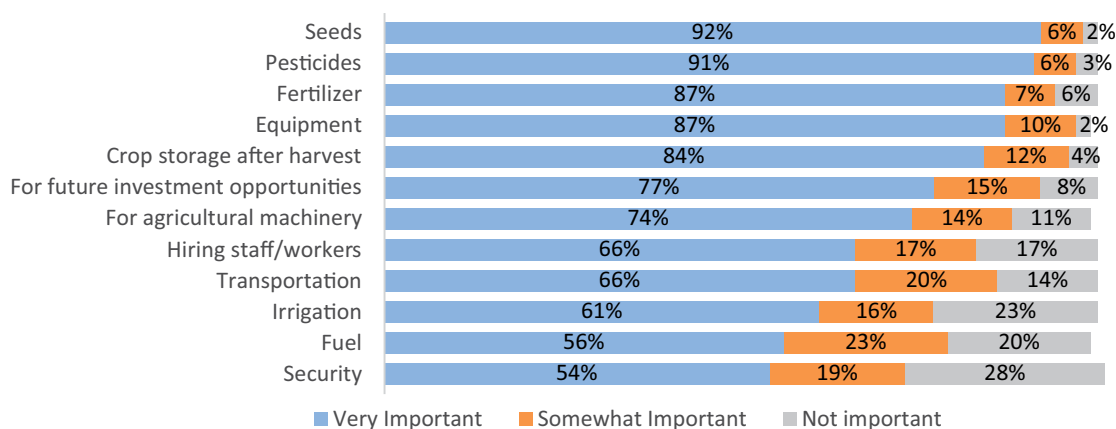
- Preparedness, in the form of savings for known agricultural expenses

- Monetization of crops, in the form of being able to store and sell goods

- Maintenance of land, by being able to manage the land (e.g., weeding, planting)

- Knowledge, by way of having information channels for agricultural related messages

Preparedness: Importance and ability to save for needs

A majority of smallholders in Tanzania see the importance of setting aside money for certain agricultural expenses, most notably seeds, pesticides, fertilizer, and equipment (Figure 54). There is less perceived relevance in setting money aside for security, fuel, and irrigation, transportation, or staff.
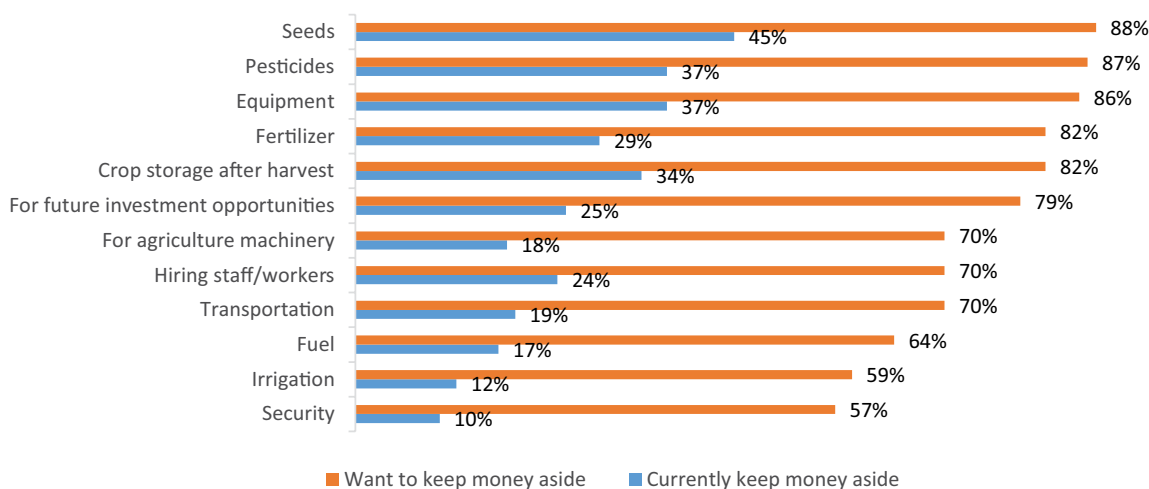
Setting money aside for seed, pesticides, fertilizer, and equipment enables a household to begin its planting season,

FIGURE 54. How important is it to keep money aside for the following agricultural needs?

	Very Important	Somewhat Important	Not important
Seeds	92%	6%	2%
Pesticides	91%	6%	3%
Fertilizer	87%	7%	6%
Equipment	87%	10%	2%
Crop storage after harvest	84%	12%	4%
For future investment opportunities	77%	15%	8%
For agricultural machinery	74%	14%	11%
Hiring staff/workers	66%	17%	17%
Transportation	66%	20%	14%
Irrigation	61%	16%	23%
Fuel	56%	23%	20%
Security	54%	19%	28%

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

FIGURE 55. Do you want to keep money aside for any of the following agricultural needs? vs. Do you currently keep money aside for any of the following agricultural needs?

	Want to keep money aside	Currently keep money aside
Seeds	88%	45%
Pesticides	87%	37%
Equipment	86%	37%
Fertilizer	82%	29%
Crop storage after harvest	82%	34%
For future investment opportunities	79%	25%
For agriculture machinery	70%	18%
Hiring staff/workers	70%	24%
Transportation	70%	19%
Fuel	64%	17%
Irrigation	59%	12%
Security	57%	10%

Sample: Smallholder farmers, n=2,795

which explains why this is of the utmost importance. Failure to have the resources to plant means, of course, there will be no harvest.

There is a large disparity between what smallholders in Tanzania want to do and what they actually practice when it comes to agricultural savings (Figure 55). In addition to considering it important, most smallholders *want* to be able to keep money aside for their agricultural expenses, particularly for those activities most closely connected with getting a crop in the ground.

The desire of smallholder households in Tanzania to save surpasses their actual practice, sometimes at a two- to-one ratio. The gap between aspirations and actual savings might inadvertently suggest that there is not as much savings occurring within the population than there actually is, when in fact, farmers are saving for a number of purposes.

Overall, more than half (57 percent) of smallholders in Tanzania set aside money for at least one agricultural expense over the course of a season, whether it is for harvesting, equipment, staffing, transportation, or future investment opportunities.

On average, the Tanzanian smallholder farmer is saving for just over three different agricultural expenses or pursuits (3.08), and close to one-third of smallholders set money aside for five or more (Table 2).

The need for savings crosses over a number of items, and smallholders have to make potentially tough choices on the materials that most need that savings. Therefore, the gap between what farmers want to save for, and what they actually save for, could reflect more of a prioritization of limited resources. They save what they can, when they can, and put those savings where it will help them most.

Compared to Mozambique and Uganda, smallholder households in Tanzania present themselves as more engaged savers, doing what they can to proactively plan for needs or anticipate unfortunate circumstances, both actions that can mitigate types of risk.

Smallholder families in Tanzania tend to set money aside for agricultural

TABLE 10. Setting aside money for agricultural expenses or pursuits, by demographics (n=2,795)

Number of expenses	Total	Gender		Education*	
		Male	Female	Attended	Did not attend
None	43%	40%	45%	40%	51%
Net (1+)	57%	60%	55%	60%	49%
1	7%	7%	7%	6%	11%
2	7%	7%	6%	7%	4%
3	6%	7%	7%	7%	7%
4	6%	7%	5%	6%	6%
5	5%	5%	6%	6%	4%
6	5%	6%	5%	5%	4%
7	4%	4%	4%	4%	4%
8	5%	6%	4%	6%	2%
9	4%	4%	4%	5%	1%
10	4%	4%	3%	4%	2%
11	2%	2%	2%	2%	2%
12	2%	3%	2%	3%	0%

*Pearson = <0.0001

expenses or pursuits. Fifty-seven percent set money aside for at least one expense (Table 10). Male smallholders typically set money aside more frequently than do women, at 60 percent and 55 percent, respectively. Male smallholders also exhibit more diverse "keeping aside," with 32 percent setting money aside for five or more items and pursuits, compared with 30 percent of female smallholders. As with savings, there are significant differences between smallholders that attended school and those who did not attend. Forty-nine percent of smallholders who did not attend school set money aside, with 21 percent setting money aside for five or more agricultural expenses, compared with 60 percent and 34 percent, respectively, of smallholders that attended school.

The data also show a relationship between the number of savings channels a smallholder in Tanzania has and the number of agricultural expenses or pursuits for which he/she is saving money. This suggests that there may be some perceived targeted savings mechanisms for what a household needs to do or produce for the farm. That is, certain mechanisms may aid setting aside money for specific agricultural expenses. A linear regression model suggests that, all else being equal and not adjusting for other factors, every increase in the number of savings channels corresponds with a 0.77 increase in the number of agricultural expenses or pursuits for which money is set aside (Figure 3). That means that for each additional savings product a smallholder has, there is roughly one additional expense

FIGURE 56. Regression of number of savings channels on number of expenses or pursuits for which money is set aside (n=2,795)

	Coefficient	T	P	95% CI
Savings channels	0.769	7.78	<0.001	0.575-0.963

that they are saving toward (rounding 0.77 to 1), supporting the possibility that certain mechanisms aid preparation for specific agricultural expenses.

Opportunities for broadening savings as a risk mitigation tool

Figure 57 combines all three dimensions of these agricultural expenses: (1) importance of saving for them, (2) desire to save for them, and (3) current practices. The importance of the item is represented in the size of the bubble on a 10-point index, with the largest bubbles being perceived as the most important. The current savings practices is shown as a percentage on the X (horizontal) axis, and the desire to set money aside for that purpose is represented as a percentage on the Y (vertical) axis.

Pesticides, equipment, and seeds are together the most important, most desired and most common expenses a farmer saves toward. This suggests that savings or even credit mechanisms for pesticides, equipment, and seeds are good options that are known and more

common for smallholders in Tanzania, and have a broad spectrum of interest.

Crop storage, fertilizer, and investments earn almost as much importance and interest as pesticides, equipment, and seed, yet smallholder farmers in Tanzania save for these. This suggests some opportunity and potential appeal in financial mechanisms to put more farmers within reach of crop storage and fertilizer.

Saving for other agricultural interests, such as security, irrigation, transportation, fuel, and agricultural machinery, are relevant to a more niche group of smallholders. Fewer find these as important or want to save for them, and fewer are currently saving for them. Expanding the use of these mechanisms for pro-active risk management would have to include more of a value proposition to earn more widespread interest.
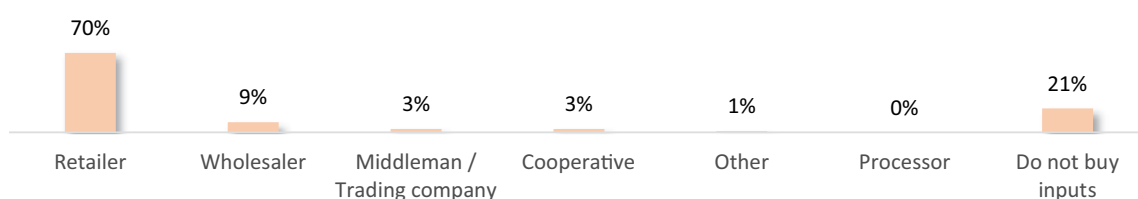
Preparedness: Purchasing inputs and contracts

The vast majority of smallholders in Tanzania purchase inputs such as seeds,

FIGURE 57. Perceptual map: Importance, desires and possession of agricultural expense
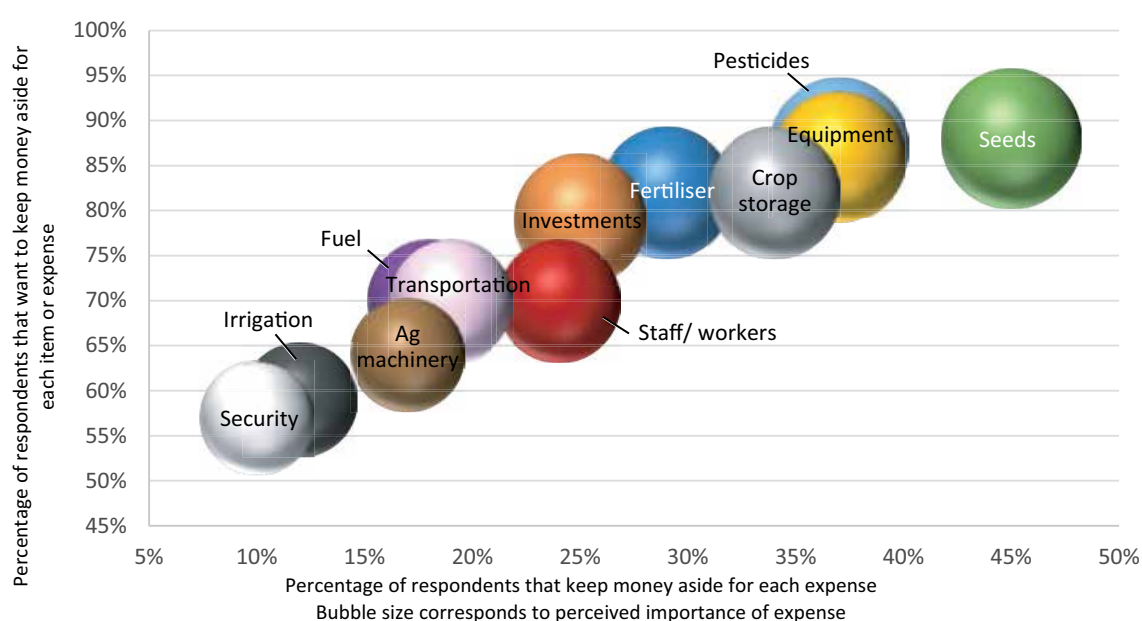
Sample: Smallholder farmers, n=2,638

FIGURE 58. Who do you normally purchase your agricultural and livestock inputs from?

Retailer	Wholesaler	Middleman / Trading company	Cooperative	Other	Processor	Do not buy inputs
70%	9%	3%	3%	1%	0%	21%

Sample: Smallholder farmers who participate in household's agricultural activities, n=4,742
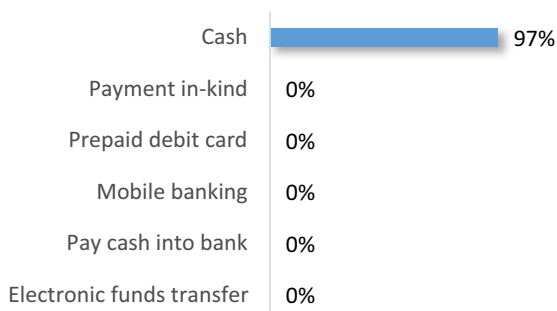Multiple responses allowed

fertilizers, or pesticides (79 percent), and they buy them largely from retailers. Small numbers of these smallholders buy from wholesalers, middlemen, or cooperatives (Figure 58). Transactions, across all sources, tend to be in cash and paid at the point of purchase (Figure 59). Very few smallholders even have an option to pay later (Figure 60), which can be a source of strain for their budgeting and planning and explains their emphasis on savings for inputs.

## Monetization: Storing and selling goods

Even though they may not be setting cash aside for their agricultural needs, smallholder farmers in Tanzania are storing crops. Close to eight in 10 smallholders currently store crops after the harvest (Figure 61). The most commonly stored crop is maize, as most smallholder farmers in Tanzania grow this crop (Figure 62). Storage focuses almost exclusively on food or staple crops and not cash crops. The storage location is normally in the home (58 percent) or in sacks/bags (24 percent) (Figure 63).

Crop storage also emerges as a tool for risk mitigation. Whether the risk is hunger or the need for income, smallholders who store their crops do so as some type of monetization of the crop. The main reason for storing crops is so the family can consume them later, further emphasizing the dependence on their agricultural outputs for subsistence (Figure 64). Nearly a third (31 percent) store until they get the market price they want, indicating their willingness to wait to better monetize their crop. One-quarter (24 percent) treat their stored crop as a form of savings, selling it when they need the money.

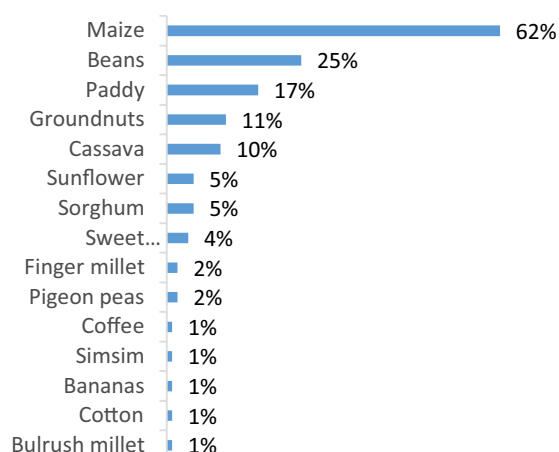**FIGURE 59.** How do you usually pay your suppliers of inputs?

Cash	97%
Payment in-kind	0%
Prepaid debit card	0%
Mobile banking	0%
Pay cash into bank	0%
Electronic funds transfer	0%

Sample: Smallholder farmers who purchase main agricultural and livestock inputs, n=3,731
Multiple responses allowed

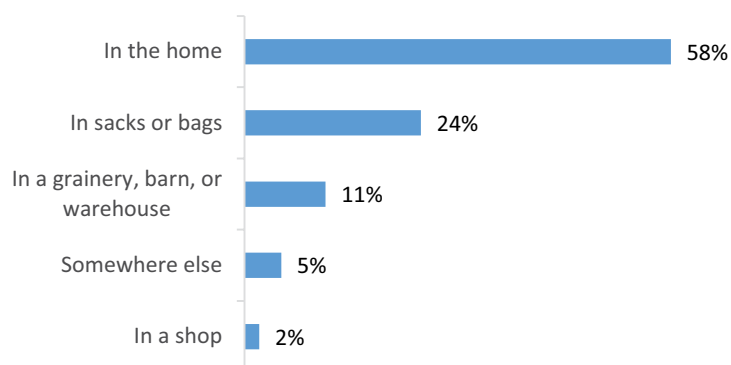**FIGURE 60.** Do your suppliers give you the option to pay them later or do you have to pay immediately?

Pay immediately 96%
Pay later 4%
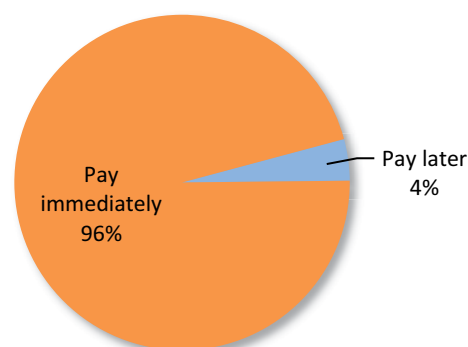
Sample: Smallholder farmers who pay suppliers for inputs, n=3,616

FIGURE 61. Do you currently store any of your crops after the harvest?
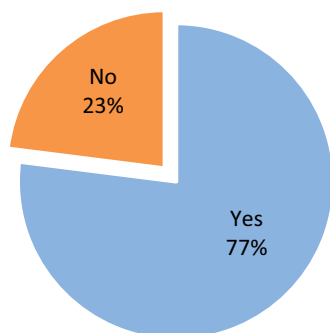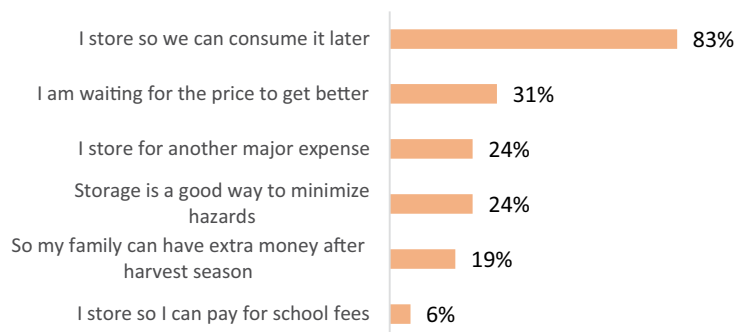

No
23%

Yes
77%

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

FIGURE 62. Which crops do you normally store?

Crop	%
Maize	62%
Beans	25%
Paddy	17%
Groundnuts	11%
Cassava	10%
Sunflower	5%
Sorghum	5%
Sweet…	4%
Finger millet	2%
Pigeon peas	2%
Coffee	1%
Simsim	1%
Bananas	1%
Cotton	1%
Bulrush millet	1%

Sample: Smallholder farmers who currently store any crops after harvest, n=2,008

FIGURE 63. Where do you store your crops?

	%
In the home	58%
In sacks or bags	24%
In a grainery, barn, or warehouse	11%
Somewhere else	5%
In a shop	2%

Sample: Smallholder farmers who currently store any crops after harvens, n= 2,008
Multiple responses allowed

FIGURE 64. Why do you store your crops?

	%
I store so we can consume it later	83%
I am waiting for the price to get better	31%
I store for another major expense	24%
Storage is a good way to minimize hazards	24%
So my family can have extra money after harvest season	19%
I store so I can pay for school fees	6%

Sample: Smallholder farmers who currently store any crops after harvest, n=2,008
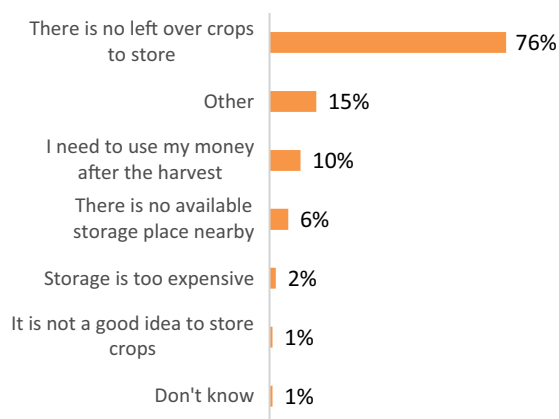Multiple responses allowed

FIGURE 65. Do you currently store any of your crops after the harvest?
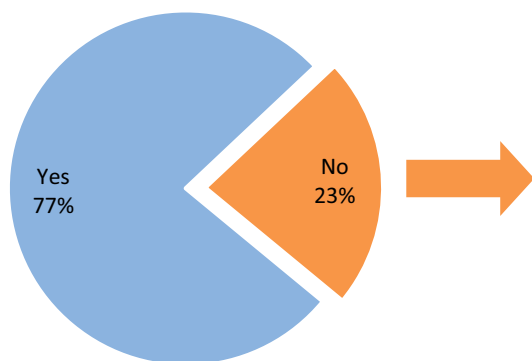
Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638.

FIGURE 66. Why do you not currently store any of your crops?

Sample: Smallholder farmers who currently do not store any crops after harvest, n=630
Multiple responses allowed

Approximately one-quarter of smallholder farmers in Tanzania do not store their crops after the harvest (Figure 65), mostly because there are no leftover crops after the harvest. Everything is either sold, traded, or consumed by the family.

Most smallholder farmers in Tanzania sell to a retailer (Figure 67), usually at a local market or in the village (Figure 68). Other less common sales outlets include wholesalers, middlemen, and cooperatives. Less than one in 10 smallholders in Tanzania (7 percent) sell directly to the public.

The majority of smallholder farmers choose their market based on factors related to price. Some are motivated by the perceived competitiveness of the prices at their market (42 percent); lack of price information from other markets is another key factor (53 percent) (Table 11).

Adding further complexity, the majority of smallholder farmers in Tanzania think they are not getting the current market price for their goods (Figure 69). The most common reason that smallholders report they do not get the current market price is that they are taken advantage of by their customers, followed closely by having too few customers (Figure 70). Smallholders also feel transportation is a barrier to earning

FIGURE 67. Who do you sell your crops and livestock to?
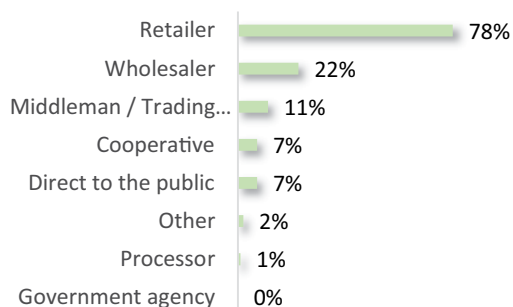
Sample: Smallholder farmers who grow and sell crops, n=3,803
Multiple responses allowed

FIGURE 68. Where do you normally sell your crops and livestock?
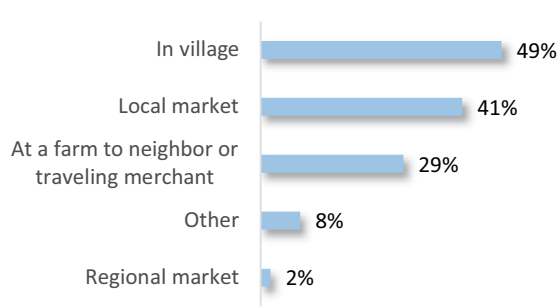
Sample: Smallholder farmers who grow and sell crops, n=3,803
Multiple responses allowed

TABLE 11. Why do you sell your crops and livestock at this location?

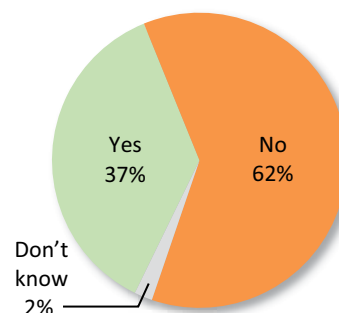|	
I am not aware of prices at other markets	53%
I get the best price at this market	42%
I do not have access to transport to other markets	25%
Poor road conditions to other markets	22%
Other reason	8%

Sample: Smallholder farmers who know where crops and livestock were sold, n=3,797
Multiple responses allowed

FIGURE 69. When you sell your crops and livestock, do you get the current market price?

Yes 37%
No 62%
Don't know 2%

Sample: Smallholder farmers who grow and sell crops, n=3,803

the most competitive prices for what they sell.

In addition to capturing where smallholders in Tanzania bring their goods to sell (Figure 68), the survey also asked to whom they sell their goods. Nearly all sales happen outside of a formal agreement (Figure 71). Transactions are almost exclusively conducted in cash. No other form of payment surpasses 1 percent (Figure 72).

Monetization: Livestock as investments

Investing in livestock also helps smallholder households in Tanzania mitigate risk. More than a quarter of smallholders
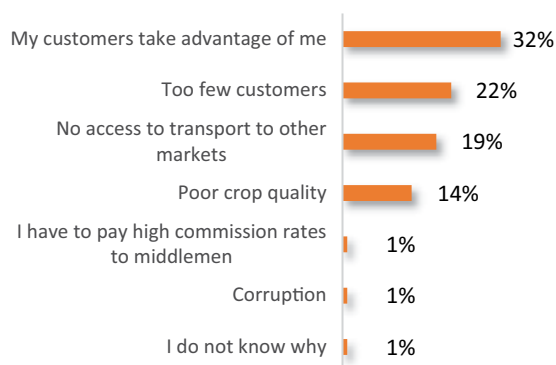
have ever made this type of investment, and a large portion currently have livestock they view as a form of investment (Figure 73).

Land maintenance: Resources

Smallholder farmers in Tanzania view their family's agricultural activities as a household business. They tend to rely primarily on themselves and their family for labor to support their agricultural activities. They turn to family for help first when they need it, and more than a third do not use any labor at all (35 percent) (Figure 74). Of those who do use labor, it is throughout all phases of the harvest (Figure 75). Much smaller

FIGURE 70. Why do you not get the current market price?

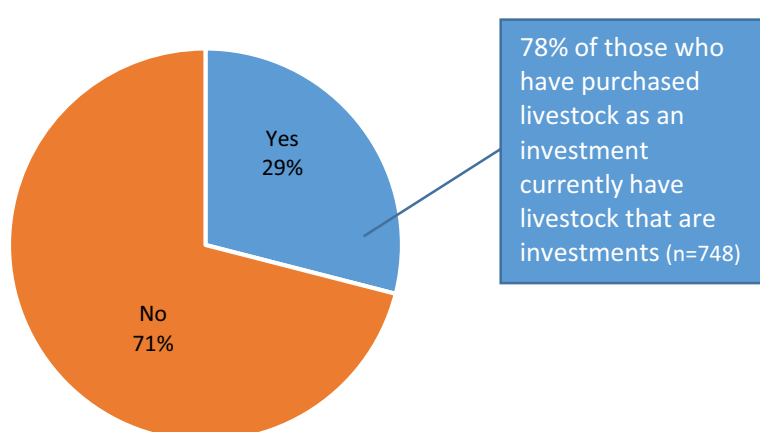|	
My customers take advantage of me	32%
Too few customers	22%
No access to transport to other markets	19%
Poor crop quality	14%
I have to pay high commission rates to middlemen	1%
Corruption	1%
I do not know why	1%

Sample: Smallholder farmers who do not get current market price for crops and livestock sold, n=2,355

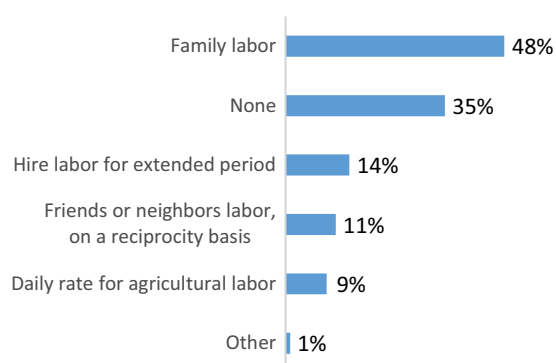**FIGURE 71.** Do you have a contract to sell any of your crops or livestock?

1% 3%
96%

Yes
No
Don't know
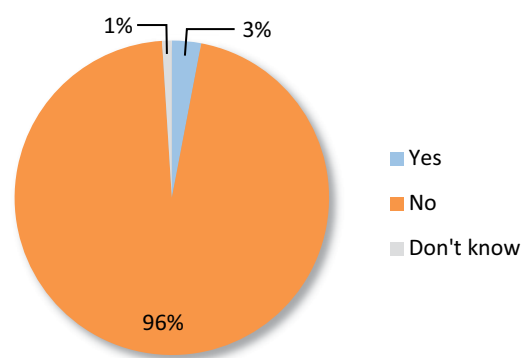
Sample: Smallholder farmers who grow and sell crops, n=3,803

FIGURE 72. How do you usually get paid for what you sell?
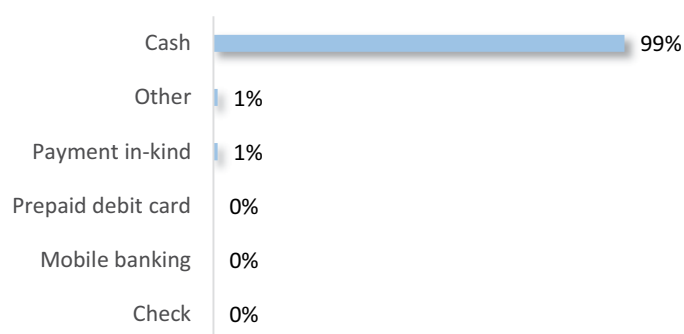
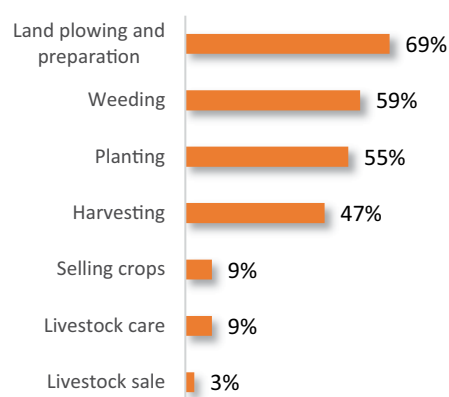|	
Cash	99%
Other	1%
Payment in-kind	1%
Prepaid debit card	0%
Mobile banking	0%
Check	0%

Sample: Smallholder farmers who grow and sell crops, n=3,803
Multiple responses allowed

FIGURE 73. Have you ever purchased livestock as an investment?

Yes 29%

No 71%

78% of those who have purchased livestock as an investment currently have livestock that are investments (n=748)

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

FIGURE 74. For managing the land and livestock, what types of labor do you use?

Family labor	48%
None	35%
Hire labor for extended period	14%
Friends or neighbors labor, on a reciprocity basis	11%
Daily rate for agricultural labor	9%
Other	1%

Sample: Smallholder farmers who participate in household's agricultural activities, n=4,742
Multiple responses allowed

FIGURE 75. What do you use the labor for?

Land plowing and preparation	69%
Weeding	59%
Planting	55%
Harvesting	47%
Selling crops	9%
Livestock care	9%
Livestock sale	3%

Sample: Smallholder farmers who use labor for managing land and livestock n=3,083
Multiple responses allowed

numbers of farmers use labor for selling crops or for the care or sale of livestock.

Knowledge gathering: Information sources

Smallholders in Tanzania most frequently turn to their family, friends, and community for information on agricultural activities, followed by radio messages (Table 12). All other sources are used much less often, with some getting only single digits for frequent use.

Friends and family, including the respondents' spouses, are also the primary sources of financial advice. Nearly 91 percent of smallholders first go to them, and no other source rates above 5 percent (Figure 76). Only a small portion of smallholder farmers in Tanzania (both men and women) turn to any groups or associations related to farm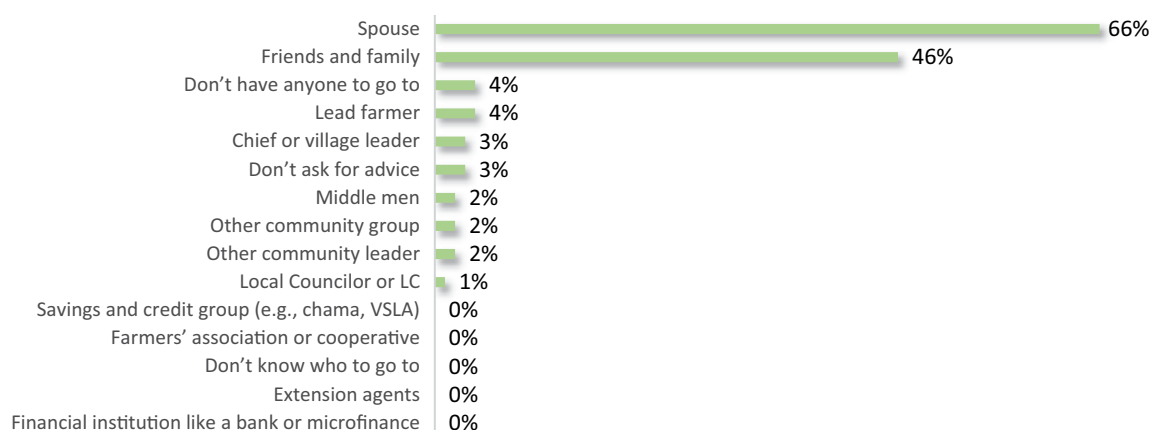ing, savings or credit; the vast majority of smallholders are not members of any of these. The highest percentage, 10 percent, are members of a planting, harvesting, and weeding group (Figure 77). This indicates few natural aggregation points for smallholder households in Tanzania. It also identifies a need for more information channels that reach farmers so they have access to meaningful information, especially as it pertains to risk mitigation.

The concentration on family and friends as a source of financial advice, combined with the very limited exposure to other outside sources, suggests there could be a lack of information channels for bringing in new, current, and relevant news about financial mechanisms into smallholder farming communities. It also suggests that family, friends, and community members could be circulating information from their own experiences but not necessarily from a position of wider expertise.

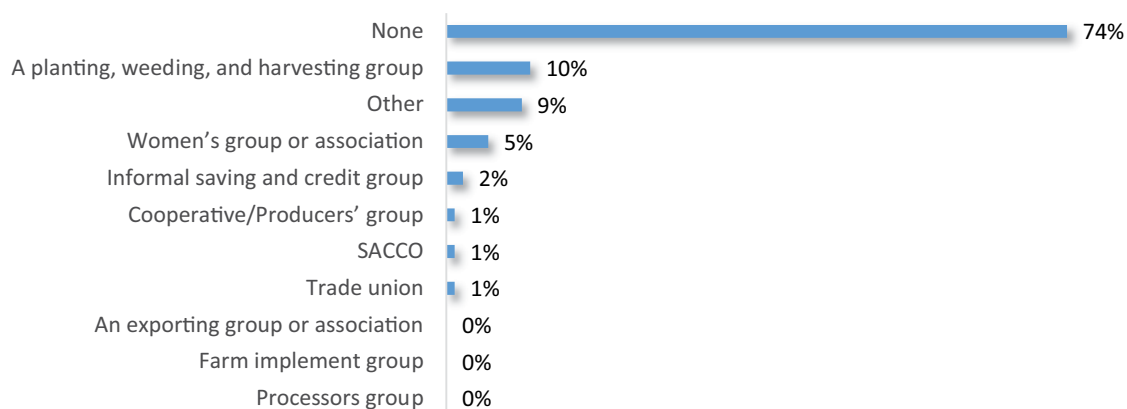**TABLE 12. How often do you use each of the following sources of information for agricultural activities?**

	Daily	Weekly	Monthly	More than monthly	Never
Friends or family members	28%	19%	16%	15%	21%
Community members	16%	17%	15%	14%	37%
Radio	15%	19%	13%	15%	38%
Cell phone/SMS	8%	4%	3%	4%	81%
Intermediaries/middlemen	6%	7%	9%	9%	69%
Television	5%	6%	5%	9%	75%
Merchants	2%	5%	8%	9%	76%
Newspapers/magazines	2%	4%	6%	9%	79%
Government officials	1%	3%	8%	14%	74%
Input suppliers	1%	6%	13%	15%	64%
Internet	1%	1%	1%	2%	95%
Religious leaders	1%	11%	7%	8%	73%
Rural development agents/ NGOs	1%	3%	8%	11%	77%
Government extension workers	0%	1%	6%	11%	81%
School teachers	0%	2%	4%	6%	87%

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638

FIGURE 76. When it comes to financial or income-related advice, who do you regularly talk to?

Spouse	66%
Friends and family	46%
Don't have anyone to go to	4%
Lead farmer	4%
Chief or village leader	3%
Don't ask for advice	3%
Middle men	2%
Other community group	2%
Other community leader	2%
Local Councilor or LC	1%
Savings and credit group (e.g., chama, VSLA)	0%
Farmers' association or cooperative	0%
Don't know who to go to	0%
Extension agents	0%
Financial institution like a bank or microfinance	0%

Sample: Smallholder farmers, n=2,795
Multiple responses allowed

FIGURE 77. Are you a member of any of the following groups or associations?

None	74%
A planting, weeding, and harvesting group	10%
Other	9%
Women's group or association	5%
Informal saving and credit group	2%
Cooperative/Producers' group	1%
SACCO	1%
Trade union	1%
An exporting group or association	0%
Farm implement group	0%
Processors group	0%

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,638
Multiple responses allowed

4. MOBILE PHONE TOOLS

Mobile phones: A critical tool for households and agriculture

Mobile phones are a critical tool for digital financial services, particularly in more rural communities where financial service providers are far away, limiting the ability to make regular transactions. A mobile phone transcends distance, allowing an individual to transact by way of a handset that they possess, and reduces the need for brick-and-mortar financial institutions.

Nationwide, 96 percent of all Tanzanians have used a mobile phone and over three-quarters (77 percent) have their own phone,[23] making Tanzania one of the African countries with higher mobile phone ownership.

Smallholder farmers in Tanzania reflect the national trend. Two-thirds (66 percent) have their own mobile phone, and 82 percent have used a phone. In contrast, 46 percent of smallholder farmers in Uganda[24] and 33 percent in Mozambique have their own phone.[25,26]
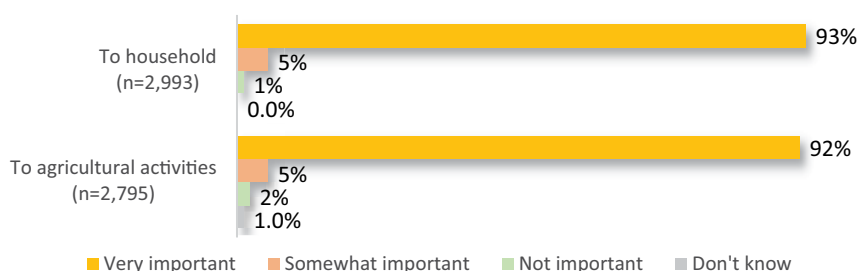
There is widespread, known importance and interest in owning a mobile phone among smallholder farmers in Tanzania, even surpassing the percentage that actually own a phone. Furthermore smallholder farmers in Tanzania recognize the relevance of mobile phones for agricultural activities. In some cases, they recognize it as a tool for helping them mitigate or cope with their biggest perceived risks. In Mozambique and Uganda, there is less of a connection between what a person can potentially do with a mobile phone and their agricultural needs.

Perceived high importance and relevance to farming

The mobile phone itself is considered a very important device: 99 percent of smallholders in Tanzania who have ever used a phone agree with the statement that "A mobile phone is important." That importance transfers almost fully to a phone as a tool for the household (93 percent "very important") or to support agricultural activities (92 percent "very important") (Figure 78). Widespread recognized importance means that smallholder farmers in Tanzania do not need to be convinced that a mobile phone can help their home or their farm. They have already made that connection. Comparatively speaking,

FIGURE 78. Regardless of what you have, how important is it to your household/ agricultural activities to have a mobile phone?

To household (n=2,993): Very important 93%, Somewhat important 5%, Not important 1%, Don't know 0.0%

To agricultural activities (n=2,795): Very important 92%, Somewhat important 5%, Not important 2%, Don't know 1.0%

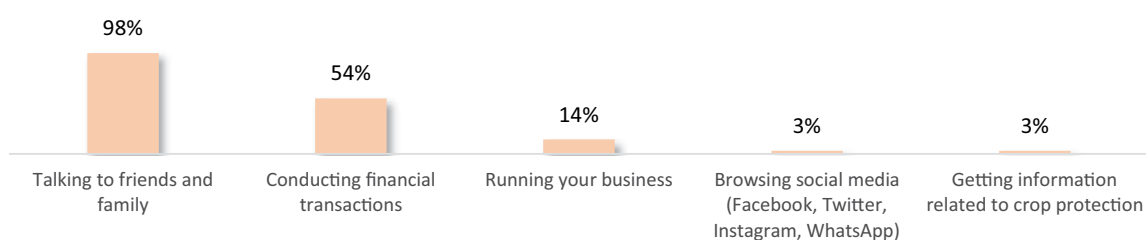■ Very important ■ Somewhat important ■ Not important ■ Don't know

Sample: Smallholder households, n=2,993; Smallholder farmers, n=2,795

23 InterMedia Tanzania 2015 (Wave 3) Financial Inclusion Insights Tracker survey, (N=3,001, 15+), September–October 2015.

24 CGAP National Surveys and Segmentation of Smallholder Households in Uganda, 2015–2016 (http://www.cgap.org/publications/national-survey-and-segmentation-smallholder-households-uganda).

25 CGAP National Surveys and Segmentation of Smallholder Households in Mozambique, 2015–2016 (http://www.cgap.org/publications/national-survey-segmentation-smallholder-households-mozambique).

26 CGAP National Surveys and Segmentation of Smallholder Households capture mobile phone use, and individual ownership as well as household ownership. Comparisons to Financial Inclusion Insights data require using the individual ownership percentages for compatibility.

FIGURE 79. What are the benefits to having your own mobile phone or SIM card?

Talking to friends and family	Conducting financial transactions	Running your business	Browsing social media (Facebook, Twitter, Instagram, WhatsApp)	Getting information related to crop protection
98%	54%	14%	3%	3%

Sample: Smallholder farmers who have ever used a mobile phone, n=2238
Multiple responses allowed

fewer farmers in Uganda and Mozambique make the same connection. In these countries, a mobile phone is primarily still seen as a communications tool.

- In Uganda, 79 percent of smallholder farmers say a mobile phone is very important to the household, and 72 percent say it is very important to agricultural activities.[27]

- In Mozambique, 67 percent of smallholder farmers say a mobile phone it is very important to the household, and 68 percent say it is very important to its agricultural activities.[28]

Smallholder farmers in Tanzania who have used a mobile phone make the connection between the device and its relevance to financial transactions. More than half see the ability to conduct financial transactions as a benefit of a mobile phone (Figure 79). That this connection between a mobile phone and financial transactions is perceived by only 54 percent of smallholder farmers in Tanzania suggests training needs to be provided.

Widespread phone ownership and use

Eighty-two percent of smallholder farmers in Tanzania have used a mobile phone (Figure 80), and of those, 80 percent have their own phone. This means that two-thirds (66 percent) of smallholder farmers in Tanzania have their own phone, slightly lower than the 77 percent of the national population overall.

The most common phone is a basic phone without internet capability (Figure 81). The use of feature phones

FIGURE 80. Have you ever used a mobile phone?

No
18%

Yes
82%
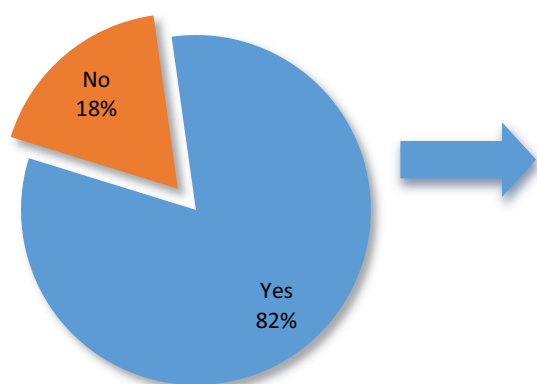
Sample: Smallholder farmers, n=2,795

FIGURE 81. What type of phone have you used?

Basic phone	89%
Feature phone	13%
Smartphone	7%
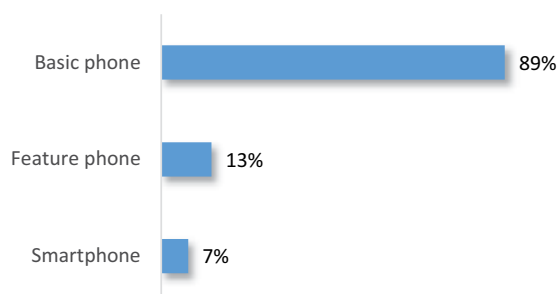
Sample: Smallholder farmers who have ever used a mobile phone, n=2,238

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27 CGAP National Surveys and Segmentation of Smallholder Households in Uganda, 2015–2016 (http://www.cgap.org/publications/national-survey-and-segmentation-smallholder-households-uganda).

28 CGAP National Surveys and Segmentation of Smallholder Households in Mozambique, 2015–2016 (http://www.cgap.org/publications/national-survey-segmentation-smallholder-households-mozambique).

and smartphones is quite low (13 and 7 percent, respectively) among smallholders in Tanzania.

There can be multiple handsets in smallholder households, suggesting that, with exposure, there is recognized utility in the device (Figure 82).

Phone ownership is inclusive of both genders and spans regions, with only a small gap. Eighty-four percent of men and 77 percent of women have their own mobile phones. Similarly, urban farmers are only 10 points more likely

to have a cell phone than rural farmers (87 percent vs. 77 percent).[29]

Those with a mobile phone typically use it to make calls or send texts (Figure 83). Close to half (47 percent) have made a financial transaction with their phone. These types of transactions are not as frequent as calls and texts. Most financial transactions have been made in the past 30 days or more, as opposed to the past day or week.
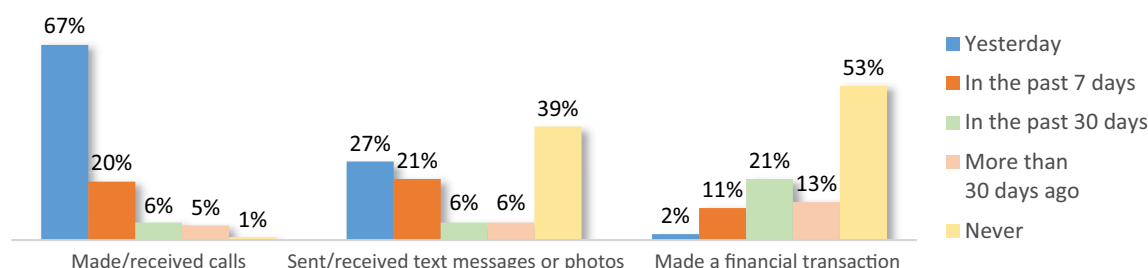
Men and women are equally as likely to have made financial transactions

**FIGURE 82.** Number of mobile phones owned by household members?
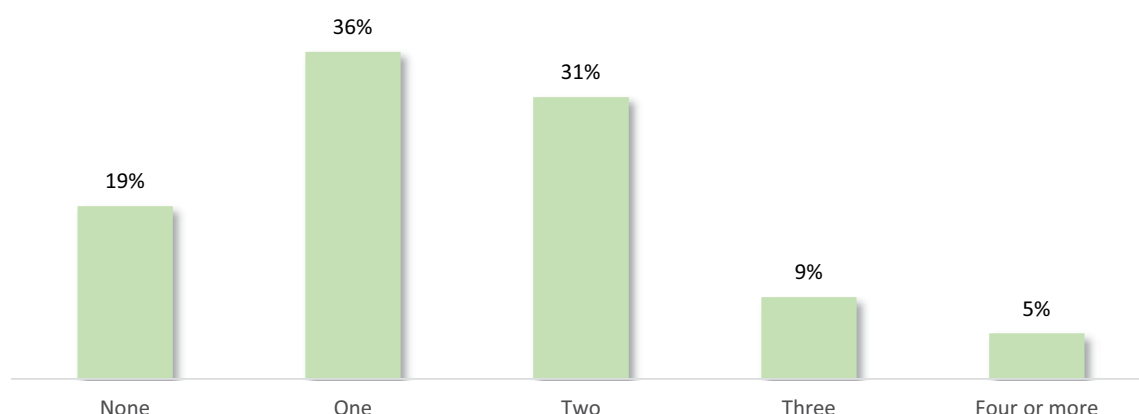
Sample: Smallholder farmers, n=2,993

FIGURE 83. Apart from today, when was the last time you performed the following activities on the mobile phone you use?
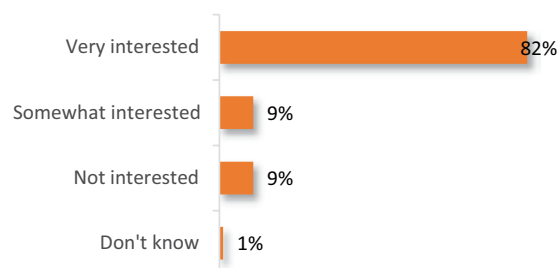

Sample: Smallholder farmers who have ever used a mobile phone or borrow or pay to use phone, n=2,150

29 Urban/rural distinction information: According to the Tanzania National Human Settlements Policy 2000, rural areas comprise hamlets and villages (human settlements with fewer than 10,000 people) and urban areas comprise minor towns, towns, municipals, and cities (human settlements with 10,000 or more people).

FIGURE 84. Have you ever used a mobile phone?
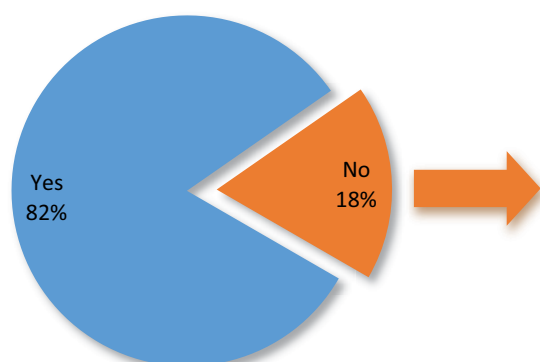
Sample: Smallholder farmers, n=2,795

FIGURE 85. How interested would you be in using a mobile phone?

Sample: Smallholder farmers who have never used a mobile phone, n=557

with a mobile phone (46 percent and 47 percent, respectively) and with the same frequency. This suggests that gender is not a barrier to accessing a financial account via a mobile phone for those smallholders who currently have a handset.

Interest in phone ownership

Overall, only 18 percent of smallholders in Tanzania have not used a mobile phone. The majority of that group, 82 percent, want to use one. An additional 11 percent are somewhat interested using a mobile device. Just a few are not interested at all (9 percent) (Figures 84 and 85).

Expanding mobile phone ownership to include more smallholders in Tanzania has less to do with building value, as the utility of a phone is clear, and more to do with minimizing the costs associated with phone ownership and use. The main reason cited by smallholders for not having a mobile phone is cost. Almost two-thirds (65 percent) feel they do not have the funds to purchase a phone (Table 13). There is no other barrier that is as pervasive as the perceived cost of obtaining a handset.

Close to one-third of those who do not currently have a phone think they are very likely to purchase one in the future (Figure 86). These cost-related barriers

TABLE 13. What is the main reason you do not have a mobile phone?

I don't have money to buy phone	65%
I don't have money to pay for airtime	2%
I worry that the phone will get stolen	2%
I am not allowed to use a phone by my spouse or family	2%
I don't have a need to use a phone	1%
I don't know how to use a phone	1%
There is no network where I live/work	0%
There is no place to charge a phone	0%
No specific reason	6%
Other	21%

Sample: Smallholder farmers who currently do not own a phone but have used a phone, n=754

FIGURE 86. How likely are you to purchase a mobile phone in the next twelve months?

Very likely	33%
Somewhat likely	41%
Not likely	26%
Don't know	0%
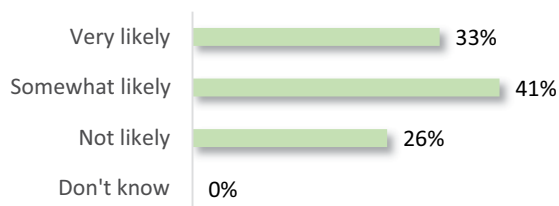
Sample: Smallholder farmers who currently do not own a phone but have used a phone, n=431

suggest that this purchase is a lot more deliberate and requires planning or saving to obtain the device.
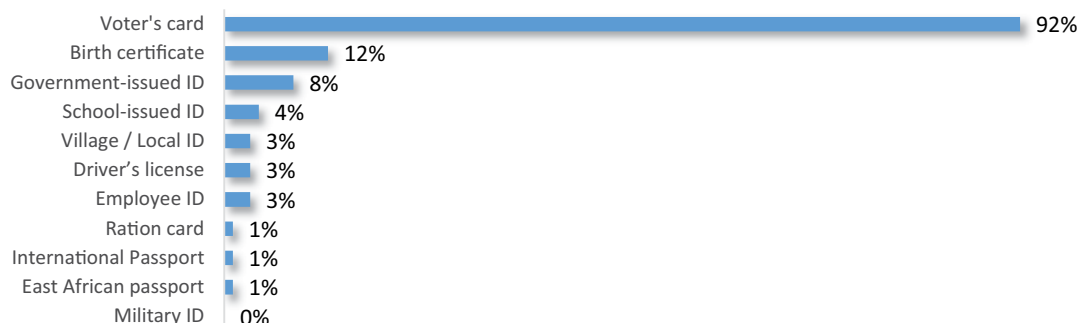
Smallholders have the necessary identification to open an account

A voter's card is the most popular type of official identification among smallholder farmers in Tanzania, and this is consistent for men and women (92 percent each). Voter cards suffice as documentation for obtaining a mobile money account, as do a driver's license, passport, school identification, and national identification.

A birth certificate and government-issued identification (the most newly introduced form of identification in Tanzania) are in the second tier at 12 percent and 8 percent, respectively (Figure 87). Across all types of identification tested, there was no gender disparity on the possession of identification.

Most of these forms of identification are also less prevalent in rural areas. Most notably, only 3 percent of rural smallholders have government-issued identification, compared to 18 percent of urban smallholders (8 percent overall).

FIGURE 87. Do you have any of the following types of an official identification?

Voter's card	92%
Birth certificate	12%
Government-issued ID	8%
School-issued ID	4%
Village / Local ID	3%
Driver's license	3%
Employee ID	3%
Ration card	1%
International Passport	1%
East African passport	1%
Military ID	0%

Sample: Smallholder farmers, n=5,034
Multiple responses allowed

5. FINANCIAL INCLUSION AMONG SMALLHOLDER HOUSEHOLDS IN TANZANIA

Financial inclusion: Benefits of formal financial institutions known to smallholders but use is minimal

Financial inclusion in Tanzania has historically been driven by mobile money services. The 2015 Financial Inclusion Insights study in Tanzania shows that the access to mobile money services and their registered and active use saw a steep increase after a slight drop in 2014. Bank use, in contrast, dropped sharply in 2015.

- 62 percent of adults in Tanzania now have a registered financial account (vs. 50 percent in 2014).

- 61 percent of adults now have a registered mobile money account, up from 38 percent in 2014 and 44 percent in 2013.

- 53 percent of adults are now active mobile money account users, up from 34 percent in 2014 and 38 percent in 2013.

- 8 percent had access to a full-service bank account in 2015 compared with 24 percent in 2014, while 5 percent actively used bank accounts, a drop from 16 percent in 2014. (Directly comparable data from 2013 are unavailable.)

Bank account access and ownership in Tanzania fell between 2013 and 2015, most notably among rural and lower-income groups. This decline occurred as mobile money use increased among the same consumer groups.
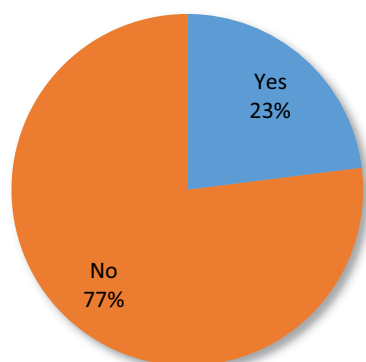
- Bank account access fell most sharply among the rural population (5 percent in 2015 from 24 percent in 2014) and among those below the poverty line (6 percent in 2015 from 24 percent in 2014).

- Number of bank account holders also fell most sharply among the rural population (5 percent in 2015 from 19 percent in 2014) and among those below the poverty line (6 percent in 2015 from 19 percent in 2014).

- Women also showed a decline in bank account access in 2015, dropping to 6 percent from 21 percent in 2014. This group also showed a decline in bank account ownership in 2015, dropping to 6 percent from 16 percent in 2014.

Smallholder farmers in Tanzania are showing similar trends, though the use of digital financial services is not as widespread, making them less financially included. Only 10 percent of smallholders in Tanzania personally have a bank account registered in their own name, characterizing them as "financially included," as defined in the nationally representative Financial Inclusion Insights survey of Tanzanian adults. Of these farmers holding bank accounts, only 8 percent are women while 11 percent are men. Compared to the total population, smallholders are lagging behind in financial inclusion.

Over three-quarters of smallholder farmers in Tanzania have never been inside a bank (Figure 88). Most farmers acknowledge the ability to save money (69 percent) and saving money in a secure location (51 percent) as the benefits of having an account with a formal financial institution; fewer mention ability to get loan (16 percent) as a benefit (Figure 89). Access to loans would further improve some smallholder farmer operations, and more awareness about the benefits of having a bank account is essential in Tanzania.
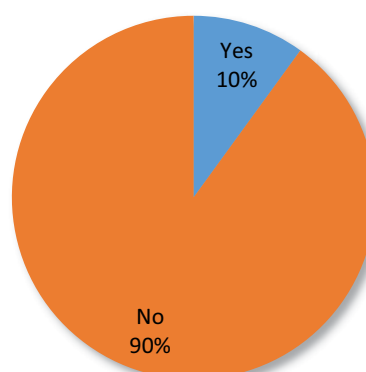
Only 10 percent of smallholder farmers have a bank account registered in their
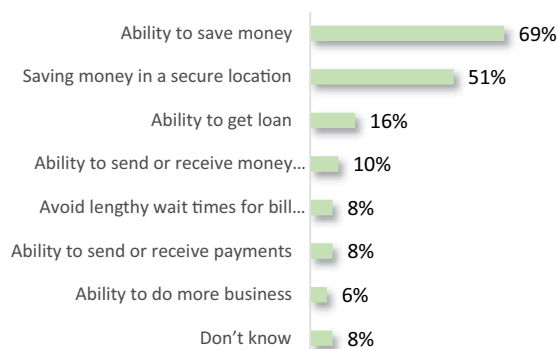
FIGURE 88. Have you ever been inside a bank?

Yes
23%

No
77%

Sample: Smallholder farmers, n=2,795

FIGURE 89. What are the benefits to having a account with a formal financial institution?

Ability to save money	69%
Saving money in a secure location	51%
Ability to get loan	16%
Ability to send or receive money…	10%
Avoid lengthy wait times for bill…	8%
Ability to send or receive payments	8%
Ability to do more business	6%
Don't know	8%

Sample: Smallholder farmers, n=2,795
Multiple responses allowed

name (Figure 90). Full-service banks can offer a range of services, including savings, money transfers, insurance, investments, and even sometimes loans. However, nearly half of smallholder farmers do not have or use accounts at full-service institutions because they have found that the institution did not offer loans.

Among smallholders who do not have a bank account, almost three-quarters have a perception that they lack means ("I do not have money"). Lack of interest ("I never thought about using a bank"), unfamiliarity ("I do not know how to
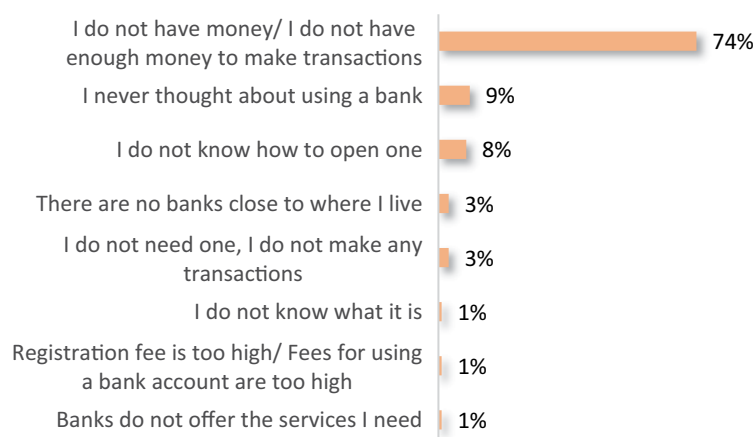
open an account"), and barriers to access ("no banks close to where I live") are barriers for less than 10 percent of smallholders in Tanzania (Figure 91).

Smallholder farmers with a bank account tend to use their account monthly or infrequently. Only 15 percent had used their account in the immediate day or the seven days prior to taking part in the survey (Figure 92). There are two primary ways that smallholder farmers in Tanzania use bank accounts: over the counter at the branch of a financial institution or through an automated teller machine (ATM) (Figure 93). When asked about their preferred method, smallholder farmers said they prefer using an ATM (58 percent) and making transactions over the counter at a bank branch (35 percent) (Figure 94).

Seventy percent of smallholder farmers who have ever used a full-service bank do not use their account for business purposes (Figure 95). A small percentage use the account to make investments.

Gender observations

The differences between male and female smallholders in Tanzania and their use of financial services are minimal.

FIGURE 90. Do you personally have a bank account that is registered in your name?

Yes
10%

No
90%

Sample: Smallholder farmers, n=2,795

FIGURE 91. **What is the main reason you do not have a bank account?**

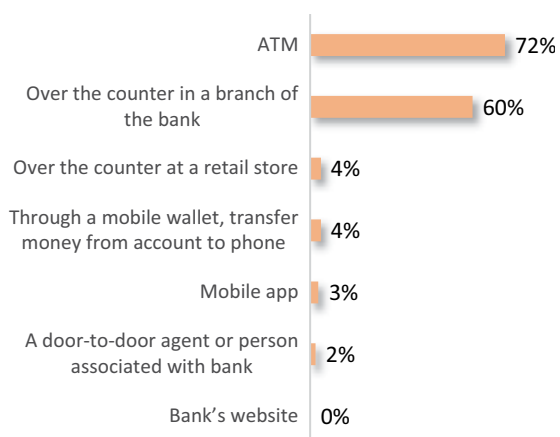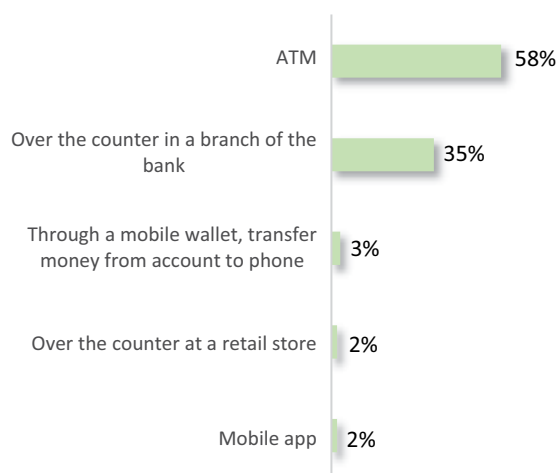| Reason	%
I do not have money/ I do not have enough money to make transactions	74%
I never thought about using a bank	9%
I do not know how to open one	8%
There are no banks close to where I live	3%
I do not need one, I do not make any transactions	3%
I do not know what it is	1%
Registration fee is too high/ Fees for using a bank account are too high	1%
Banks do not offer the services I need	1%

Sample: Smallholder farmers who don't have a bank account, n=2,505

FIGURE 92. **Apart from today, when was the last time you made a deposit or withdrawal using a bank account or used a bank account for any other financial activity?**
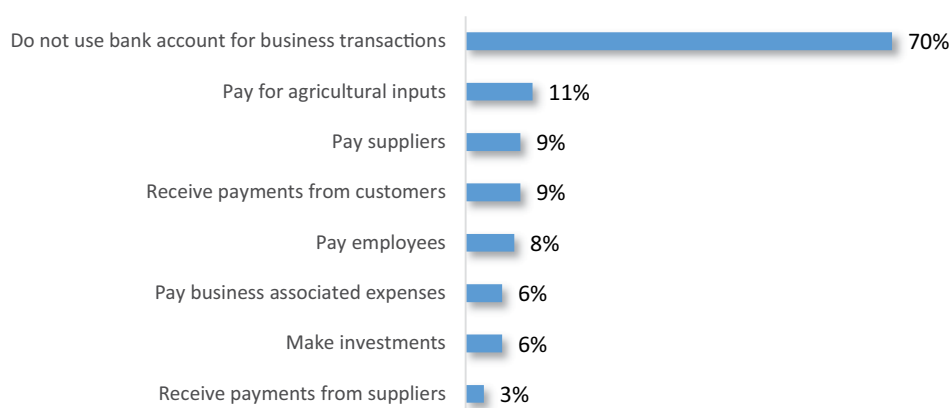
Yesterday	Past 7 days	Past 30 days	Past 90 days	More than 90 days ago	Never
4%	11%	35%	19%	29%	2%
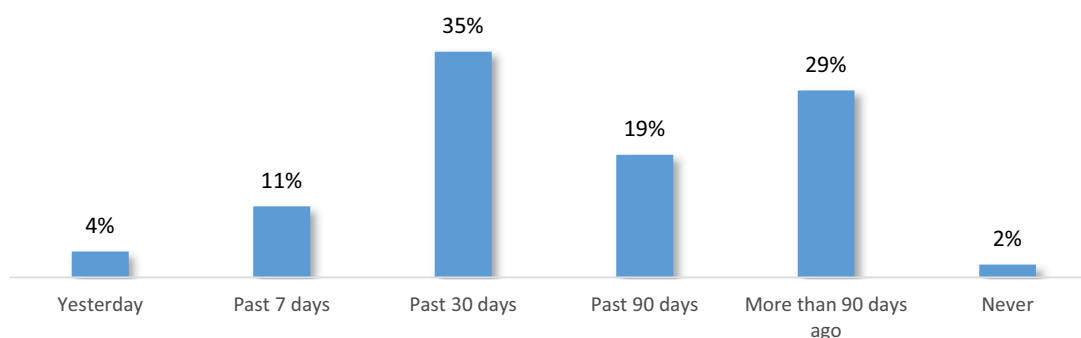
Sample: Smallholder farmers who have ever used a full-service bank for any financial activity

FIGURE 93. **When you use a bank account for any financial activity, do you use any of the following?**

Method	%
ATM	72%
Over the counter in a branch of the bank	60%
Over the counter at a retail store	4%
Through a mobile wallet, transfer money from account to phone	4%
Mobile app	3%
A door-to-door agent or person associated with bank	2%
Bank's website	0%

Sample: Smallholder farmers who have access to a full-service bank and have used it for any financial activity, n=260
Multiple responses allowed

FIGURE 94. **Of the different ways you use a bank for financial activities, which is your preferred way?**

Method	%
ATM	58%
Over the counter in a branch of the bank	35%
Through a mobile wallet, transfer money from account to phone	3%
Over the counter at a retail store	2%
Mobile app	2%

Sample: Smallholder farmers who have access to a full-service bank and have used it for any financial activity, n=260

FIGURE 95. Do you use a bank account for the following payments or purchases?

Do not use bank account for business transactions	70%
Pay for agricultural inputs	11%
Pay suppliers	9%
Receive payments from customers	9%
Pay employees	8%
Pay business associated expenses	6%
Make investments	6%
Receive payments from suppliers	3%

Sample: Smallholder farmers who have access to a full-service bank and have used it for any financial activity, n=260

Access to bank service either by owning an account or use another's account is at 14 percent for men and 11 percent for women, while access to mobile money service among smallholders is at 58 percent for men and 55 percent for women. Access to nonbank financial institutions is at 8 percent for male and 10 percent for female smallholders in Tanzania. Smallholders who hold bank accounts are at 11 percent for men and 8 percent for women, while those holding mobile money accounts are at 52 percent for men and 45 percent for women.

Farmers in Tanzania who have ever used a mobile phone comprise 85 percent for men and 78 percent for women, while those most likely to purchase a mobile phone in the next 12 months are 38 percent for men and 29 percent for women. Among smallholders in Tanzania who have an active, working SIM card registered in their name, 85 percent are men and 81 percent are women.

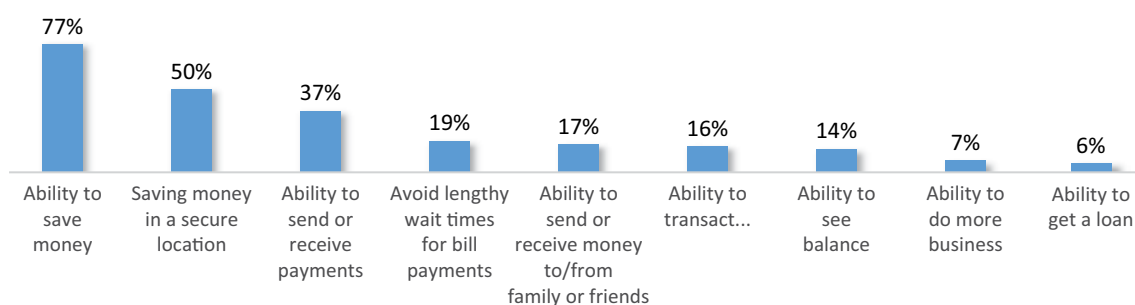### Financial inclusion: High awareness of mobile money

Three-quarters of the smallholder farmers in Tanzania say they have heard of mobile money (Figure 96), and the majority of them (97 percent) see benefits to having a mobile money account (Figure 97). They see a range of benefits from mobile money services, including the ability to do person-to-person transfers (sending and receiving remittances) as well as the ability to save money (Figure 98).

FIGURE 96. Have you ever heard of something called mobile money?

No
24%

Yes
76%
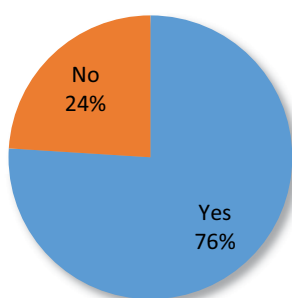
Sample: Smallholder farmers, n=2,795

FIGURE 97. Are there benefits to having a mobile money account?

No
3%

Yes
97%
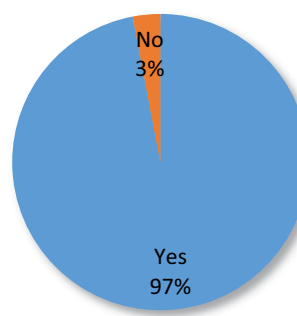
Sample: Smallholder farmers who are aware of mobile money concept, n=2,095)

FIGURE 98. What are the benefits to having a mobile money account?

Ability to save money	Saving money in a secure location	Ability to send or receive payments	Avoid lengthy wait times for bill payments	Ability to send or receive money to/from family or friends	Ability to transact...	Ability to see balance	Ability to do more business	Ability to get a loan
77%	50%	37%	19%	17%	16%	14%	7%	6%

Sample: Smallholder farmers who believe there are benefits to having a mobile money account, n=2,022
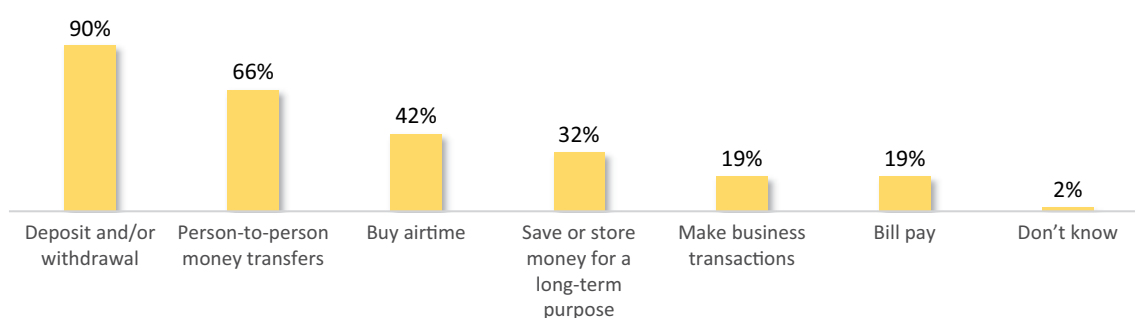Multiple responses allowed

Half of those who perceive benefits to having an account view mobile money as a secure location for saving money. Conducting business via a mobile money account does not seem to register highly as a benefit, as it was one of the lowest-scoring applications for this financial mechanism.

Male and female smallholders in Tanzania are equally as likely to have saved money with a bank or other formal financial institution (men, 9 percent, and women, 8 percent) in the past 12 months. Most of these farmers are in urban areas (16 percent) compared to those in rural areas (4 percent). The older farmers (25 years and older) also show a higher percentage for saving money in a financial institution compared to the younger farmers (younger than 25 years).
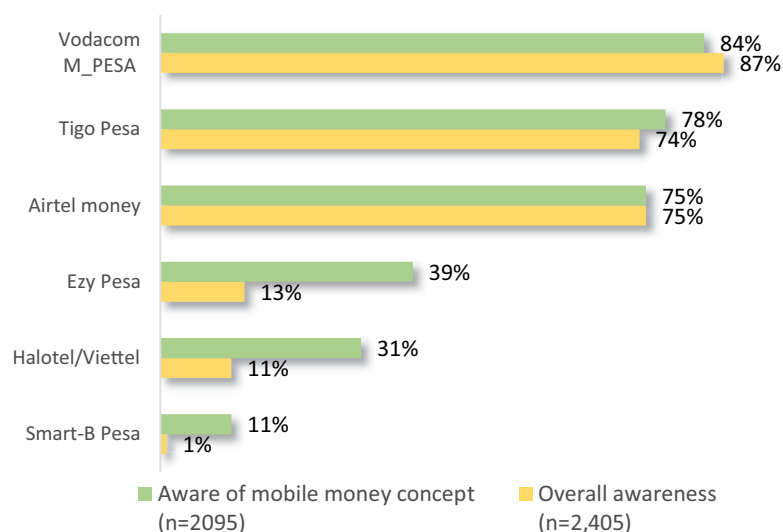
Smallholder farmers in Tanzania commonly use mobile money services for basic financial activities, with deposit and/or withdrawal (i.e., cash in, cash out [CICO]) at 90 percent and person-to-person money transfers at 66 percent.

Advanced use of mobile money is still at a lower rate of adoption with smallholders purchasing airtime at 42 percent and saving money for a long-term purpose at 32 percent (Figure 99).

Overall awareness of mobile money providers is high for three providers: Vodacom, Tigo, and Airtel. Eighty-four percent named Vodacom M-Pesa unprompted, 78 percent mentioned Tigo Pesa, while 75 percent mentioned Airtel Money. Ezy Pesa, Halotel, and Smart-B Pesa showed lower awareness scores comparatively (Figure 100).

FIGURE 99. To the best of your knowledge, for what types of financial activities can you use mobile money?

Deposit and/or withdrawal	Person-to-person money transfers	Buy airtime	Save or store money for a long-term purpose	Make business transactions	Bill pay	Don't know
90%	66%	42%	32%	19%	19%	2%

Sample: Smallholder farmers who are aware of mobile money concept, n=2,095
Multiple responses allowed

FIGURE 100. Please tell me the names of any mobile money providers that you are aware of?

By overall awareness and awareness of mobile money concept
Sample: Smallholder farmers, n=2,771
Multiple responses allowed

Use of mobile phones for financial transactions among smallholders in Tanzania is largely monthly. Close to three in 10 (26 percent) have made a financial transaction in the past 30 days. Most of the smallholders transacting monthly are men in rural areas (Figure 101).[30]

Financial Inclusion: Use of nonbank or informal financial institutions is not widespread among smallholder farmers

Smallholder farmers in Tanzania are not embracing the options available with nonbank financial institutions. The highest

FIGURE 101. When was the last time you made a financial transaction such as send/receive money, pay debt, or banking transaction on your mobile phone
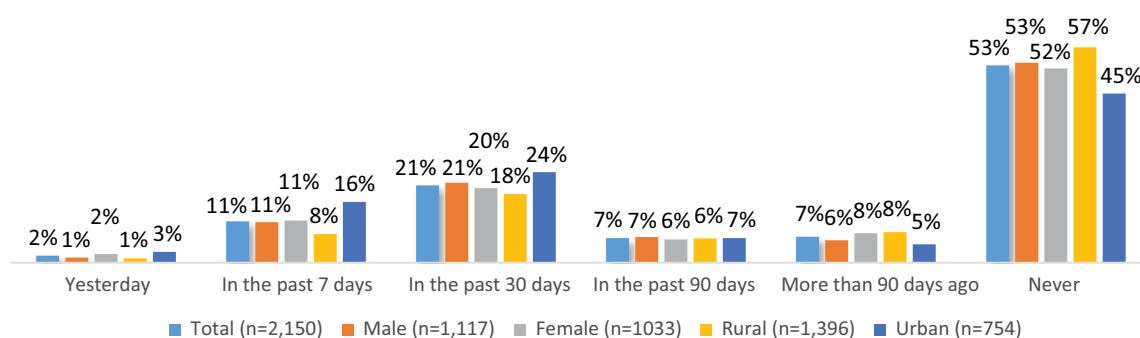
Sample: Smallholder farmers who currently own phone or can borrow/pay to use phone in each category

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30 Urban/rural distinction information: According to the Tanzania National Human Settlements Policy 2000, rural areas comprise hamlets and villages (human settlements with fewer than 10,000 people) and urban areas comprise minor towns, towns, municipals, and cities (human settlements with 10,000 or more people).
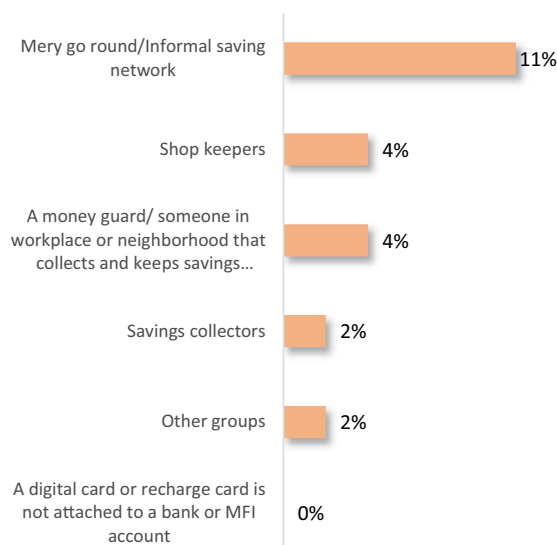
FIGURE 102. Have you ever used any of the following? Do you have an account/membership in your name with any of the following?

Sample: Smallholder farmers, n=2,795

FIGURE 103. Have you ever used any of the following?
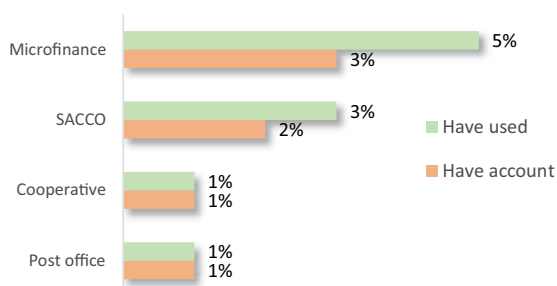
Sample: Smallholder farmers, n=2,795

use of nonbank financial service providers is among microfinance institutions (5 percent), though account ownership is even lower at 3 percent (Figure 102).

Informal financial service providers are used at a slightly higher rate than nonbank financial institutions, with over one-tenth of smallholders saying they have used a merry-go-round/informal saving network (Figure 103). Smallholders are also looking to shopkeepers and money guards or someone in the workplace or neighborhood that collects and keeps saving deposits for informal financial services.

The smallholder farmers who use merry-go-rounds/informal saving networks,

shopkeepers, or money guards do so on a somewhat regular basis. The majority (almost nine in 10) had used shopkeepers in the prior week, half used an informal saving network, and about a third used a money guard in the same time period (Figure 104).

The main reason smallholders in Tanzania do not have membership with any informal financial service institutions is mostly financial. Close to two-thirds report that they do not have any money for

FIGURE 104. Apart from today when was the last time you used these services or service providers for any financial activity?

Sample: Smallholder farmers

59
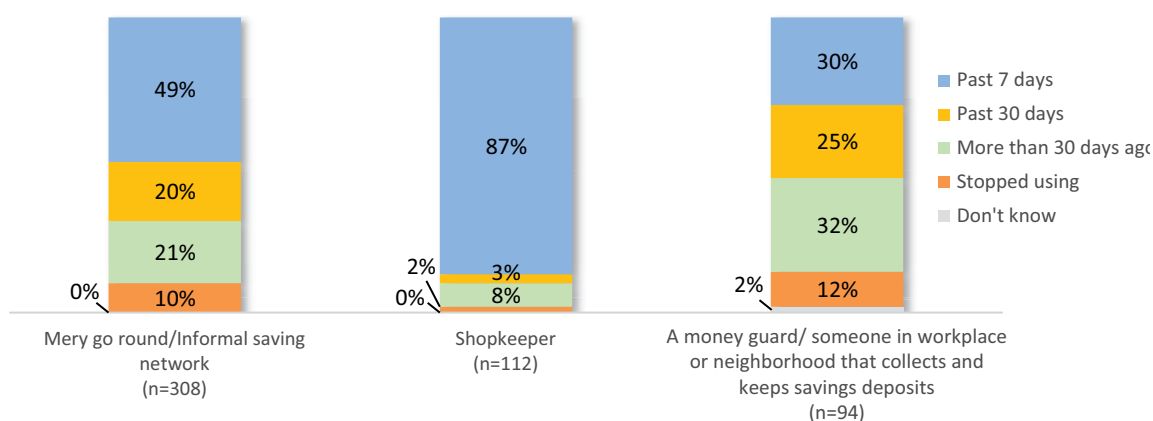
FIGURE 105. Why do you not have a membership with any of these groups?
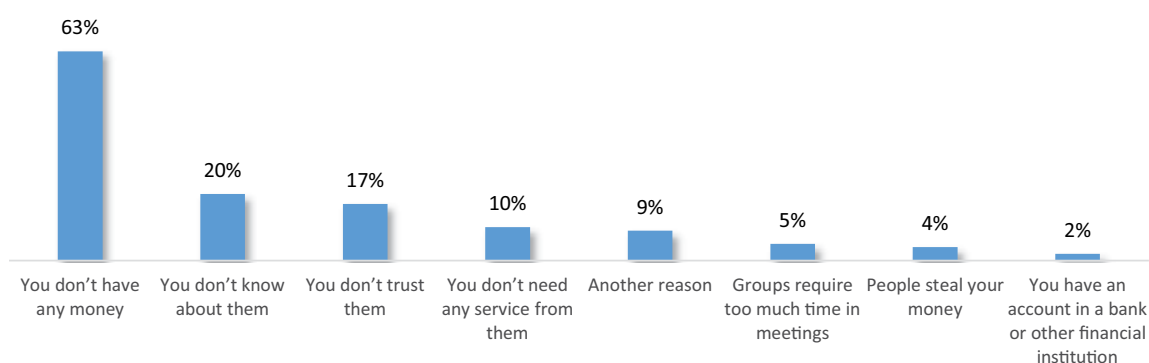
Sample: Smallholder farmers who do not have any membership with an informal financial service provider, n=2,276
Multiple responses allowed

a membership. One-fifth do not know about them (Figure 105).

There is traction for financial planning products

Saving plans and investment plans are common among smallholders in Tanzania; about two–fifths have them. Living wills and insurance are also somewhat common among smallholders (Figure 106).

Even though only 18 percent of smallholders in Tanzania have insurance, the majority believe their households need insurance. Medical insurance is clearly

the most desired, trailed by agricultural and life insurance (Figure 107).

High trust in banks and mobile money highlights an opportunity for smallholders

Roughly half of smallholders in Tanzania fully trust banks, bank agents, mobile money providers, and mobile money agents. This is much higher than their trust in nonbank and informal financial institutions (Figure 108). This solid level of trust is a strong foundation that can be built on to financially include more smallholder farmers.

FIGURE 106. Do you have any of the following?
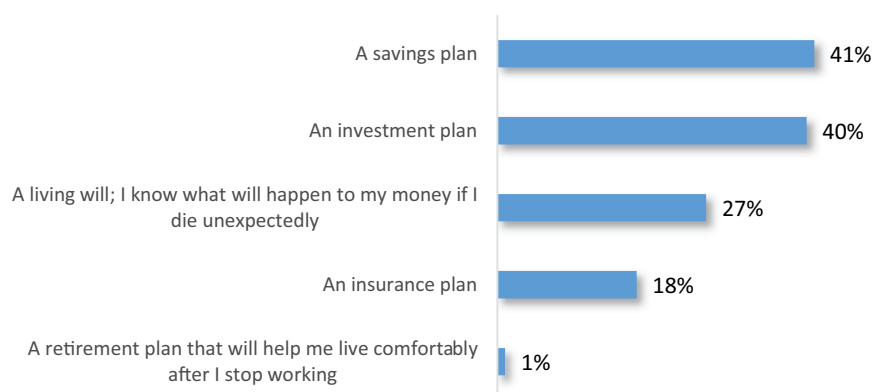
Sample: Smallholder farmers, n=2,795

FIGURE 107. Which of the following types of insurance do you feel your household needs the most?
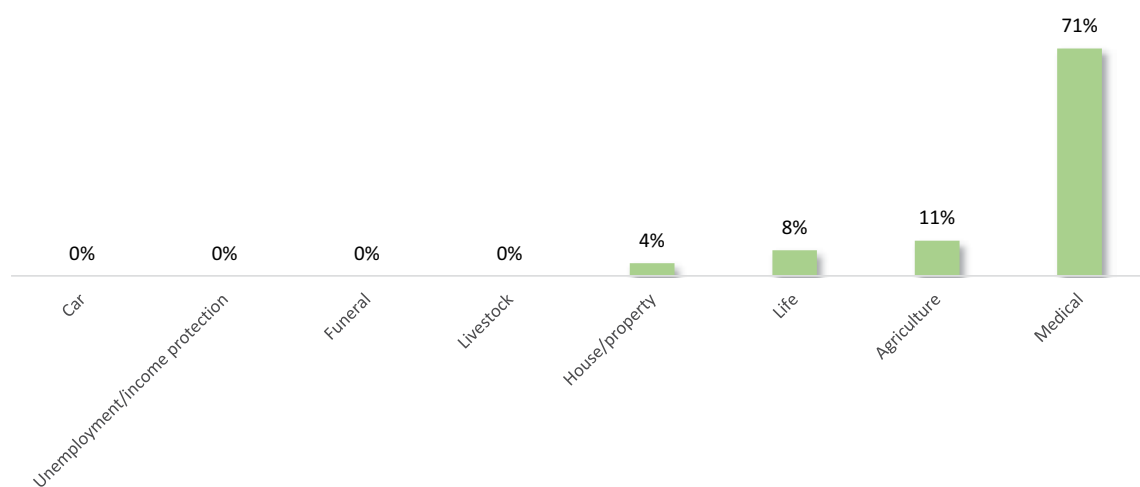
Sample: Smallholder farmers, n=2,795

FIGURE 108. How much do you trust each of the following as financial sources?
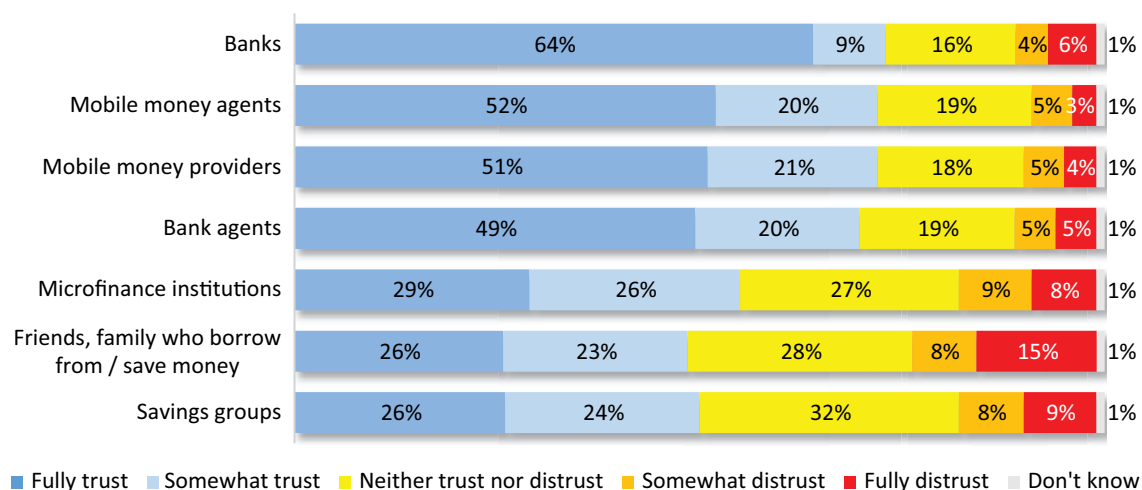
Sample: Smallholder farmers, n=2,795

6. TOOLS AND FINANCIAL INCLUSION: SEGMENTATION— TANZANIA'S FIVE UNIQUE SMALLHOLDER FARMING HOUSEHOLD SEGMENTS

The segmentation technique

A collection of demographic, psychographic, behavioral, and attitudinal dimensions can often characterize unique groups within an overall population, more so than any single factor or variable. The CGAP National Survey and Segmentation of Smallholder Households in Tanzania anticipated the complexity of smallholder households, expecting there would be unique personas within the broader population.[31] To that end, it sought to explore the key dimensions that underlie different groups of smallholder households using a segmentation analysis.

Segmentation is a form of statistical multivariate analysis that groups people based on their psychographics,[32] attitudes, expectations, or behaviors with respect to their own household dynamics. The groups, also referred to as clusters, that emerge from the analysis ultimately allow us to deepen our understanding of how various characteristics drive financial inclusion. Classifying smallholder households by key attitudinal and behavioral characteristics provided a better understanding of the population and the challenges on the path to financial inclusion.

The segmentation process uncovered various underlying structures that delineated groups of people. This clustering technique looked for homogenous groups that exist within the population sample examined. It did not create these groups. Rather the technique identified groups through analysis of the responses given by each respondent to various questions, examining how respondents in the sample are similar to each other and how they differ from one another.

Truly effective segmentation analyses are rooted in dimensions that lead to a common, desired, and shared goal for the population overall. This allows a segmentation analysis to be more germane and better targeted, therefore, more useful to relevant parties. In the case of smallholder households in Tanzania, the common, shared goal is building strategies that lead to more useful, reliable, trusted, consumer-focused financial services, formal or informal, that are connected to agriculture and that also meet the wide range of other household needs. This segmentation therefore is rooted in defining elements that correlate with greater formal financial inclusion.

Looking beyond the initial analysis, this segmentation can be repeated in follow-up or tangential studies, where the discerning indicators that define the unique segments are included to create the same groups within the target audience. For instance, an organization bringing a financial mechanism to market can use these segments to do the following:

- Identify which segment poses the most potential for the organization and its intentions.

- Customize type of mechanism based on the needs of a desired segment.

- Fine-tune application and go-to market strategy based on market readiness of the segment.

31 Personas as profiles that create reliable and realistic representations of key audience segments for reference.

32 Psychographics refer to behaviors, interests, activities. and acquisitions of a population, together with demographics and other attitudinal factors.

- Optimize market positioning of the mechanism to capture a specific segment of the population.

- Level-set expectations for uptake and use based on the size of the desired segment.

- Track impact of the mechanism within the most relevant and intended segment.

Phases of the Smallholder Household[33] Segmentation

Predicting corollary values

The first phase of the segmentation analysis involved a machine learning algorithm called Random Forest[34] that assessed the individual factors that most correlate with formal financial account ownership (mobile money, bank, NBFI) (Annex 2). The six most predictable and discerning measures of financial account ownership are as follows:

1. Educational attainment of the head of household

2. Socioeconomic status or PPI of head of household

3. Access to emergency funds

4. Mobile phone ownership

5. Attitude toward the future

6. Encountering unexpected life and farming events

These measures emerged as the most discerning after extensive tests and modeling, which considered more than 30 demographic, psychographic, and farmographic (e.g., size of land, type of

crops, value chains, inputs used, cash crops, consumption crops) variables collected by the surveys. The model showed that listed variables (Figure 109) correlated the most with the tendency to have a formal financial account. None of the agricultural or land-specific questions correlated with formal financial account ownership (mobile money, bank, NBFI) with enough relative strength to be considered part of the model.

At first, this seemed perplexing, knowing that agriculture is central to smallholder households. Further exploration suggested that the relative homogeneity of smallholder farming activities in Tanzania was in fact manifesting itself in the modeling. For instance, the number of crops or tendency to sell versus consume them are not the factors that drive smallholders to have a financial account. In an ecosystem where sales relationships exist with formal contracts, payments were digital, or loans were more formal, you might see some more direct correlations. Here, correlations manifest themselves through socioeconomic elements including education, PPI, access to funds, phone ownership, and other experiences or attitudes.

Forming segments

The second phase of the segmentation analysis was to explore the degree to which these factors together explained the variation within the population and formed meaningful cleavages within it, carving out distinct personas. Individually, these measures are the strongest predictors of financial inclusion and are useful in helping determine the likelihood of becoming part of the

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33 The segmentation analysis is based on a three-part survey that gathered information from all aspects of the smallholder farmer—the household, all household members who contribute to the income of the household, and a randomly selected household member. The term "smallholder household" is used throughout this report to refer to the sampled population, which draws information from the head of household or a randomly selected household member.

34 See Annex 2 and http://www.statsoft.com/Textbook/Random-Forest for documentation on the Random Forest Algorithm.

FIGURE 109. Tanzanian Smallholder Farmers

Education
(n=2,993)

23% none | 65% up to primary | 11%, Secondary or more

Socio-Economic Status (PPI)
(n=2,993)

$2.50+, 15%
Below $2.50, 85%

Access to emergency funds
(n=2,795)

21% — Very possible
29% — Somewhat
49% — Not possible
0% — Unsure

Mobile Phone Ownership
(n=2,993)

81%
have at least one mobile phone in their household

Attitude: The Future Will Take Care of Itself
(n=2,795)

Agree: **33%**
Disagree: **67%**

Experienced an unexpected event
(n=2,795)

None 8%
At least one 92%

(Sample: All Smallholder Farmers)

financial fold. Compiled together in a segmentation model, these factors cause meaningful divisions that enable greater understanding of the population and can facilitate targeted strategies for moving the group to the end goal.

Using the most predictive variables identified in the Random Forest[35] exercise, the clustering analysis delineated five unique segments of smallholder households:

1. Farming for sustenance

2. Battling the elements

3. Diversified and pragmatic

4. Options for growth

5. Strategic agricultural entrepreneurship

Since the sample was randomly selected and represents the population of smallholder farmers and households across Tanzania, we can reasonably assert the five segments represent natural groups

in the population as a whole. We also expect that similar groups exist in smallholder farming populations outside of Tanzania, though the description and the incidence of each reported herein is unique to Tanzania.

By segmentation variables only, the five clusters or segments of smallholder households in Tanzania are as follows:

1. **Farming for sustenance.** The "farming for sustenance" segment represents a more entrenched, economically vulnerable smallholder household in Tanzania. The segment indexes low on the Progress out of Poverty Index, has been farming for many years, and is the highest in wanting their children to continue farming. This segment has the lowest household income of all five, and truly does live off of what the farm produces, consuming, selling, or trading the fruits of their agricultural labor. This is a highly vulnerable group, and

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35 See Annex 2 and http://www.statsoft.com/Textbook/Random-Forest for documentation on the Random Forest Algorithm.

FIGURE 110. Tanzania Smallholder Household Segments

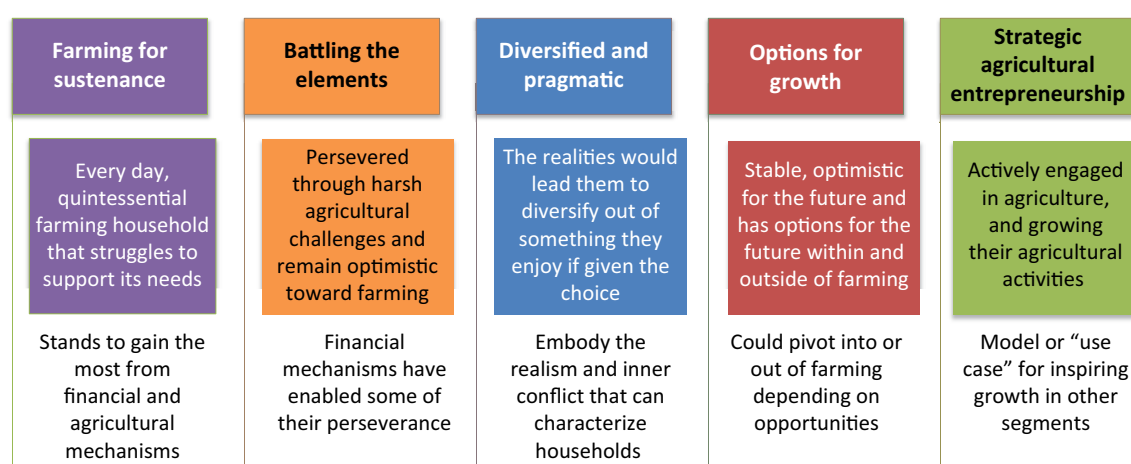| Farming for sustenance	Battling the elements	Diversified and pragmatic	Options for growth	Strategic agricultural entrepreneurship
Every day, quintessential farming household that struggles to support its needs	Persevered through harsh agricultural challenges and remain optimistic toward farming	The realities would lead them to diversify out of something they enjoy if given the choice	Stable, optimistic for the future and has options for the future within and outside of farming	Actively engaged in agriculture, and growing their agricultural activities
Stands to gain the most from financial and agricultural mechanisms	Financial mechanisms have enabled some of their perseverance	Embody the realism and inner conflict that can characterize households	Could pivot into or out of farming depending on opportunities	Model or "use case" for inspiring growth in other segments

perhaps stands to gain the most from financial and agricultural mechanisms that can optimize their daily labor.

2. **Battling the elements.** The "battling the elements" segment also has some risk mitigation advantages. A greater portion of this group, compared with the "farming for sustenance" segment, generates income from agriculture, and a greater portion of these households has multiple income sources. This segment is still challenged by somewhat limited education and the incidence of unexpected life or farm-related events, such as weather challenges or illnesses in the family. Experience with negative farm events (e.g., pests, diseases) is the highest for this group, but these challenges have not dampened their future aspirations or dissuaded them from working hard. This group has persevered, sometimes using financial tools, making them a group that might better understand the value of having some form of a safety net. The biggest difference between this group and the "farming for sustenance" segment is that its smallholders are relatively more educated, have greater access to emergency funds, and are younger.

3. **Diversified and pragmatic.** The "diversified and pragmatic" segment of smallholder households in Tanzania reflects the realism and inner conflict that can characterize smallholder families. These households grow more, sell more, and earn more, and have more income streams and connectivity to financial mechanisms. They have suffered unexpected life events to a similar level as other segments, and have had resources to overcome what they do experience. In some ways, they have an aspirational profile like "farming for sustenance" and "battling the elements." The conflict that arises in this group, however, is that despite enjoying farming, taking pride in it, and looking for opportunities to expand their agricultural activities, many would diversify out of agriculture if given the opportunity, potentially out of frustration with its realities. They are thoughtful about what they do, but can also be impulsive, looking for opportunities to improve their situation. This is an important segment, as they represent smallholder households that have diversified within and outside of agriculture to best sustain their household needs.
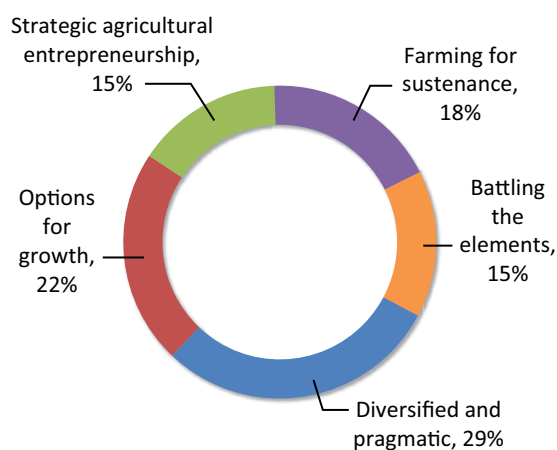
4. **Options for growth.** The "options for growth" group earns a higher income, has more resources for when the unexpected occurs, and is optimistic about the future. Their future, though, could take them in one of two directions, within or outside of agriculture. This diversification appears deliberate, so that a household has options to take care of itself if their agricultural yield becomes too difficult to maintain. While the segment relies heavily on agricultural income, it is also the most likely to be engaged in more stable income sources outside of agriculture. They are equally as passionate about farming, continuity in agriculture, and satisfaction with farming as they are embracing of opportunities outside of the agricultural sector. The youngest of all five groups, this segment could pivot in either direction, depending in part on how they are cultivated by policy makers, development organizations, and financial institutions.

5. **Strategic agricultural entrepreneurship.** The "strategic agricultural entrepreneurship" segment of smallholder households in Tanzania includes households that appear to be actively engaged in building their agricultural work with some indications of success or at least progress. The group is more enabled than others, with a relatively higher income, greater access to emergency funds, and more financial mechanisms at their disposal. This group of smallholders has been impacted by the realities and challenges of farming, and has been able to rely on their savings or other resources to get them through tough times. What characterizes them more definitively, though, is their mindset. Smallholders in this segment put much thought into what they do and have big aspirations that include a future

in agriculture. Farming is what they want to do, what satisfies them, and the origin of their legacies. They are not as likely to want out, or be willing to take work outside of agriculture. This is a group that can be a model or a use-case for carrying meaningful messages or examples for growth to other segments of the population.

There is greater definition and characterization of these segments when we explore more deeply how they behave, what they believe, and where their interests lie.

As a whole, these five segments of smallholder households in Tanzania behaviorally characterize smallholder households across Tanzania, and there is no one segment that dominates the landscape. Comparatively, the smallholder population in both Uganda and Mozambique is predominantly the "farming for sustenance" segment (54 percent and 77 percent, respectively), showing that movement in the marketplace really must be through evolving portions of this massive group into the financial fold. Tanzania's smallholders, however, are more evenly distributed across the five segments, and each requires a distinct, targeted approach for advancing the marketplace.

FIGURE 111. Tanzania Smallholder Household Segments

(Shown: All smallholder farmers)

FIGURE 112. Uganda Smallholder Household Segments

Strategic agricultural entrepreneurship, 4%
Options for growth, 16%
Diversified and pragmatic, 4%
Battling the elements, 21%
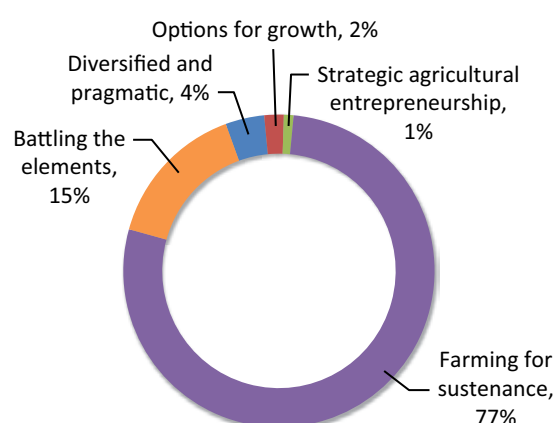Farming for sustenance, 54%
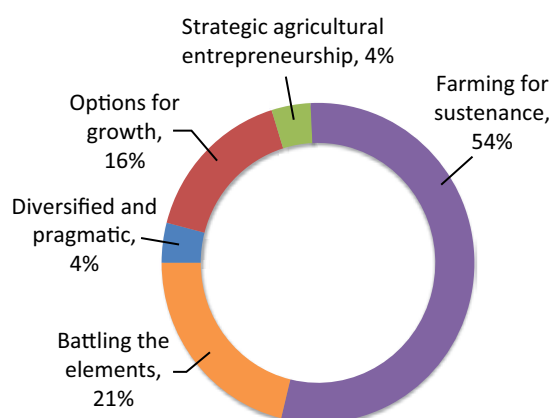
(Shown: All smallholder farmers)

FIGURE 113. Mozambique Smallholder Household Segments

Options for growth, 2%
Diversified and pragmatic, 4%
Strategic agricultural entrepreneurship, 1%
Battling the elements, 15%
Farming for sustenance, 77%

(Shown: All smallholder farmers

Table 14 shows each segment and how it fares on each of the cluster-defining variables: education, socioeconomic status, access to emergency funds, mobile phone ownership, attitude toward the future, and experience with unexpected events.

The profiles in Figures 114 and 115 detail the dynamics of each segment, bringing character and depth to each of them. Perhaps the best illustration of the differences in the segments, however, is the linear progression of the five groups, where the "farming for sustenance" (and largest group) is the most impoverished and in need, and the "options for growth" are at the far other end showing models of progress within the population.

Segment 1: "Farming for Sustenance": Dependent on the Farm for Day-to-Day Survival

The **farming for sustenance** segment includes 18 percent of smallholder households in Tanzania. It is a mid-sized segment that does not overpower or dominate the population. Its presence is still notable, especially because of the vulnerability within the segment.

SEGMENT SYNOPSIS

Representing the most vulnerable Tanzanian farming household, the "farming for sustenance" segment indexes very low on the Progress out of Poverty Index, shows a high number of years in farming, and generally wants their children to continue farming, even though they themselves could be interested in full-time employment.
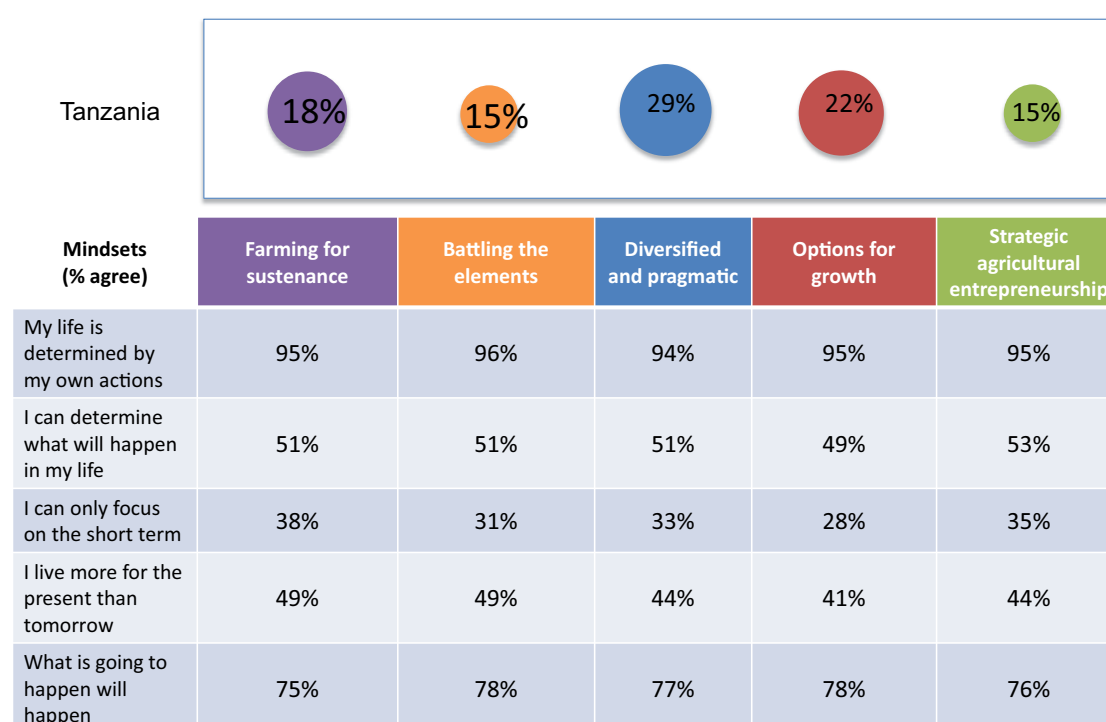
This segment truly does live off of what the farm produces, either consuming, selling, or trading the fruits of their agricultural labor, without much else to sustain their households.

This is a highly vulnerable group, and perhaps stands to gain the most from financial and agricultural mechanisms that can facilitate their daily labor.

TABLE 14. Tanzania Smallholder Household Segments by Clustering Criteria

Segment n= 2,795	Farming for sustenance 557	Battling the elements 393	Diversified and pragmatic 826	Options for growth 628	Strategic agricultural entrepreneurship 391
Educational attainment of household head					
Never attended school	41%	25%	37%	6%	2%
Preprimary	1%	0%	1%	0%	0%
Primary	57%	69%	54%	85%	66%
Secondary	1%	5%	7%	8%	25%
Higher education	0%	1%	0%	1%	7%
Socioeconomic status					
Above the poverty line	4%	4%	13%	12%	43%
Below the poverty line	96%	96%	87%	88%	57%
Access to emergency funds: Can come up with 100,000 shillings within the next month					
Very possible	9%	16%	17%	21%	51%
Somewhat possible	17%	26%	31%	27%	49%
Not possible	73%	57%	52%	52%	0%
Don't know	0%	0%	0%	1%	0%
Mobile phone ownership – at least one phone in the household					
No	54%	38%	2%	0%	0%
Yes	46%	62%	98%	100%	100%
Attitude: The future will take care of itself					
Agree	38%	41%	32%	27%	28%
Disagree	61%	59%	67%	72%	72%
Don't know	1%	0%	1%	1%	0%
In the past 12 months, experienced any unexpected events (including, but not limited to death, illness, accidents, etc.).					
No, I didn't	9%	5%	7%	10%	7%
Yes, I did	91%	95%	93%	90%	93%

(Shown: All smallholder farmers)

FIGURE 114. Tanzania Smallholder Household Segment Mindset

Mindsets (% agree)	Farming for sustenance	Battling the elements	Diversified and pragmatic	Options for growth	Strategic agricultural entrepreneurship
My life is determined by my own actions	95%	96%	94%	95%	95%
I can determine what will happen in my life	51%	51%	51%	49%	53%
I can only focus on the short term	38%	31%	33%	28%	35%
I live more for the present than tomorrow	49%	49%	44%	41%	44%
What is going to happen will happen	75%	78%	77%	78%	76%

(Shown: All smallholder farmers)

Demographics: Nearly all households live in poverty and are largely headed by older farmers.

Relative to other segments, the "farming for sustenance" segment skews older. More than half the population of this segment (57 percent) is over 50, and more than one-third (37 percent) is over 60. Only 23 percent are under 40. While the age distribution is concerning for such a vulnerable group, the absence of youth is potentially a good thing so as not to perpetuate the vulnerability in the next generation of farming.

FIGURE 115. Smallholder Farmers in Tanzania Financial Inclusion* by Segment
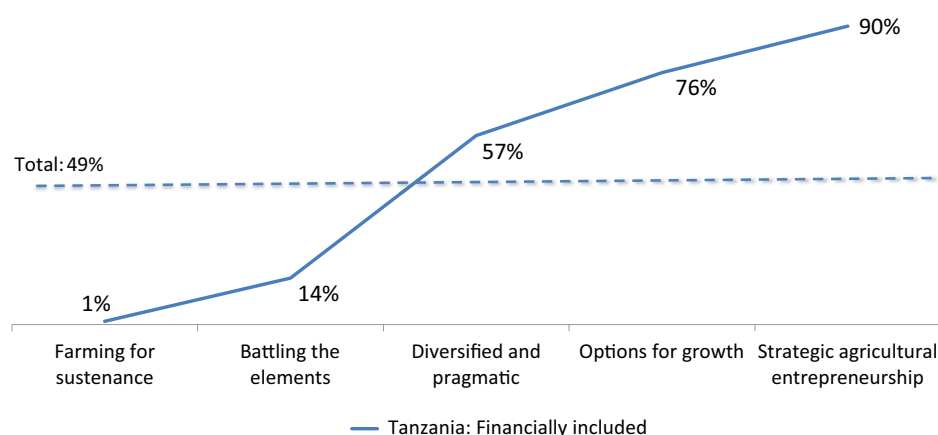
(Shown: All smallholder farmers)
*Financial Inclusion defined as having a full-service bank, mobile money or nonbank financial institution account with access in one's own name.

FIGURE 116. Age distribution (Head of Household)

Farming for sustenance (n=557)
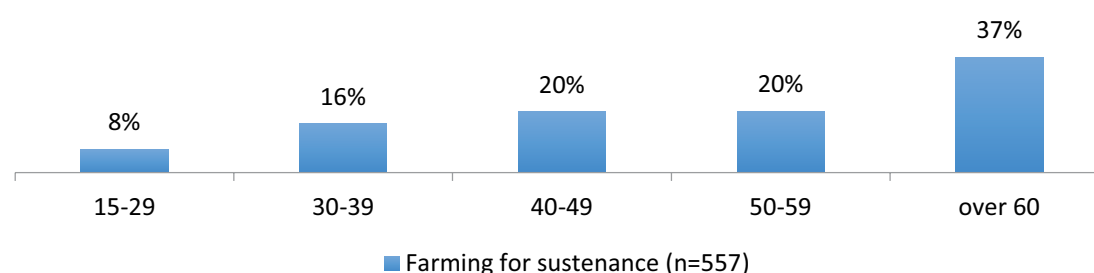
(Sample: Smallholder farmers by segment)

Households are concentrated in the Border (32 percent), Lake (27 percent), and Inland (27 percent) zones. Few are Coastal (13 percent) or in Zanzibar (1 percent). Nearly all (96 percent) live under the poverty line as defined by the Progress out of Poverty Index ($2.50 or less a day) with the vast majority living in extreme poverty (76 percent earning $1.25 a day or less).

*Farming:* Experienced, and dependent on crops for income

"Farming for sustenance" households are tenured in their craft. Three-quarters (75 percent) have been working in agriculture for 10 or more years.

These households intend to continue working in agriculture (97 percent). They generally enjoy it (90 percent) and want to expand their capabilities (92 percent). That said, full-time employment could also be attractive to most of these households (83 percent).

Fewer than seven in 10 (69 percent) of smallholders in this segment are satisfied with what their agricultural work has achieved (Figure 117). This suggests they are critical of themselves, and perhaps want better outcomes than their circumstances can support.

These are more unifying sentiments across the segments than they are differentiating. Even the segments that are more financially included and more prosperous show a similar trend. However, farming for sustenance households are further handicapped by extreme poverty and age, as well as a lack of resources. This can translate to them being trapped in their circumstances, and less capable of changing the course of their lives. While they might intend to keep

FIGURE 117. View of success in agriculture vs. willingness to continue working in it
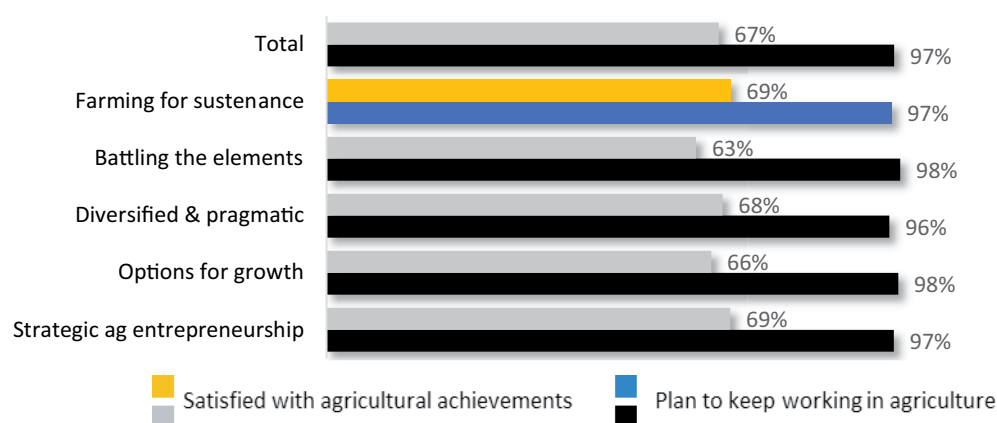
Sample: All smallholder households who participate in agricultural activities by segment

working in agriculture, only 57 percent agree with the statement, "I would not want to be doing any other type of work," suggesting that their trajectory might be more predetermined based on their skills, abilities, and access to other income streams, versus a true choice.

"Farming for sustenance" households lack income diversification. They tend to depend almost exclusively on what the farm will yield. On average, these households have 2.55 income sources, with the top two income sources related to agriculture: 80 percent of "farming for sustenance" households generate income from crops, and 28 percent generate income from livestock. Crops tend to be this segment's single biggest source of income (73 percent), with no other single source of income reported as a significant contributor to households. Thirteen percent report only one source of income, just over a third report two (39 percent), and crops and livestock are again the most common sources of income. Forty-five percent have three or more income sources.

Collective reporting from all household members active in agriculture shows that average land size is 3.26 hectares for "farming for sustenance" households.[36]

On average, the smallholder households in the "farming for sustenance" segment are growing four crops (4.26 precisely) each year on their land. They tend to sell on average two of the four crops they grow (1.95 precisely). Maize (94 percent), beans (50 percent), cassava (46 percent), ground nuts (34 percent), sweet potatoes (33 percent), and paddy (29 percent) are the most commonly grown crops by smallholders in this segment.

Vulnerable to outside elements

The vulnerability of this segment of smallholders becomes even more apparent when comparing the percentage generating income from agriculture against the percentage whose agricultural events have been seriously affected by an outside element. Nearly all smallholders in this group who participate in agricultural activities (99 percent) were impacted by weather, pests, disease, accidents, market fluctuations, equipment failure,and/or their own health issues. Sixty-three percent were affected by more than one issue. Weather has impacted the vast majority of this segment (77 percent), and many have also suffered crop loss due to pests and disease (64 percent).

Smallholders in the "farming for sustenance" segment in Tanzania have less experience, with their agricultural activities being impacted by price fluctuations in the market, not being able to sell crops, or fire and theft. When the unexpected does happen, and agriculture activities are impacted, "farming for sustenance" households are likely to have had no specific response (29 percent). The tendency to do nothing outweighs any single action that a farmer could take, if that resource was in place.

- 25 percent turned to their savings

- 22 percent took a temporary job

- 16 percent sold crops/livestock

- 12 percent borrowed from someone they know

- 5 percent borrowed from a bank

36 The land size measurement comes from the household survey where multiple members of the agricultural household offer up their recollection of various dynamics so as to capture full dynamics instead of relying on just one member's knowledge of the household. An aggregate estimate of this measure was then created and appended to the segmentation, which is based on participant responses to the individual questionnaire (asked of just one randomly selected household member). These data are weighted accordingly. Use data with caution surrounding extrapolation and inferences. These should be used only as added descriptive measures.

Reflecting lack of access to credit or loans, close to three-quarters (73 percent) report that they would not be able to come up with 100,000 Tanzanian Shillings in the event of emergency.

Financial attitudes

The segmentation model is built on predictors of financial inclusion, which is defined here as those having a full-service bank, mobile money, or NBFI account in their name. It follows, then, that ordering segments from more vulnerable "farming for sustenance" and "battling the elements" groups to "strategic agricultural entrepreneurship" shows a somewhat linear relationship with financial inclusion.

Extremely limited access to financial services

Overall, 49 percent of Tanzanian smallholder households are financially included, and mobile money accounts are the most common for smallholders. The "farming for sustenance" segment comes in lowest, with only 1 percent being financially included. Most of that 1 percent has an account at a NBFI. Only few have a mobile money account.

The barriers to mobile money for the "farming for sustenance" segment begin with awareness. A mere one-third of this segment (32 percent) is aware of mobile money accounts, compared to 76 percent of smallholder farmers in Tanzania overall. This is a segment that has not been exposed to the broad-based messaging and mobile money campaigns

that have otherwise swept the nation. The second barrier is the conversion from awareness of mobile money to use, indicating that exposure to the concept has not offered a compelling reason to use the service, either because the segment does not know how, does not think they qualify, or does not have access to mobile money. Close to half of this segment (46 percent) have at least one mobile phone in their home, creating a third barrier, which is access. For the 54 percent who do not have a phone in their home, access to mobile money is that much harder.

Just 1 percent of "farming for sustenance" smallholders have an NBFI account, and 2 percent have used such an account. Less than half of 1 percent of smallholder farmers in this segment report having a bank account or using a bank account.

While more prevalent than formal financial services, still only 13 percent of the "farming for sustenance" segment in Tanzania has access to an informal financial mechanism such as a savings or loan association, ROSCA, moneylender, or money guard. Informal savings networks (merry-go-round) are the most common (7 percent), followed by shopkeepers (4 percent), and VSLAs (3 percent).

Close to eight in 10 of "farming for sustenance" households managed to save money in the past year (78 percent), trailing the overall population of smallholders but only by a small gap (84 percent all smallholders).

TABLE 15. Informal and formal financial mechanisms

	Financially included	Own bank account	Own mobile money account	Own NBFI account	Access to informal savings
Farming for Sustenance	1%	0%	<.5%	1%	13%

(Shown: All smallholder farmers)

FIGURE 118. View saving money through different mediums as "very important"

At home — 79%
Financial institution — 78%
On a mobile phone — 68%
With an informal group — 48%

Sample: "Farming for sustenance" households, n=557

High perceived importance of financial practices

Though "farming for sustenance" house-holds might be without financial mechanisms, formal or informal, they do possess a strong sense of the importance of savings, investing, and using formal financial institutions.
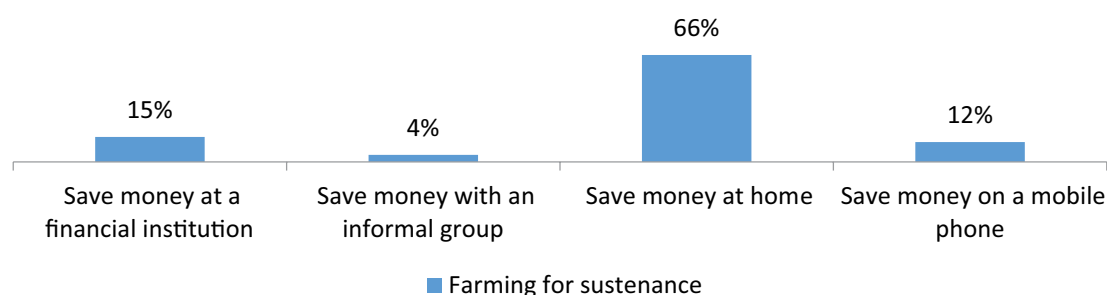
- They are as likely as other smallholders in Tanzania to think it is very important to save for future purchases (93 percent), for an unexpected event (85 percent), for regular purchases (81 percent), and school fees (78 percent).

- They are as likely as other smallholders in Tanzania to think it is very important to invest in the farm (94 percent), healthcare (94 percent), the home (87 percent), and education (82 percent).

This segment of smallholder households in Tanzania finds it highly important to save at home (79 percent). Saving with a financial institution also earns high importance (78 percent); however, when having to choose, saving at home ranks as most important.

"Farming for sustenance" finds it more important to save on a mobile phone than to save with an informal group (68 percent, compared to 48 percent). More select it as the most important savings channel over an informal one by three to one.

Segment 2: "Battling the Elements": Challenged, with Limited Resources, but Perseverant

The **battling the elements** group comprises 15 percent of smallholder farming households in Tanzania and is a mid-sized segment. It is an important group because it contains much of the

FIGURE 119. Perceived Importance of savings channels

Save money at a financial institution — 15%
Save money with an informal group — 4%
Save money at home — 66%
Save money on a mobile phone — 12%

■ Farming for sustenance

(Sample: Smallholder farmers by segment)

SEGMENT SYNOPSIS

The "battling the elements" segment is also a vulnerable group, but as a group, does not face the limitations of the "farming for sustenance" segment. A greater portion generates income from agriculture, and a greater portion of these households have multiple income sources. This segment is more educated and has better access to emergency funds, but is still challenged by the incidence of unexpected life or farm-related events.

Experience with unexpected life events is somewhat greater for this group than the others. Challenges have not dampened their future aspirations or dissuaded them from working hard. This group has persevered through those challenges, sometimes with the support of financial tools, which might make them the group that best understands the value of having some form of a safety net.

Compared to the "farming for sustenance" group the "battling the elements" segment can call on a stronger financial support network and is younger.

younger generation—the future of farming. These households face many of the same limiting circumstances as those in the "farming for sustenance" group (e.g., low education, high poverty, limited financial resources), but are optimistic, committed to farming, and taking better financial steps in their lives, despite facing the brutal realities of farming.

Demographics: A majority of households live in poverty, are concentrated in the Lake and Inland parts of the country, and represent a younger group of farmers.

"Battling the elements" smallholders include a preponderance of youth. In fact, a plurality (41 percent) are under 40. The greatest density of this segment is found in the Lake zone of the country (32 percent),

followed by Inland (28 percent). There are less "battling the elements" households in the Border zone (24 percent) and the Coastal zone (16 percent). Like farming for sustenance, 96 percent are below the poverty line. The vast majority, 96 percent, live under the poverty line, with 71 percent living in extreme poverty.

Farming: Experienced farmers who enjoy their work, even though they contemplate life outside of farming.

"Battling the elements" households include a mix of mature, tenured farmers as well as newer, younger farmers. Six-in-10 (59 percent) have been farming for over 10 years, and the balance, close to 40 percent, have been farming for 10 or less years. By age (described above),

FIGURE 120. Age distribution

	15-29	30-39	40-49	50-59	over 60
Farming for sustenance	8%	16%	20%	20%	37%
Battling the elements	17%	24%	23%	18%	18%
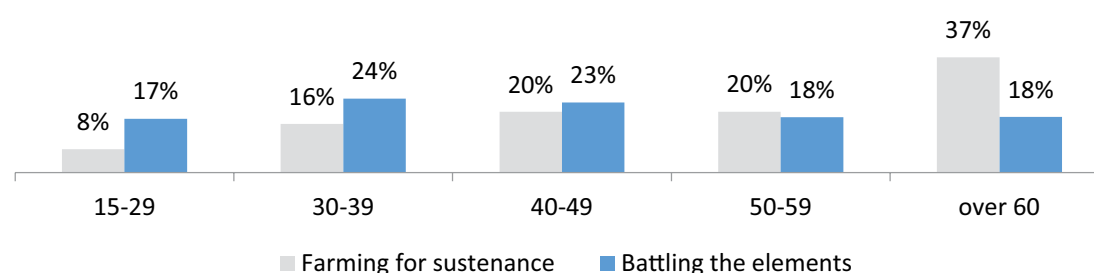
(Sample: Smallholder heads of household by segment)

this segment is younger than the others, underscoring the lack of tenure compared to "farming for sustenance."

Enjoyment of farming

These households intend to continue working in agriculture (98 percent). They generally enjoy it (95 percent), and many would like to expand their capabilities (96 percent). Close to two-thirds are satisfied with their farming achievements (63 percent) (Figure 121). That said, it is worth noting that full-time employment also could be attractive to some households (87 percent). Only about four-in-10 (44 percent) say that they do not want to do any other kind of work outside of agriculture.

Most "battling the elements" households in Tanzania generate income from agriculture, either selling crops (79 percent) or livestock (28 percent). Agriculture is still this segment's largest reported income source (67 percent crops, 8 percent livestock as largest source), but dependence on agriculture is less so. Roughly half have three or more sources for generating

income (vs. 45 percent for "farming for sustenance"), including the following:

- An occasional job (20 percent)
- Running a retail or manufacturing business (20 percent)
- Running another type of business (12 percent)
- Remittances from family and friends (15 percent)

On average, smallholder households in the "battling the elements" segment in Tanzania have 3.48 hectares of land or less[37] and are growing five crops each year on their land. They tend to sell, on average, two crops they grow. Commonly grown crops include the following:

- Maize (93 percent)
- Cassava (49 percent)
- Beans (45 percent)
- Sweet potatoes (39 percent)
- Paddy (34 percent)

AQ5 **FIGURE 121.** **View of success in agriculture vs. willingness to continue working in it**
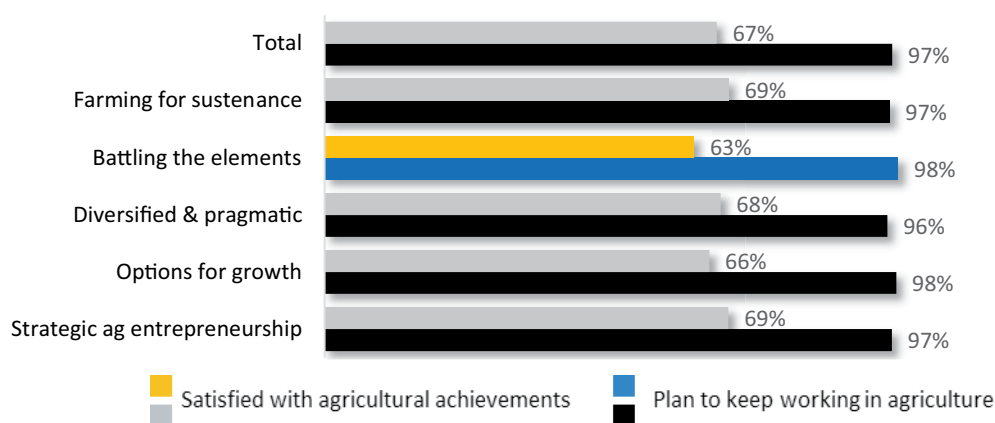
Sample: All smallholder households who participate in agricultural activities by segment

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37 The land size measurement comes from the household survey where multiple members of the agricultural household offer up their recollection of various dynamics so as to capture full dynamics instead of relying on just one member's knowledge of the household. An aggregate estimate of this measure was then created and appended to the segmentation, which is based on participant responses to the individual questionnaire (asked of just one randomly selected household member). These data are weighted accordingly. Use data with caution surrounding extrapolation and inferences. These should be used only as added descriptive measures.

Vulnerable to weather

All "battling the elements" households experienced a unexpected event in the past three years in their agricultural activities (including weather, pests, illness, loss, accidents) that caused a loss of income. The most common is weather (75 percent), followed by pests (69 percent).

Price fluctuations hurt this group more so than they did the "farming for sustenance" segment. About one-quarter (26 percent) were impacted by market-driven price fluctuations when it came to selling their crops, and a third (33 percent) were impacted by changes in the cost of inputs. And just over one in 10 (13 percent) faced a market downturn where they could not sell their crops or livestock.

Among those that were seriously affected by any of the above events, close to one-quarter (24 percent) of smallholder households in Tanzania did nothing specific in response. Others turned to what they either had, including savings, or options they had for bringing in more money (e.g., temporary job, borrowing, selling):

- 30 percent used savings

- 20 percent sold livestock or crops

- 20 percent took a temporary job

- 11 percent borrowed from someone they knew

Financial attitudes

Compared with all of the other groups, the "battling the elements" segment comes in with the second lowest percentage of those who are financially included. Only 14 percent of this segment of smallholder households in Tanzania are financially included, compared to 49 percent of Tanzania smallholder households overall. This segment is 14 times as likely to have formal financial

mechanisms in place compared with the "farming for sustenance" group.

Some formal financial accounts

All of the financially included in this segment have a mobile money account (14 percent). Among this group, 2 percent also have an NBFI account, in addition to their mobile money account. Less than a quarter of 1 percent have a bank account, though some have access to one.

"Battling for elements" smallholder households in Tanzania are more equipped for a mobile money account than "farming for sustenance" households. Close to two-thirds (62 percent) have a mobile phone in their home, 70 percent are aware of mobile money, and more than one-third (37 percent) have tried mobile money.

Mobile money awareness is much greater than use. The actual conversion rate, comparing awareness of mobile money to use is about two to one (1.89), and awareness to account ownership is five to one, indicating there is still some barriers to entry. In this case, the barriers are more about perceived eligibility and ability to access mobile money providers, which suggests a need for building meaningful awareness that goes beyond conceptual awareness. There is a general sense among this segment that it is important to save money on a mobile phone, more so than through an informal channel. This segment also has to feel like this is a service they can afford and fits their needs.

Access to informal financial accounts is on par with formal accounts, with just 17 percent having used some informal group. Informal savings networks are the most common (6 percent), followed by shopkeepers (5 percent), and money guards (4 percent) (Figure 122).

Overall, 80 percent of smallholders in the "battling the elements" segment have saved money in the past year.

TABLE 16. Informal and formal financial mechanisms

	Financially included	Own bank account	Own mobile money account	Own NBFI account	Access to informal savings
Farming for Sustenance	1%	0%	<.5%	1%	14%
Battling the Elements	14%	0%	14%	2%	17%

(Sample: Smallholder farmers by segment)

Like "farming for sustenance," "battling the elements" thinks it is very important that they save for future purchases (94 percent), unexpected events (83 percent), or even regular purchases (81 percent). Being able to afford school fees is also important (81 percent). A similar proportion find it important to invest money in the farm (93 percent), home improvements (80 percent), and an educational opportunity (which can include school fees) (83 percent). For this segment, household-related items are nearly as important as farming items, indicating that there could be multiple ways of appealing to this segment, and that appeals do not have to be squarely focused on agriculture.

The "battling the elements" segment places greater emphasis on saving with financial institutions than they do at home, or with informal groups. Saving on a mobile phone earns the same importance as saving at home. Close to eight in 10 of "battling the elements" households managed to save money in the past year (78 percent), trailing the overall population of smallholders, but only by a small gap (84 percent of all smallholders).

FIGURE 122. View saving money through different mediums as very important

Financial institution 76%
On a mobile phone 68%
At home 66%
With an informal group 42%
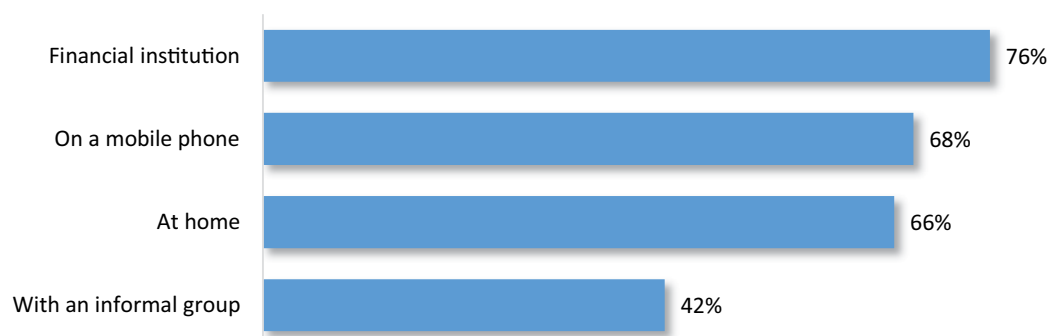
Sample: "Battling the elements" households, n=393

FIGURE 123. Perceived most important savings medium

Save money at a financial institution: 15% / 28%
Save money with an informal group: 4% / 4%
Save money at home: 66% / 45%
Save money on a mobile phone: 12% / 22%

Farming for sustenance   Battling the elements
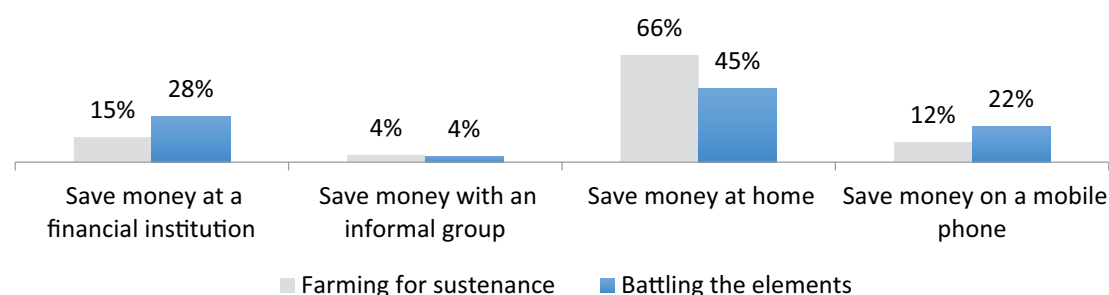
(Sample: Smallholder farmers by segment)

SEGMENT SYNOPSIS

The "diversified and pragmatic" segment reflects the realism and inner conflict that can characterize smallholder farming households. These households grow more, sell more, earn more, are slightly less dependent on farming, and have a marginally broader portfolio of financial mechanisms.

They are empowered, but believe that someone else or circumstances more generally might have more power than they do to shape their destiny. They think through decisions, but also know that reality can get in the way of the best-laid plans. This is an important group, as it represents smallholder households that have diversified within and outside of agriculture to best sustain their household needs.

Their experience has conditioned them to take a more pragmatic approach to farming. They tend to diversify income sources, plan for the unexpected, and perhaps even consider full-time employment outside of agriculture if the opportunity presented itself, though they enjoy and take pride in farming.

Segment 3: "Diversified and Pragmatic": Realistic, Grounded, and Planning for the Realities of Agricultural Life

The **diversified and pragmatic** segment, which includes 29 percent of Tanzania's smallholder households, is moving away from vulnerability and onto a path of stability. Perhaps what is most important about this group is its large size, suggesting plenty of use cases and models in the marketplace for coming out of vulnerability. Its size is also important in level-setting expectations as to what financial and agricultural mechanisms mean for a less-entrenched household.

Demographics: The majority still live in poverty. This segment is evenly distributed, with a slightly higher concentration seen in the Lake region, and largely headed by older farmers.

The "diversified and pragmatic" group tends to be slightly older (42 percent, 50-plus years), second to the "farming for sustenance" group. They are evenly distributed in the mainland, with all regions having more than 20 percent. The highest concentration of this segment is in the Lake region (29 percent), followed by Coastal and Inland (24 percent). The majority of this group (87 percent) lives below the poverty line (earning less than $2.50 a day).

FIGURE 124. Age distribution

| | Farming for sustenance | Battling the elements | Diversified and pragmatic |
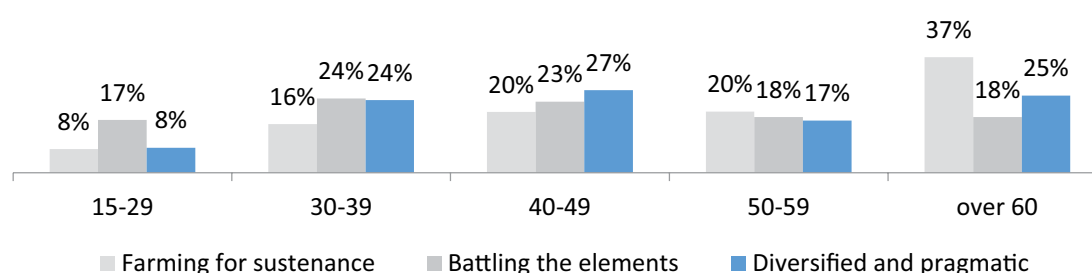
(Sample: Farming for Sustenence, Battling the Elements)

Farming: Experience, income, and crops.

"Diversified and pragmatic" smallholder households are mostly experienced in farming. More than two-thirds have been farming for over 10 years (69 percent), and 31 percent have been farming for 10 years or less. Compared to the "battling the elements" group, more people in the "diversified and pragmatic" segment are tenured in agriculture, and have been working in the sector for more than 10 years (compared to 59 percent of "battling the elements").

Enjoyment of farming

The "diversified and pragmatic" segment of smallholder households in Tanzania intend to continue working in agriculture (96 percent), showing similar intentions as other segments. They enjoy it (96 percent), and many would like to expand their capabilities (94 percent). Farming is hard work and is susceptible to elements that make it unpredictable or difficult to grow the business. This segment feels only somewhat satisfied with their agricultural achievements (68 percent), suggesting they may have wanted better outcomes than their circumstances could support (Figure 125).

It is critical to point out with this segment that full-time employment is attractive (84 percent). And that pragmatism might be more than just idealistic. This group, despite their age, is more likely to find opportunities to leave agriculture than either the "farming for sustenance" or "battling the elements" segments. Their income streams are more diverse, and one could develop into full-time employment.

More sources of income

Close to three-quarters (74 percent) of "diversified and pragmatic" smallholder households in Tanzania generate income from crops, and 30 percent generate income from livestock. Other sources of income for the "diversified and pragmatic" households can include the following:

- Running own business in retail or manufacturing (selling or making goods) (26 percent). Eleven percent say this is their largest source of income.

- Money from family and friends (17 percent).

- Wages from occasional jobs (17 percent).

- Running a business that provides services (9 percent).

FIGURE 125. View of success in agriculture vs. willingness to continue working in it
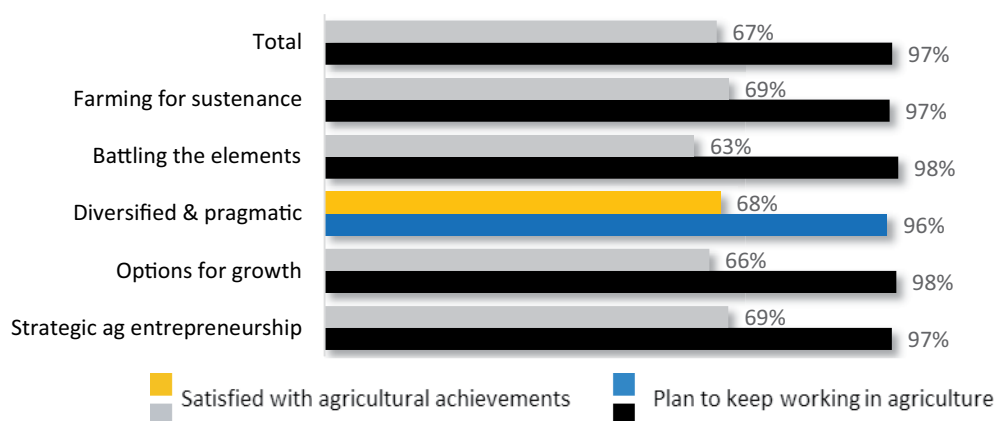
	Satisfied with agricultural achievements	Plan to keep working in agriculture
Total	67%	97%
Farming for sustenance	69%	97%
Battling the elements	63%	98%
Diversified & pragmatic	68%	96%
Options for growth	66%	98%
Strategic ag entrepreneurship	69%	97%

Sample: All smallholder households who participate in agricultural activities by segment

The average land size for "diversified and pragmatic" is 3.9 hectares, and they typically grow four crops each year on their land. They tend to sell, on average, two crops they grow. Commonly grown crops include the following:

- Maize (93 percent)

- Beans (53 percent)

- Cassava (46 percent)

- Sweet potatoes (36 percent)

- Ground nuts (36 percent)

- Paddy rice (34 percent)

Affected by outside elements

All in this group have experienced unexpected events (100 percent), and are more likely to have experienced two or more unexpected events in the past three years (74 percent).

- Four in five (81 percent) were affected by weather alone.

- Almost seven in 10 (69 percent) of this segment of smallholders faced notable challenges with pests and disease.

Price fluctuations are also a significant challenge for this group (27 percent). Fluctuations are also surrounding the cost of inputs (32 percent) and a quarter were affected by health-related issues. Smallholders in this segment cope with this events in a number of ways. Most notably, this segment was more likely to have used their savings to recover than they were to have done nothing to address the problems. Borrowing also was used to cope more often that among the "farming for sustenance" or "battling the elements" segments.

- Savings (33 percent)

- Doing nothing (26 percent)

- Selling livestock/crop (23 percent)

- Temporary job (19 percent)

- Borrowing from someone (13 percent) or taking a loan from a financial institution (5 percent)

Financial attitudes

The segmentation model itself is built off of predictors of financial inclusion. More than half (57 percent) of the "diversified and pragmatic" segment of smallholder households in Tanzania are financially included. The level of financial inclusion among this segment surpasses the overall level of financial inclusion among smallholder families in Tanzania (49 percent).

This segment is the one that offers hope that farming households can put their livelihoods on a path toward greater stability that includes mechanisms for household management. With more than half of this segment financially included, it suggests an opportunity to foster more advanced use of mobile money accounts since these individuals already have the account and are already using them. Their audience size and digital capabilities might help fuel expansion of merchant payments, digital savings, and/or bill pay. And, the segments use could set examples for other farmers. Therefore, the collective reach of those efforts might extend far beyond the people within the segment.

A "pragmatic" approach to finances

Among the "diversified and pragmatic" segment of smallholder households in Tanzania, almost all households have access to a mobile phone (98 percent) and are aware of mobile money (83 percent). It then follows that mobile money accounts are the most popular formal financial mechanisms, with 56 percent of the segment using a mobile money account registered in their name.

TABLE 17. Informal and formal financial mechanisms

	Financially included	Own bank account	Own mobile money account	Own NBFI account	Access to informal savings groups
Farming for Sustenance	1%	0%	<.5%	1%	14%
Battling the Elements	14%	0%	14%	2%	17%
Diversified and Pragmatic	57%	6%	56%	6%	23%

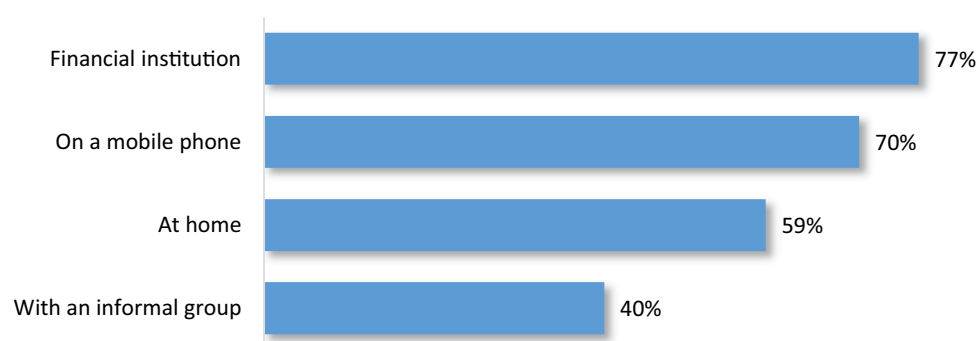(Sample: Smallholder farmers by segment)

Six percent of smallholders in this segment have NBFI accounts, and 6 percent have bank accounts. Only 8 percent have ever used a bank. Similarly, 8 percent have every used an NBFI. More than one in five (23 percent) have used informal savings mechanisms such as a moneylender, merry-go-round, VSLA, or savings collector.

Over eight in 10 (84 percent) have saved money for something in the past 12 months, and 45 percent of the segment have two or more savings channels. A majority believe saving for specific purposes (e.g., school fees, regular expenses, the future, health) is very important. Saving for a dowry was ranked the least important (37 percent), followed by death in the family (65 percent). The rest vary between seven and nine in 10 with future expenses being most important (94 percent) followed by the need for the household to invest in the farm, home improvement, education, business, and health.

Similar to all other groups, those in the "diversified and pragmatic" segment find saving at a financial institution to be very important (77 percent) (Figure 126). This is followed by saving on a mobile phone (70 percent), and distantly by saving money at home.

When asked to choose which of the four (financial institution, on a mobile, at home, or with an informal group) is most important, smallholders in this segment are somewhat divided. A plurality (36 percent) say saving at home is the most important savings medium for their household, reflecting the need to be in close proximity to one's money). A notable portion choose "financial institution" or "mobile phone" over saving at home (Figure 127).

FIGURE 126. View saving money through different mediums as very important

Sample: "Diverse and pragmatic" households, n=826

FIGURE 127. Perceived most important medium for saving money
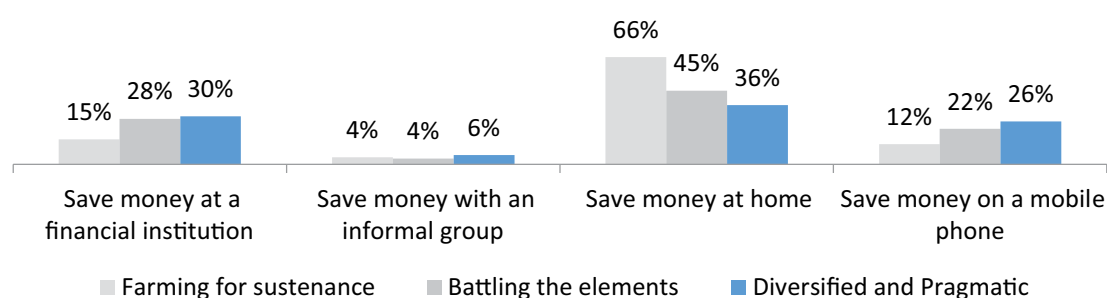
(Sample: Smallholder farmers by segment)

Segment 4: "Options for Growth": Stable, Optimistic, and Building Various Paths for the Future

Smallholder households in the "options for growth" segment comprise 22 percent of the smallholder population in Tanzania. Their most significant characterizing elements are their level of financial inclusion, youth, and recent entry into agriculture, which together distinguish them from the other segments. They have access to financial tools, a range of livelihood opportunities, and feel more empowered than other groups.

Though they are optimistic, there is still room for growth. Their optimism conveys they have improved their current situations, largely because of their net incomes. Furthermore, it might not be farming income alone that helps stabilize their households, as agriculture is but one of the household's diverse revenue streams.

Demographics: Smallholders young and old, and mostly poor.

Close to two-thirds of the "options for growth" segment of smallholder households in Tanzania is over 40 years old (64 percent). They are more concentrated in the Lake (32 percent) and Inland areas (29 percent), with smaller portions in Coastal and Boarder zones (22 and 17 percent, respectively).

Twelve percent live above the poverty line. It may seem counterintuitive that some portion of a segment called "options for growth" falls below the poverty line. Individual upward mobility and drive

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SEGMENT SYNOPSIS

The "options for growth" segment has greater access to financial tools and external support. It includes few uneducated individuals and feels least oppressed by powerful figures. But their youth, optimism, and interest in opportunities, including those outside of agriculture, could also mean that their future takes them away from farming.

The segment relies heavily on agricultural income. At the same time, smallholder farmers in the "options for growth" segment are also the most likely to be engaged in more stable income sources outside of agriculture, such as running one's own business or working at a regular, full-time job.

This segment could pivot in either direction depending, in part, on how they are cultivated by policy makers, development organizations, and financial institutions.

FIGURE 128. Age distribution (Head of Household)

- ■ Farming for sustenance
- ■ Battling the elements
- ■ Diversified and pragmatic
- ■ Options for growth
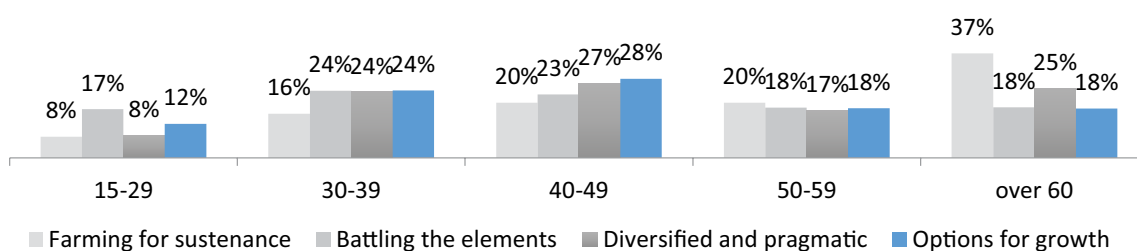
(Sample: Smallholder farmers by segment)

for financial services (on which the segmentation model was built), however, can cross the poverty line. This results in lower-income groups with tendencies and attitudes similar to higher-income groups.

Farming: Experience, income and crops.

The "options for growth" segment is newer to farming: 59 percent have been farming for 10 years or less. This segment of smallholder households sees their future in farming, and almost all (98 percent) intend to continue working in agriculture. They derive great enjoyment from it (91 percent), and many would like to expand their agricultural activities (93 percent).

Wanting to expand their agricultural activities

That said, full-time employment could also be very attractive. Many say they want to expand their agricultural

activities (93 percent), but most also say they would welcome full-time employment (89 percent). This suggests that they may, at some point, determine that the best path for their future is outside of agriculture.

Two-thirds (66 percent) of this segment are satisfied with what their agricultural work has achieved (Figure 129), exacerbating this contradiction. This is also a potential call to action. If this segment of smallholder households in Tanzania cannot be successful in agriculture and discovers other options, then they may change direction. The question becomes, "What do they need to stay in farming?"

The mean land size for "options for growth" farming households in Tanzania is 3.76 hectares. On average, these farmers grow four crops each year, two of which they grow to sell.

FIGURE 129. View of success in agriculture vs. willingness to continue working in it
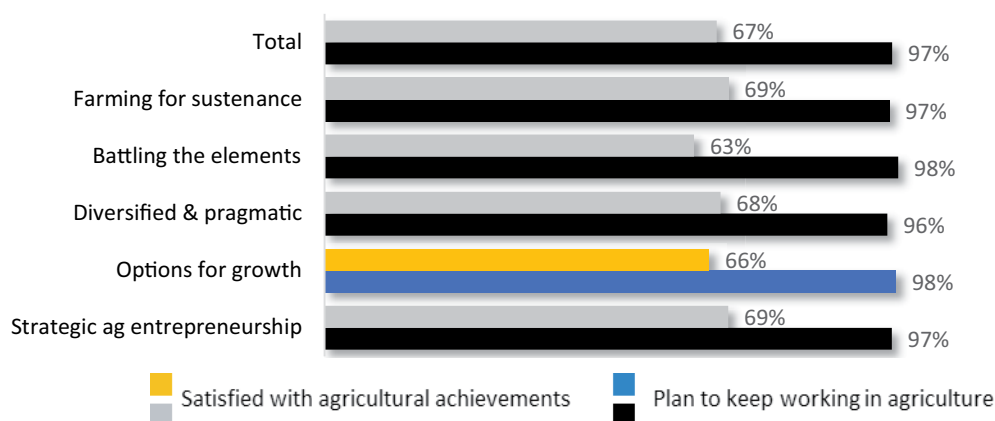
- ■ Satisfied with agricultural achievements
- ■ Plan to keep working in agriculture

Sample: All smallholder households who participate in agricultural activities by segment (n=2,638)

"Options for growth" households tend to have more sources of income (58 percent have three or more), and can therefore rely on more than just agriculture for revenue. These farmers also have revenue streams that could potentially convert to full-time employment.

- Close to one-third (32 percent) generate income from their own retail or manufacturing business.

- 13 percent run a business providing services.

- 11 percent have salary or wages from a regular job.

Agriculture still generates income for most (73 percent get income from selling crops, 29 percent from livestock), and it tends to be the largest reported source of income. It is also the source of income most vulnerable due to unexpected events.

All smallholder households in the "options for growth" segment have had their agricultural activities seriously affected by an unexpected event, and close to three-quarters experienced two or more unexpected events in the three years prior to the survey. This group experiences both environmental events as well as market-based issues.

- Over eight in 10 (84 percent) experienced a weather-related event.

- Over two-thirds (68 percent) were impacted by pests or disease.

- 30 percent were impacted by unexpected changes in sales price fluxes for their goods, and 34 percent by unexpected changes in the price of inputs.

- 16 percent were impacted by market downturns that meant they could not sell goods.

The "options for growth" segment is also most enabled by savings when disaster does strike. Thirty-eight percent turned to their savings (similar to the next segment, the "strategic agricultural entrepreneurs"). Only two in 10 had no specific response to the shock. This group also had other agency during times of disaster:

- 23 percent sold livestock

- 19 percent took a temporary job

- 10 percent borrowed from friends or family

- 9 percent took a loan

Financial attitudes

The segmentation model is built on predictors of financial inclusion defined as those having a full-service bank, mobile money, or NBFI account in their name. It follows, then, that ordering segments from "farming for sustenance" to the more optimized groups shows a somewhat linear relationship with financial inclusion. Overall, 49 percent of Tanzania smallholder households are financially included.

Much higher financial inclusion

Just over three-quarters (76 percent) of the "options for growth" segment of smallholder households in Tanzania are financially included, which is 19 percent higher than the "diversified and pragmatic" segment. While a small portion of the population, this segment is also one that offers hope that smallholder households can put their livelihoods on a path toward greater stability as well as growth.

Mobile money accounts are the most common formal financial mechanism among those in the "options for growth" segment. Three quarters (75 percent) of smallholder farmers have a mobile money account, and 80 percent can access mobile money

TABLE 18. Informal and formal financial mechanisms

	Financially included	Own bank account	Own mobile money account	Own NBFI account	Access to informal savings
Farming for Sustenance	1%	0%	<.5%	1%	14%
Battling the Elements	14%	0%	14%	2%	17%
Diversified and Pragmatic	57%	6%	56%	6%	23%
Options for Growth	76%	14%	75%	9%	23%

(Sample: Smallholder farmers by segment) (Sample: Smallholder farmers by segment)

either through their own or through someone else's account. Ninety-one percent of smallholders in the "options for growth" segment had heard of mobile money prior to the survey.

Nine percent of smallholders in the "options for growth" segment have an NBFI account, and 14 percent have a bank account. One-third (35 percent) had been in a bank—18 times that of those in the "farming for sustenance" segment.

Roughly one-quarter (23 percent) have used an informal financial institution, most commonly an informal savings network, such as a merry-go-round (14 percent).

Apart from access to financial mechanisms, there is deep acknowledgment in this segment of the importance of various financial behaviors, such as saving.

Nearly all smallholders in this group (94 percent) feel it is very important to save for future purchases, as well as healthcare (94 percent). Many also find it very important to save for school fees (81 percent). Perhaps due to their tendency to experience shocks, most also find it very important to save for the unexpected (85 percent) and future loss of income (75 percent) as well as regular purchases (84 percent). There is a strong belief in the importance of investing in the farm; 94 percent of smallholders in this segment consider it very important.

Smallholder households in the "options for growth" segment consider saving at a financial institution or on a mobile phone more important than saving at home or with an informal group (Figure 130). When asked to choose

FIGURE 130. View saving money through different mediums as "very important"

Financial institution	82%
On a mobile phone	77%
At home	56%
With an informal group	42%
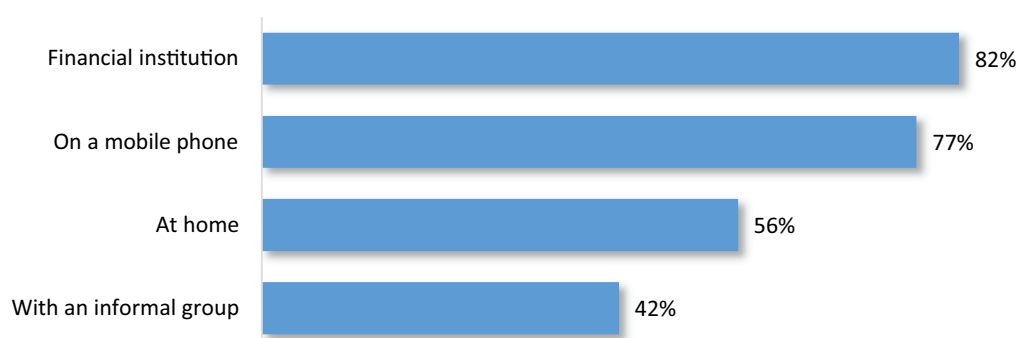
Sample: "Options for growth" households, n=628

FIGURE 131. Most important medium for saving money

	Save money at a financial institution	Save money with an informal group	Save money at home	Save money on a mobile phone
Farming for sustenance	15%	4%	66%	12%
Battling the elements	28%	4%	45%	22%
Diversified and Pragmatic	30%	6%	36%	26%
Options for Growth	33%	6%	26%	33%
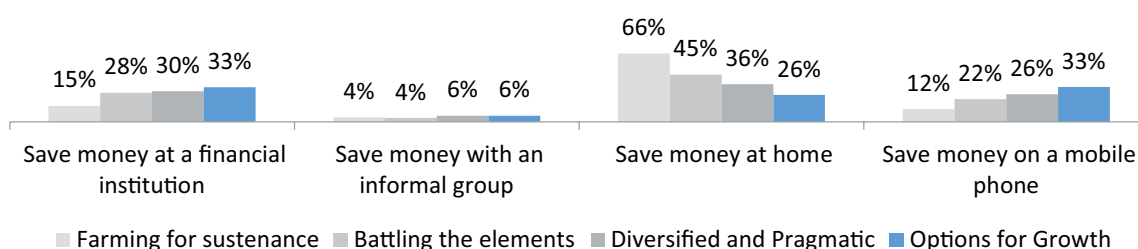
(Sample: Smallholder farmers by segment)

which is more important, the segment mostly chooses a financial institution or mobile phone over informal options, indicating that it sees the value proposition in the formal sources that others have not yet discovered (Figure 131).

Segment 5: "Strategic Agricultural Entrepreneurship": Actively Engaged, Empowered, and Expanding Their Agricultural Activities[39]

The **strategic agricultural entrepreneurship** segment includes 15 percent of Tanzania's smallholder households.

They have emerged from life's events empowered, enabled, and perhaps even succeeding, and have a distinct profile of for their agricultural activities.

Demographics: Close to half of this group is above the poverty line, making it least impoverished, and they are evenly distributed across the regions and across age groups.

The age of the household head in the "strategic agricultural entrepreneurship" segment is more evenly distributed across the age groups. No one age group has a distribution larger

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SEGMENT SYNOPSIS

The "strategic agricultural entrepreneurship" segment includes households who appear to be actively engaged in building their agricultural work, with some indications of success or at least progress. The segment is more enabled than the others, has a higher income, more education, greater access to emergency funds, and more financial mechanisms at their disposal. They've been impacted by the realities of farming, and have been able to rely on their savings or other resources to get through tough times.

What characterizes those in this segment more definitively is their mindset. They put much thought into what they do. They have big aspirations that include a future in agriculture. Farming is what they want to do, what satisfies them, and where their legacy lives. Though they aren't as likely to want out of agriculture, and are the most satisfied with their achievements in the sector, they are also the most pessimistic about the future.

This is a group that can be a model or a use-case for carrying meaningful messages or examples for growth to other segments of the population.

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39 Caution: Small segment size limits analysis. Proceed with caution in extrapolating findings.

FIGURE 132. Age distribution

- Farming for sustenance
- Battling the Elements
- Diversified and Pragmatic
- Options for Growth
- Strategic ag entepreneurship
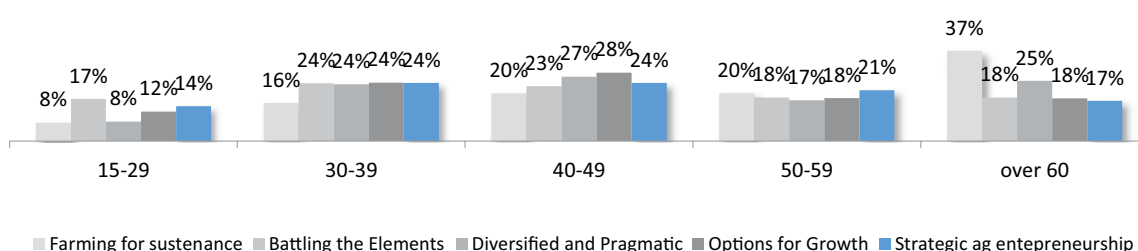
(Sample: Smallholder farmers by segment)

than 24 percent. Close to four in 10 (38 percent) heads of household in the "strategic agricultural entrepreneurship" segment are under 40, which is a sizable youth population.

The segment is also evenly distributed across the regions, with the largest groups in the Coastal zone (33 percent) and the Inland zone (28 percent). This is also the least impoverished segment, with only 57 percent below the poverty line. No smallholder households in this segment live in extreme poverty (earning under $1.25 a day).

Farming: Experience, income and crops.

Over half of smallholder households in the "strategic agricultural entrepreneurship" segment are new to farming and have worked in the sector for 10 years or less (53 percent). Nearly all intend to continue working in agriculture (97 percent), showing similar intentions as other segments. Almost all of them enjoy it (95 percent), and many would like to expand their capabilities (95 percent), even more so than most other segments. That said, full-time employment could also be attractive to many in this segment (87 percent). Seven in 10 (69 percent) smallholders in this segment are satisfied with what their agricultural work has achieved (Figure 133), the second most among all segments.

Considering that so smallholders in this segment want to expand their agricultural activities and find them satisfying, and yet would also consider alternatives outside of farming suggests a wider entrepreneurial spirit. The question becomes, "What can be done to feed the entrepreneurial spirit of this segment, and expand their reach and influence in agriculture in Tanzania?"

FIGURE 133. View of success in agriculture vs. willingness to continue working in it
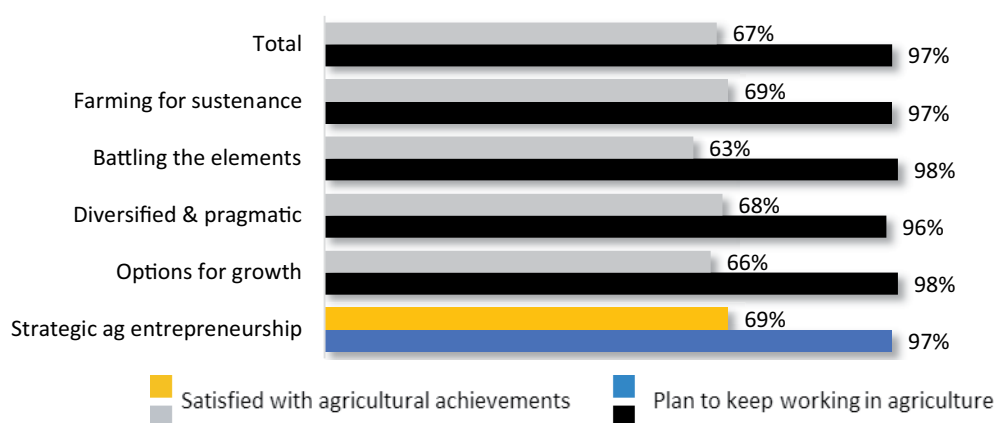
- Satisfied with agricultural achievements
- Plan to keep working in agriculture

Sample: All smallholder households who participate in agricultural activities by segment

More sources of income

Compared to the other segments, a smaller portion of the "strategic agricultural entrepreneurship" segment generates income from livestock (24 percent) and growing crops, fruits, or vegetables (67 percent). Larger portions also generate income from earning wages from a regular job (22 percent), earning wages from an occasional job (20 percent), and running a business in retail or manufacturing (36 percent). This suggests that agricultural pursuits are key components of a larger and diversified income strategy.

On average, those in the "strategic agricultural entrepreneurship" segment grow the fewest types of crops each year (3.52). They tend to sell on average two crops they grow. They also have the most land with an average of 4.44 hectares.[40]

All (100 percent) of the "strategic agricultural entrepreneurship" smallholders have been seriously affected by an outside element including weather, pests and disease, accidents, market fluctuations, equipment failure, and/or their own health issues. Just 13 percent had no specific response when coping with these events, indicating a wider range of coping mechanisms and options at their disposal.

Financial attitudes

Overall, 49 percent of Tanzanian smallholder households across the country are financially included. The majority (90 percent) of smallholder households in the "strategic agricultural entrepreneurship" segment is financially included. Most smallholders in this group (89 percent) have mobile money accounts, the highest of all five segments.

Ninety-three percent have access to a mobile money service, and nearly all (98 percent) have heard of mobile money. Bank account and NBFI account ownership are at 32 percent and 12 percent, respectively. Roughly three in 10 (27 percent) have used an informal group at some point in their life (even if they are not using it now). Experience with these informal financial mechanisms ranged, but was overall relatively low:

- Merry-go-round: 16 percent
- Money guard: 5 percent
- Shopkeepers: 4 percent
- VSLA: 3 percent
- Other: 3 percent

Importance of saving

Smallholder households in the "strategic agricultural entrepreneurship" segment consider saving important. Ninety-five percent have saved money in the past 12 months and on average have two savings channels at their disposal. Around one-third (35 percent) have three or more channels at their disposal.

Most (96 percent) feel it is very important to save for future purchases, unexpected expenses (89 percent),

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40 The land size measurement comes from the household survey where multiple members of the agricultural household offer up their recollection of various dynamics so as to capture full dynamics instead of relying on just one member's knowledge of the household. An aggregate estimate of this measure was then created and appended to the segmentation, which is based on participant responses to the individual questionnaire (asked of just one randomly selected household member). These data are weighted accordingly. Use data with caution surrounding extrapolation and inferences. These should be used only as added descriptive measures.

TABLE 19. Informal and formal financial mechanisms

	Financially included	Own bank account	Own mobile money account	Own NBFI account	Access to informal savings
Farming tor sustenance	1%	0%	<.5%	1%	14%
Battling the elements	14%	0%	14%	2%	17%
Diversified and pragmatic	57%	6%	56%	6%	23%
Options for growth	76%	14%	75%	9%	23%
Strategic agricultural entrepreneurs	90%	32%	89%	12%	27%

(Sample: Smallholder farmers by segment)

and school fees (84 percent). There is also emphasis on investing in the farm (94 percent).

Smallholders in the "strategic agricultural entrepreneurship" segment consider saving with a financial institution and on a mobile phone more than two times as important than saving at home or through an informal channel. This shows that the group values the functions of a formal account in way that other segments haven't yet discovered (Figure 134). When indicating their preference, this segment is more likely to indicate that saving at a financial institution or a mobile phone is the most important channel for their household.

Market implications

There is a collection of attitudinal, behavioral, and circumstantial factors that define smallholder farming households in Tanzania. This segmentation model offers a dynamically nuanced perspective to capture the unique points within each segment and leverage them for positive market interventions.

Smallholder farmers in Tanzania are not a monolithic group. Instead, there are five segments that characterize the landscape.

- The "farming for sustenance" and "battling the elements" segments

FIGURE 134. View saving money through different mediums as very important

Financial institution — 80%
On a mobile phone — 76%
At home — 35%
With an informal group — 34%
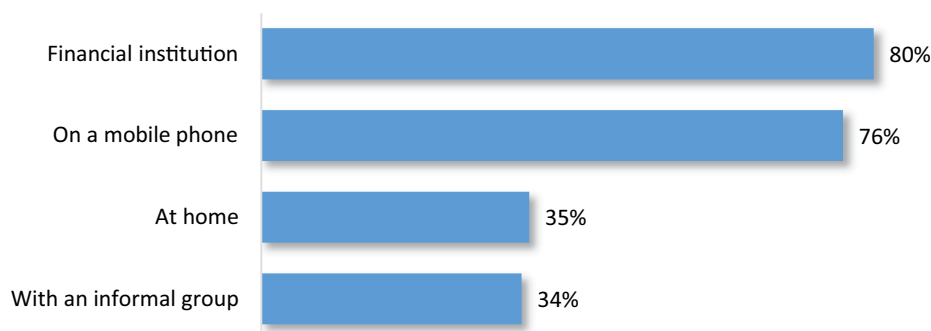
Sample: "Strategic agricultural entrepreneurship" households, n=391

FIGURE 135. Most important medium for saving money
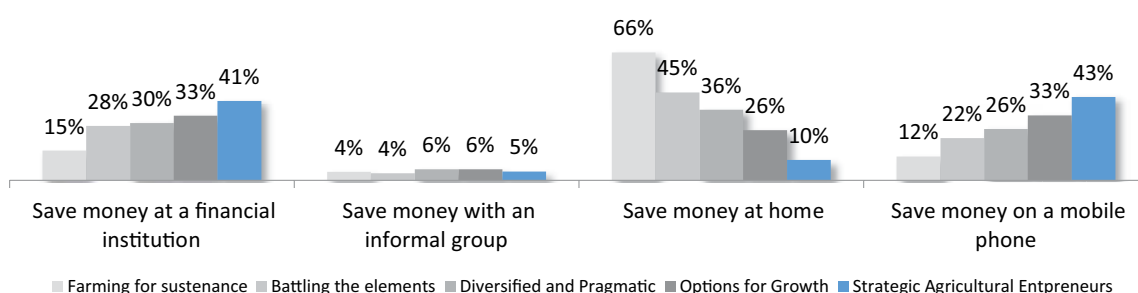
(Sample: Smallholder farmers by segment)

are the furthest from financial inclusion. They currently lack the skills and tools to join the digital financial ecosystem. They are more vulnerable segments, as they are the poorest and the least educated, with the least savings and the fewest places to turn when something goes wrong. Together they comprise about a third (33 percent) of the smallholder farming population in Tanzania.

- "Farming for sustenance" farmers are the most vulnerable and they are relatively older. Very few are under 30 in this segment, most are over 50.

- "Battling the elements" farmers are considerably younger, with sizable portions under 40 and even under 30. They are newer to farming, are slightly more educated, and do not suffer from extreme poverty to the degree that "farming for sustenance" does.

- The "diversified and pragmatic" segment is the largest segment, encompassing about a third (29 percent) of smallholder households in Tanzania. They have paved a way for themselves in agriculture, but have diversified, so that farming alone does not have to sustain them.

- The "options for growth" segment is also a sizable segment, including over two in 10 of the country's smallholder households. They have built a good life for themselves in agriculture, while also cultivating other revenue streams. Their future offers choices and options for how they sustain themselves. Their profile is similar to the "diversified and pragmatic" segment, though smallholder households in the "options for growth" segment are younger, more financially stable, and more financially included.

- The segment of "strategic agricultural entrepreneurs" is the smallest group, comprising just 15 percent of smallholder household in Tanzania. Though relatively small, this segment is important. These are the potential trendsetters and catalysts within the smallholder household sector in Tanzania. They are financially included and are using and innovating with mobile money.

Fostering greater financial inclusion, agricultural stability and growth, as well as overall economic well-being requires an approach specific to each segment. This segmentation highlights several agricultural and digital financial implications for the field.

FIGURE 136. Number of income sources for the smallholder household
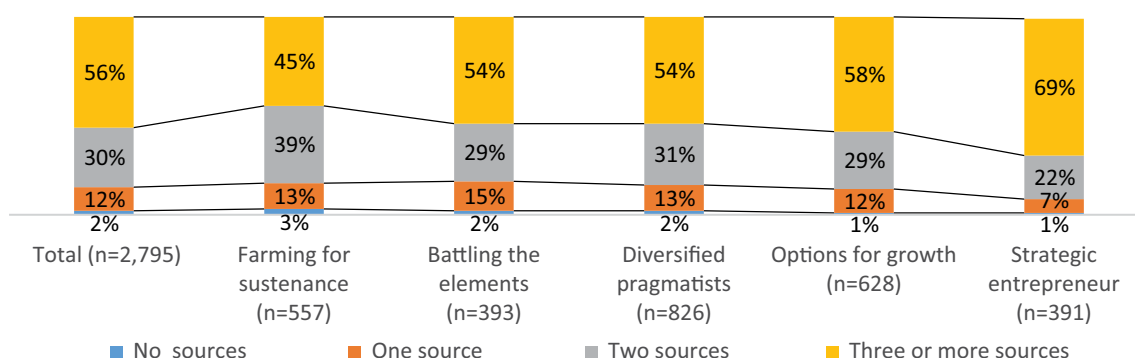
(Sample: Smallholder farming households by segment)

Agricultural Finance Implications

Implication 1: Household income sources expand and diversify for more stable households

The more vulnerable "farming for sustenance" and "battling the elements" segments are highly dependent on their land, and unexpected events that impact this resource impact them, sometimes severely. Along the segmental progression toward "strategic agricultural entrepreneurs," income sources grow and diversify, implying that the more

vulnerable segments could benefit from more diverse revenue streams.

Implication 2: More stable, diversified, and productive households might have greater needs to manage unexpected events

The higher income, more stable segments may have greater risk management needs. All farmers face income loss due to weather, pests, and disease, but the "diversified and pragmatic," "options for growth," and "strategic agricultural entrepreneur" segments have a heightened

FIGURE 137. Experienced income loss due to market factors
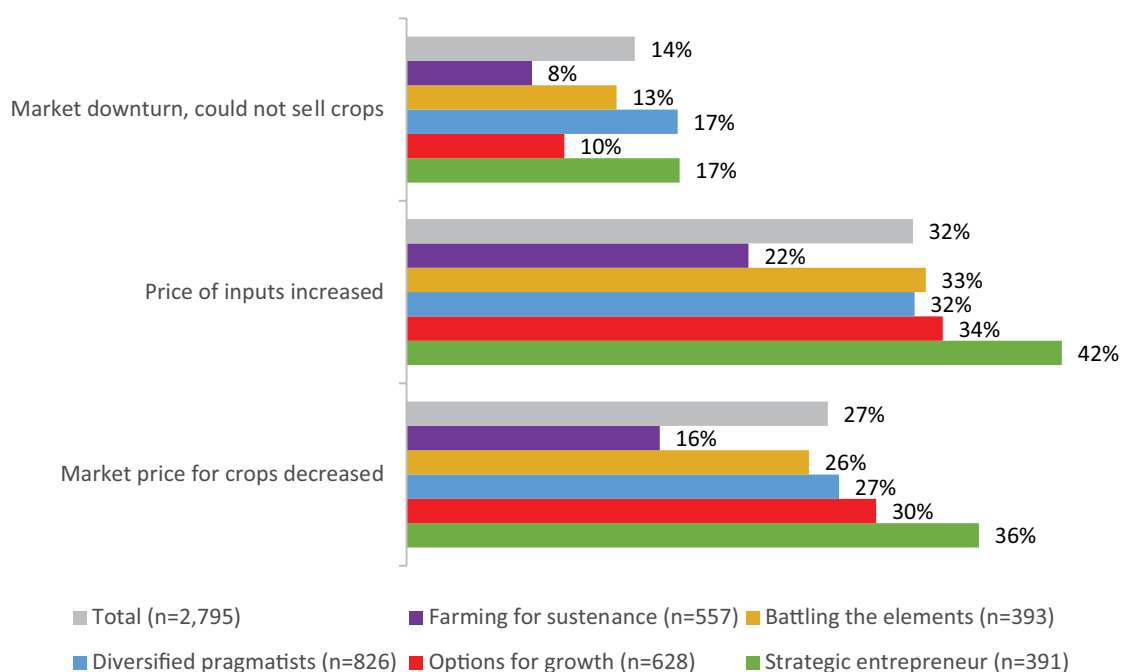
(Sample: Smallholder farmers by segment)

chance of losing income to market fluctuations when buying inputs or selling crops. To cope they rely on their savings or a temporary job, or they just take the loss.

Very few have any kind of insurance, let alone a mechanism to protect them against market fluctuations. Risk management mechanisms that protect these segments from the income impact that results from changing prices for crops and inputs could be important to make agriculture work better for these important segments of smallholder households in Tanzania.

Implication 3: There are suggestions of more fruitful land-to-crop ratios among the less vulnerable segments

Compared to the other segments, the "strategic agricultural entrepreneurs," "options for growth," and "diversified and pragmatic" segments tend to have more land, grow

fewer crops (overall and for sale), have more income sources, and show higher incomes and greater economic stability. It can be surmised that there is income stability that comes from diversification, as well as strategy for a ratio of crops to land.

As their name would suggest, the "strategic agricultural entrepreneurs" may have found a sweet spot for balancing land, crops, and income sources. They have the most land, grow the fewest number of crops, have more income sources, and boast the highest incomes and stability among smallholder households in Tanzania.

Implication 4: Young farmers are in a precarious position in the market, and might need targeted assistance

Among smallholder families in Tanzania, young heads of households are a minority. And the young heads of

FIGURE 138. Perceptual map of crop growth, income and land
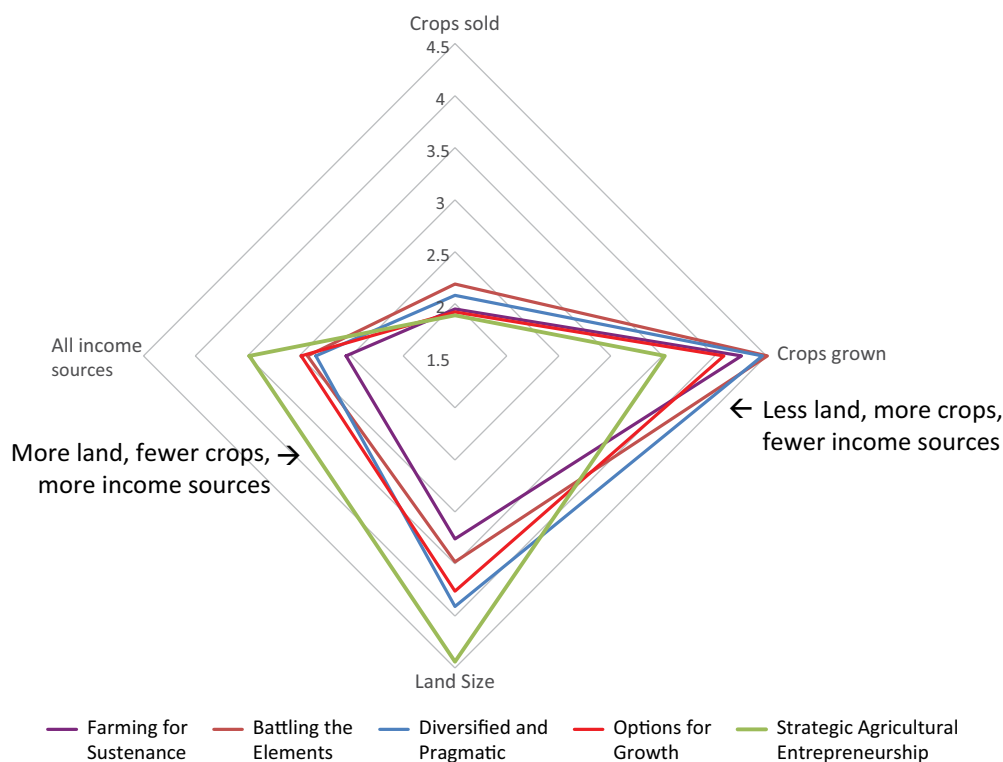
(Sample: Smallholder farming households by segment)

About this graph: A radar graph shows four different dimensions on one plane to spatially depict those dimensions alongside each other to show the relationship between the dimensions, and the dynamic that it forms for the population. This radar graph plots the following four dimensions; number of crops grown, number of crops sold, number of income sources, and land size in hectares. Specific values for each variable are in the grid below for reference.

TABLE 20. Individual scores and percentages for crops, land size and income sources

Segment	# Crops grown	# Crops grown/sold	Land size hectares	Number of Income Sources	Income from crops/livestock	Largest income source (crop/livestock)
Farming for sustenance (n=557)	4.26	1.95	3.26 ha	2.55	79.82% / 28.26%	72.88% / 4.77%
Battling the elements (n=393)	4.51	2.19	3.48 ha	2.92	79.25% / 28.20%	66.83% / 7.91%
Diversified pragmatists (n=826)	4.46	2.08	3.91 ha	2.84	73.71% / 29.94%	61.09% / 4.88%
Options for growth (n=628)	4.09	1.92	3.76 ha	2.98	73.07% / 28.64%	60.95% / 2.28%
Strategic agricultural entrepreneurship (n=391)	3.52	1.898	4.44 ha	3.48	66.68% / 24.40%	41.95% / 6.08%

(Sample: Smallholder households by segment)

FIGURE 139. Age distribution (Head of Household)

	15-29	30-39	40-49	50-59	over 60

(Sample: Smallholder farmers by segment)

households are most likely to be found in the "battling the elements", "strategic agricultural entrepreneurs," and "options for growth" segments. These segments are also newer to farming, mostly because of the youth within the segment.

The preponderance of youth in the vulnerable "battling the elements" segment is a concern. These younger farmers need a new, contemporary way to operate their farm to minimize their vulnerability and build opportunity.

Young smallholders in the "options for growth" and "strategic agricultural entrepreneurs" segments are not as vulnerable, and are making a living off farming. They also have a back-up plan if farming does not yield enough support for their households, and could leave the agricultural sector. If retaining young farmers is important for the sector, these two segments will need special attention and retention efforts so that farming continues to be a viable option for them.

Digital Finance Implications

Implication 1: Mobile money is a critical tool for the financially included segments

Mobile money enables close to half (49 percent) of the population of smallholder farmers in Tanzania to be financially included. No other formal financial channel is as prominent across the population as mobile money. It is even more prominent than any of the informal financial mechanisms.

Its presence, combined with the ways in which the market has begun to use mobile money, signifies just how important a component it is for agricultural finance and digital finance.

Furthermore, many smallholders have adopted a mindset conducive to the perception of mobile phones as a channel for digital finance. Smallholders want to save money on their mobile phone, consider a mobile phone an important tool for their financial and agricultural lives, and are generally interested in doing more with their phone.

Implication 2: Less financially included segments need access to mobile phones to catalyze financial inclusion

Perhaps the first, and most notable barrier to bringing the "farming for sustenance" and "battling the elements" segments into the financial fold is equipping them with a mobile phone. Only 46 percent and 62 percent of these segments, respectively, have a phone in their home, and fewer have their own. This is in stark

FIGURE 140. Perceptual map of mobile phone ownership (household) and financial inclusion by size of market segment
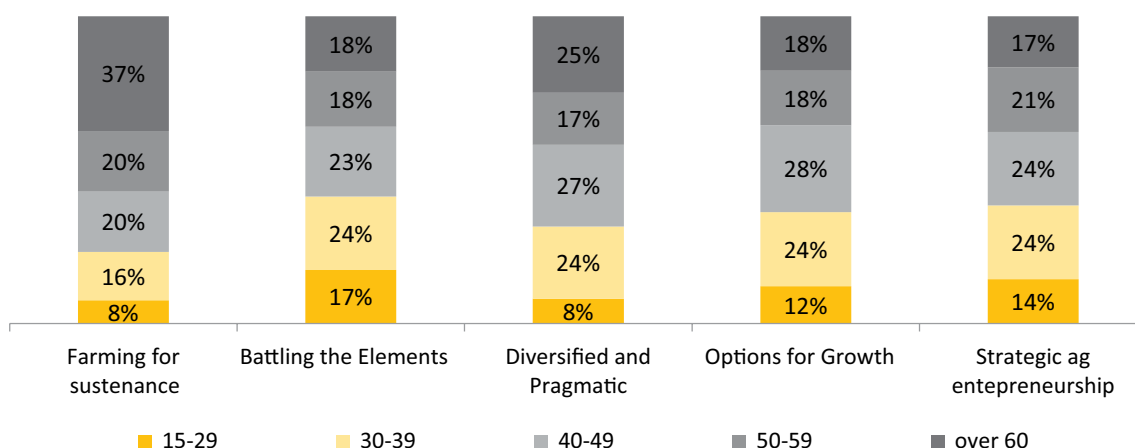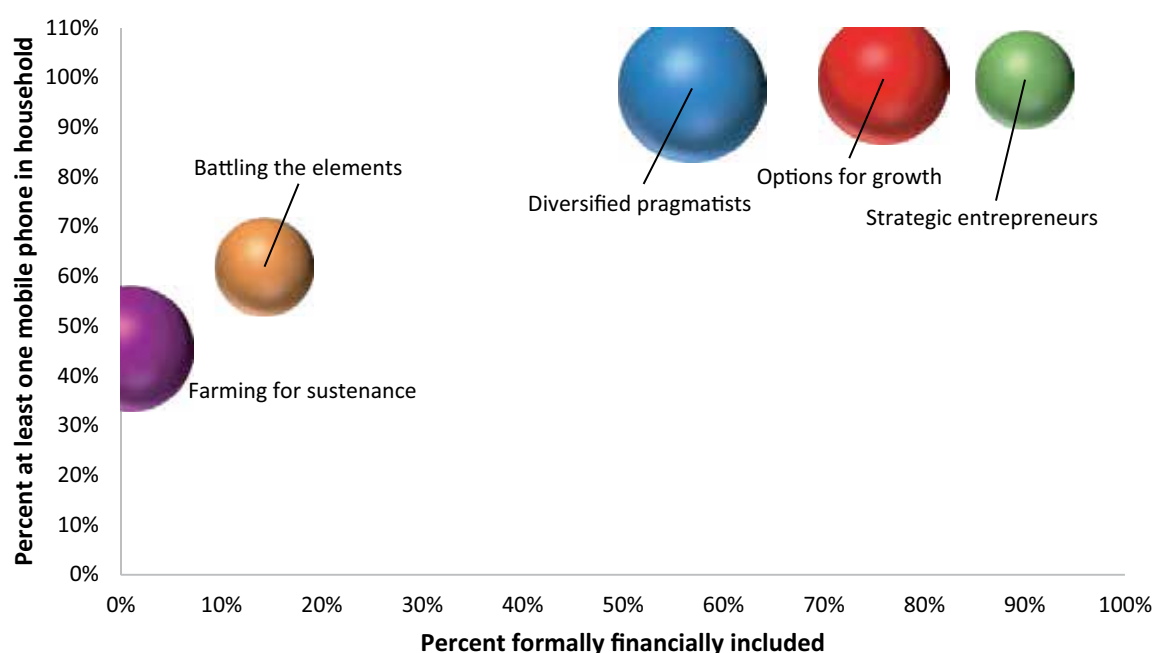

Sample: Smallholder farmers by segment
About this graph: A bubble chart shows three different dimensions on one plane to spatially depict relationships and placement of groups of people, or in this case, segments. The size of the bubble represents the size of segment (percentage of overall population). The X axis represents the percentage of the segment that is financially included, and the y axis represents the percentage of the segment that have a mobile phone.

contrast to the other segments, who all largely have a phone in their home.

Figure 140 depicts each of the five smallholder farming segments on a three-dimensional chart, called a bubble chart. The size of the bubble represents the size of the segments relative to each other. The x-axis represents the percentage of each segment that is financially included, and the y-axis represents the percentage that have a mobile phone in their household. The "farming for sustenance" and "battling the elements" segments appear in the lower left hand side of the chart, illustrating their low cell phone ownership and financial inclusion compared to other segments.

Implication 3: Less financially included segments also need meaningful knowledge about mobile money

There is a notable awareness gap between the more vulnerable segments, and the more stable segments. The "farming for sustenance" and "battling the elements" segments are not nearly as aware of a mobile money provider as the others. This indicates a need to introduce these farmers to providers, ideally with value-based messaging that pairs what the farmer needs or aspires to with what digital financial services offer.

In Figure 141, the size of the bubble represents the size of the segments relative to each other. The x-axis represents the percentage of each segment that is financially included, and the y-axis represents the percentage that are aware of a mobile money provider. The "farming for sustenance" segment appears in the lower left hand side of the chart, illustrating its low awareness of a mobile money providers and financial inclusion compared to other segments. The "battling the elements" segment is higher, exhibiting more awareness, but still lagging other segments.

FIGURE 141: Perceptual map of awareness of mobile money provider and financial inclusion by size of market segment:
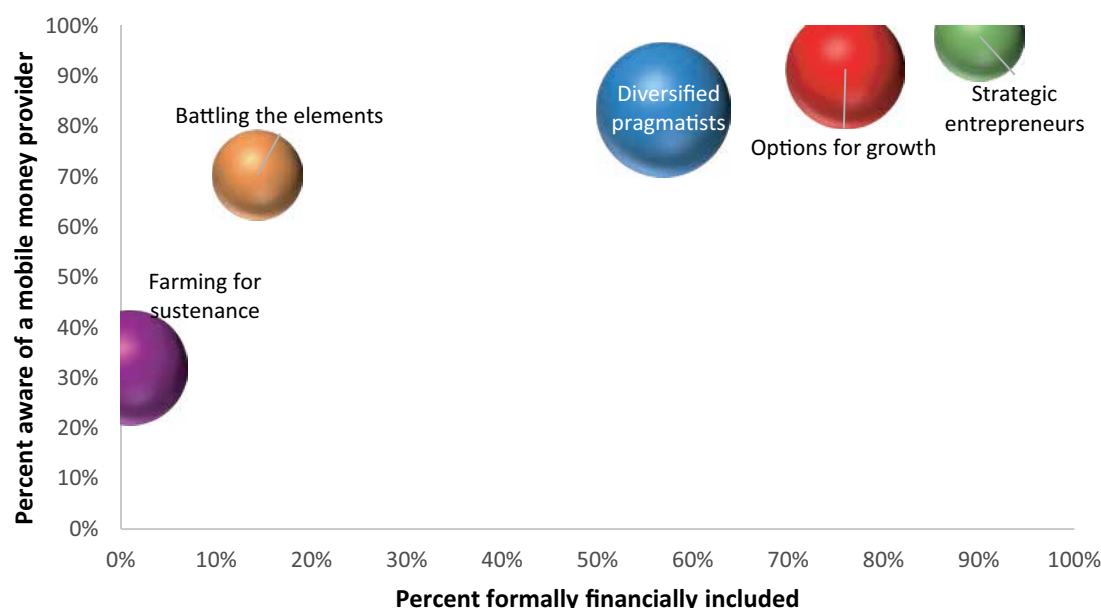
Sample: Smallholder farmers by segment
About this graph: A bubble chart shows three different dimensions on one plane to spatially depict relationships and placement of groups of people, or in this case, segments. The size of the bubble represents the size of segment (percentage of overall population). The X axis represents the percentage of the segment that is financially included, and the y axis represents the percentage of the segment that are aware of the mobile money provider

Implication 4: There are synergies between mobile phones and finance that bode well for making agricultural finance easy and accessible

The more stable segments, "options for growth," "strategic agricultural entrepreneurs," and "diversified and pragmatic," have a connection between a mobile phone and their financial lives for various financial functions, and particularly savings. In fact, large portions think it is most important to save on a mobile phone, more so than in a bank or through an informal savings mechanism. Cultivating this connection and building the digital ecosystem can help facilitate agricultural finance for those financially included segments, and it is desirable for those who are not yet included.

In Figure 142, each of the five segments are positioned on the bubble chart at the intersection of financial inclusion and perceived importance of saving on a mobile phone. The bubble represents the size of the segment relative to other segments. The x-axis represents the percentage of each segment that is financially included, and the y-axis represents the percentage that think it is more important to save on a mobile phone than any other means. The connection is strongest for "strategic agricultural entrepreneurs," the most financially included. "Diversified and pragmatic" and "options for growth" lag. "Farming for sustenance" and "battling the elements" also lag; however, these face other barriers to financial inclusion.

Cultivating all segments

These several agricultural and financial implications show that there is a need for more targeted approaches to supporting the smallholder farming population in Tanzania. It is important to tend to the segments that struggle, as well as cultivate those segments that are more stable and already financially included.

FIGURE 142. Perceptual map of importance of saving on a mobile phone and financial inclusion by size of market segment:
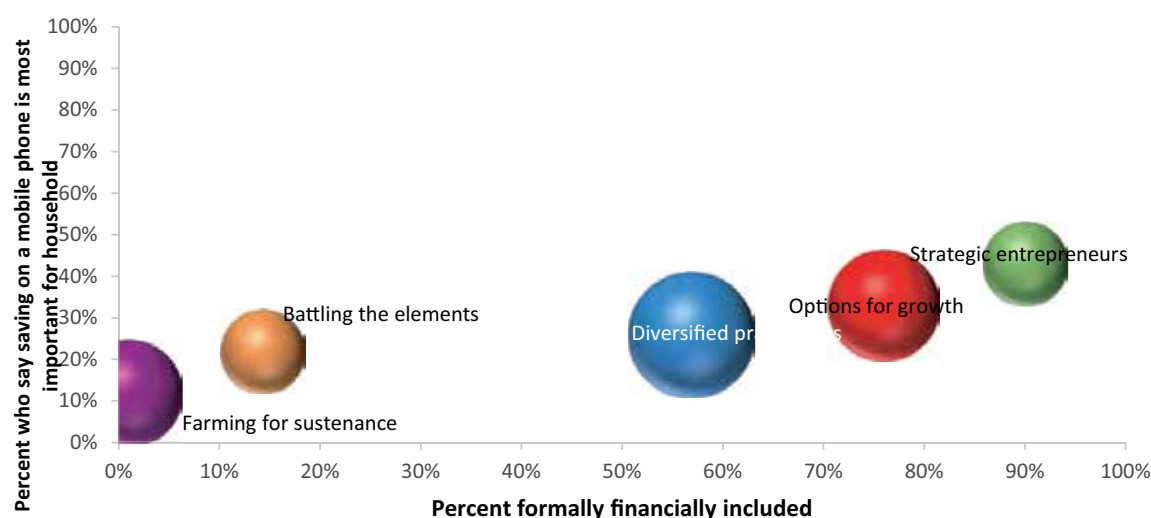
Sample: Smallholder farmers by segment
About this graph: A bubble chart shows three different dimensions on one plane to spatially depict relationships and placement of groups of people, or in this case, segments. The size of the bubble represents the size of segment (percentage of overall population). The X axis represents the percentage of the segment that is financially included, and the y axis represents the percentage of the segment that are aware of the mobile money provider.

There is value in tending to the segments that struggle. Finding entry points to financial inclusion among these vulnerable segments of smallholder households in Tanzania will be challenging, but given that these two segments comprise a third (33 percent) of the sector, its size also presents opportunities. The "battling the elements" segment also includes a preponderance of young smallholders who are the heads of households.

They, therefore, have greater lifetime value and importance in the sector, given their overall scarcity in the marketplace. "Farming for sustenance" and "battling the elements" segments need mobile phones, awareness of mobile money, products to help protect them against weather, pests and disease, and perhaps even crop planning so they can better manage their land and diversify income sources.

It is also important to cultivate those segments that are more stable and already financially included, keeping them, and especially their youth, a satisfied and productive part of the agricultural sector in Tanzania. "Diversified and pragmatic," "options for growth," and "strategic agricultural entrepreneurs" could benefit from a growing digital ecosystem that makes agricultural finance easy for them, as well as mechanisms for persevering market fluctuations, and perhaps even ways to invest in their agricultural endeavors.

In a market as heterogeneous as Tanzania, it will take multiple approaches and strategies to best position financial and agricultural mechanisms for meaningful uptake and use within a population. Providers have the opportunity to choose their target segment, and better calculate their approach as well as potential return with each segment. At the same time, stakeholders can consider how to shape the sector according to the distinct needs of each.

7. DESIRES AND ASPIRATIONS

The national survey of smallholder farmers in Tanzania also included a series of questions on what financial and agricultural tools farmers considered relevant in their agricultural and financial lives, what they want and need, and how that differs from what they have now. This section analyzes the desires and aspirations of smallholder households in Tanzania as a tool for identifying where financial and agricultural mechanisms can be most relevant, and what farmers think they want (or need) the most. This analysis of the smallholder population in Tanzania presents the overall picture, as opposed to focusing on any one behavioral segment, largely because many of these desires and aspirations span the population.

Smallholder households know the importance of saving, investing in financial institutions

Financial products, particularly financial accounts and insurance, are highly relevant to all smallholder households in Tanzania. They not only recognize how important these mechanisms are for their household, but also for their agricultural activities. And there is some strength in that belief. Most feel that insurance and accounts are "very important," compared to just "somewhat important," showing intensity.

Close to nine in 10 smallholder households consider insurance and mobile money "very important." Close to eight in 10 and seven in 10 say that having a savings accounts and nonsavings bank accounts are also seen as important. Though credit lags somewhat, 45 percent still feel it is very important to their household (Figure 143). The findings are similar when you ask smallholder farmers about the perceived relevance of these financial products to their agricultural activities (Figure 144).

This perceived relevance of financial tools for either their households or their agricultural activities among smallholder households in Tanzania carries through to the importance of saving. When asked where they should save, a majority of smallholder farmers believe it is very important to save at a financial institution and even on a mobile phone (Figure 145). There is a great opportunity here as the inherent importance for Tanzania smallholder farmers is already present. Saving with an informal group received the lowest level of importance.

FIGURE 143. Regardless of what you have, how important is it to your household to have the following?

	Very important	Somewhat important	Not important	Don't know
Insurance	86%	9%	5%	1%
Mobile money account	85%	10%	5%	0%
Savings account	78%	13%	8%	0%
Bank account (non-savings)	69%	13%	17%	1%
Credit	45%	22%	31%	2%
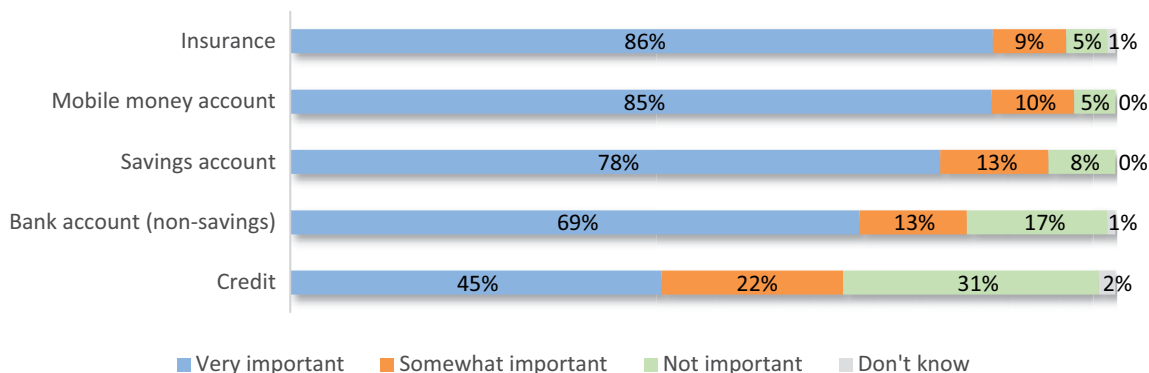
Sample: Smallholder households, n=2,993

FIGURE 144. How important is it to your agricultural activities to have the following?

	Very important	Somewhat important	Not important	Don't know
Insurance	87%	7%	5%	1%
Mobile money account	85%	10%	5%	1%
Savings account	78%	13%	8%	1%
Bank account (non-savings)	65%	15%	19%	1%
Loan	59%	17%	23%	1%
Credit	43%	20%	34%	3%
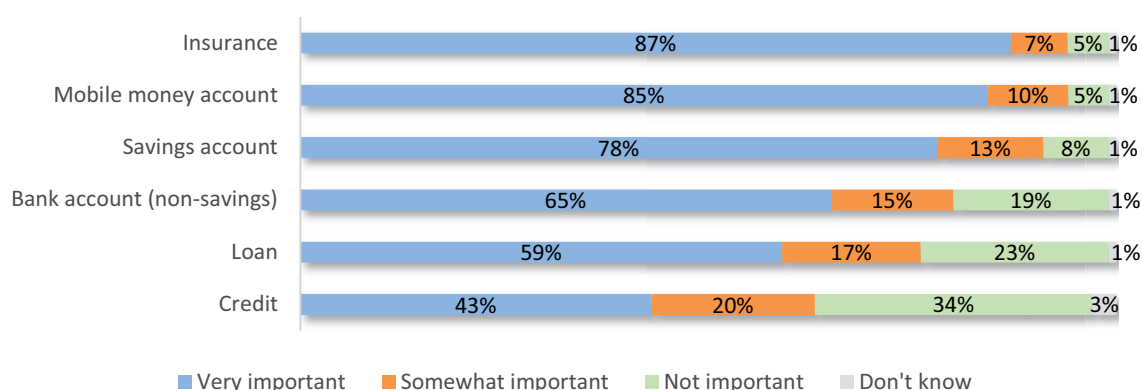
Sample: Smallholder farmers, n=2,795

Savings priorities: Health and future expenses

The majority of smallholder farmers in Tanzania feel it is very important to save for future purchases, health care, an unexpected event, regular purchases, and school fees (Figure 146). Looking at the trend, smallholder farmers tend to save for a planned future purchase and also recognize the fact that healthcare and having a safety net is important. When asked what they need to do the most, they chose health care as a planned future purchase, followed by saving for both the future and unexpected events (Figure 147).

Smallholder farmers in Tanzania demonstrate that trust, purpose, and ease of access are important factors to consider while saving. They value storing money in a trustable place that can be easily accessed in case of an emergency with minimal risk of losing it. They also perceive that saving money for purpose is critical mainly because it provides a target and ensures discipline (Figure 148). When this desired mindset is in place, it serves as the first step in building relevance of financial mechanisms that pair to these beliefs.

Investing priorities: The farm

While savings tends to serve health and future purposes, nearly all (93 percent) smallholder farmers in Tanzania consider the farm an important place to invest as well (Figure 149). Many say the farm is the most important

FIGURE 145. How important is it for your household to save at each of the following?

	Save money at a financial institution	Save money on a mobile phone	Save money at home	Save money with an informal group
Don't know	0%	1%	0%	1%
Not important	9%	10%	17%	31%
Somewhat important	12%	17%	23%	26%
Very important	79%	72%	59%	42%

Very important Somewhat important Not important Don't know
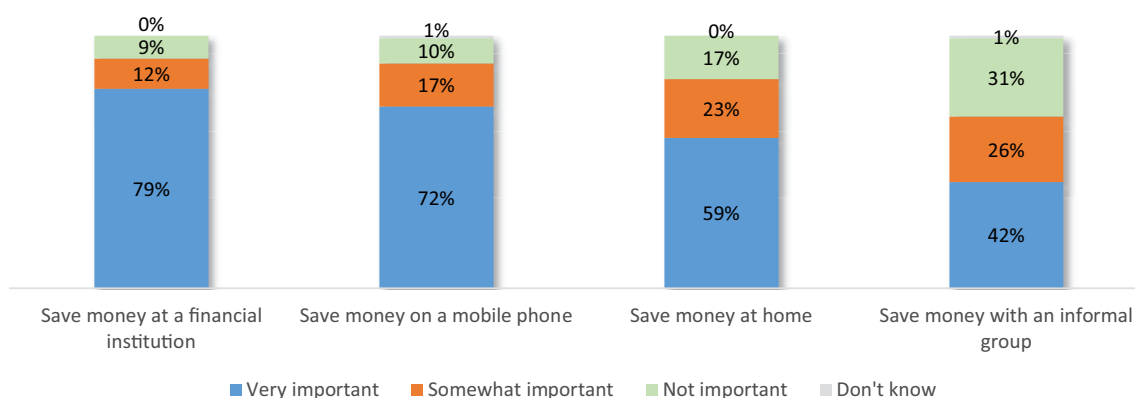
Sample: Smallholder farmers, n=2,795

FIGURE 146. How important is it for your household to save for each of the following?

	Very important	Somewhat important	Not important
Save money for a future purchase	94%	4%	1%
Save money for health care	94%	5%	1%
Save money for an unexpected event	85%	11%	4%
Save money for regular purchases	82%	15%	3%
Save money for school fees	81%	11%	8%

■ Very important ■ Somewhat important ■ Not important
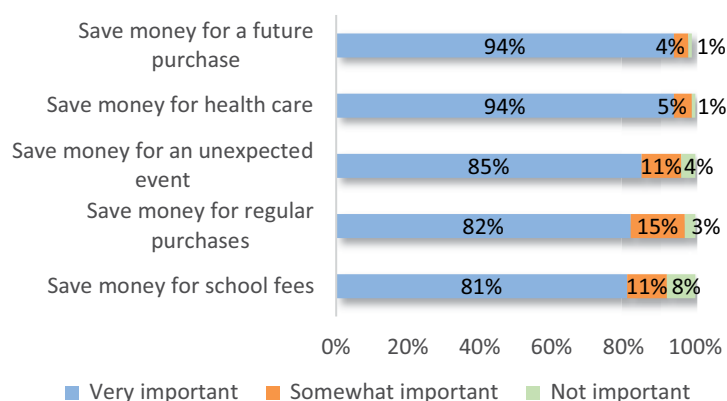
Sample: Smallholder farmers, n=2,795

FIGURE 147. Which of the following do you feel your household needs to save for the most?

- Save money for a future purchase: 20%
- Save money for an unexpected event: 20%
- Save money for regular purchases: 11%
- Save money for school fees: 6%
- Save money for health care: 32%
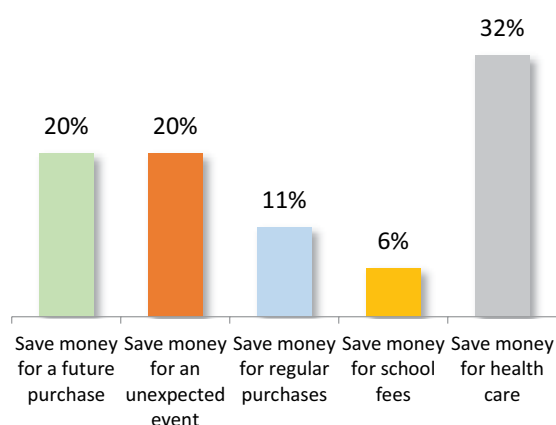
Sample: Smallholder farmers, n=2,793

place to invest their money, followed by healthcare (Figure 150). Investing in educational opportunities and the home are also considered "very important" to a smaller portion of the population.

Desires and aspirations: Smallholder households prefer to borrow from banks even though they ultimately turn to other sources for loans

Smallholder farmers in Tanzania recognize the importance of borrowing from formal institutions such as banks for their agricultural activities. Banks also tend to carry greater importance than family and friends, MFIs, or informal options (Figure 151).

FIGURE 148. Do you agree or disagree with the following statements?

	Agree	Disagree	Don't know
I like to store my money somewhere I trust	97%	3%	0%
I like to store money somewhere for a specific purpose	94%	6%	0%
I like to save my money in case of an emergency	93%	7%	0%
I need to be able to access my money immediately	91%	9%	0%
I like to save my money in an account because it is safer	85%	15%	0%
Storing my money somewhere is easier than saving in an account	71%	28%	1%
When my money is in an account, it is constantly working for me	63%	34%	3%

■ Agree ■ Disagree ■ Don't know

Sample: Smallholder farmers, n=2,795

FIGURE 149. How important is it for your household to invest in each of the following?

Invest money in a farm — Very important 93%, Somewhat important 5%, Not important 2%

Invest money in a future educational opportunity — Very important 85%, Somewhat important 11%, Not important 4%

Invest money in a home/home improvement — Very important 84%, Somewhat important 12%, Not important 4%

■ Very important ■ Somewhat important ■ Not important

Sample: Smallholder farmers, n=2,795

FIGURE 150. Which of the following do you feel your household needs to do the most?

Don't know 1%
Healthcare 28%
Invest money in a farm 43%
Business 12%
Invest money in a future educational opportunity 9%
Invest money in a home/home improvement 7%

Sample: Smallholder farmers, n=2,794

Nevertheless, despite the perceived the importance of banks, smallholders will turn to family and friends or informal financial mechanisms more frequently than banks for credit. (Figures 152 and 153). This suggests that there are some barriers, either real or perceived, that prohibit farmers from even attempting to borrow from banks when the need arises.

Smallholder farmers in Tanzania consider a host of factors when borrowing money, including interest rate, quick access, repayment terms, convenience, and the loan amount that they could receive (Figure 154). The top reasons for borrowing money are focused on either investing in their business or in their farms and agricultural activities. The only other

major reason is in case of an emergency (Figure 156). Only one in 10 currently have an outstanding loan (Figure 155).

Desires and aspirations: There is high interest in plans for credit or savings inputs and school fees

Smallholder farmers in Tanzania consider savings, credit, and payment plans for school fees and inputs (Figure 157) important to their agricultural activities. Comparatively, prepaid cards and mobile money accounts have less recognized importance. While financial practices

FIGURE 151. For your agricultural activities, how important to you is it to borrow from each of the following?

Bank — Very important 66%, Somewhat important 16%, Not important 17%, Don't know 1%

Friends and family — Very important 53%, Somewhat important 27%, Not important 19%, Don't know 1%

Microfinance institution — Very important 46%, Somewhat important 28%, Not important 25%, Don't know 1%

Cooperative — Very important 37%, Somewhat important 25%, Not important 37%, Don't know 1%

SACCO — Very important 36%, Somewhat important 25%, Not important 37%, Don't know 2%

Informal money lender — Very important 28%, Somewhat important 22%, Not important 49%, Don't know 1%

■ Very important ■ Somewhat important ■ Not important ■ Don't know

Sample: Smallholder farmers, n=2,795.

FIGURE 152. In the past 12 months, have you attempted to borrow from any of the following?

Friends and family	37%
Informal money lender	5%
Microfinance institution	4%
VSLA	3%
Bank	3%
SACCO	2%
Cooperative	1%
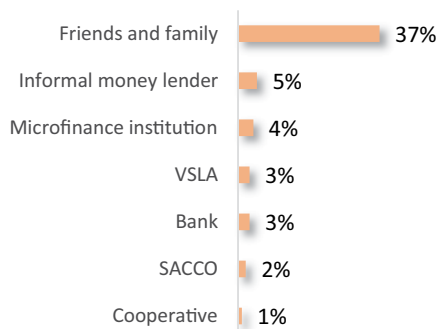
"Yes" answers
Sample: Smallholder farmers, n=2,795

FIGURE 153. If the need arose, would you attempt to borrow from any of the following?

Friends and family	78%
Bank	62%
Microfinance institution	50%
VSLA	44%
SACCO	40%
Cooperative	38%
Informal money lender	29%
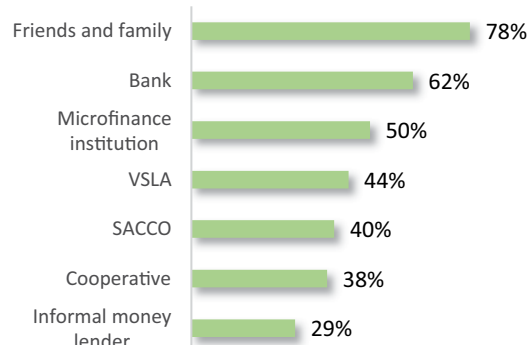
"Yes" answers
Sample: Smallholder farmers, n=2,795

FIGURE 154. What factors would you consider when you want to borrow money?

Best interest rates	68%
Quickest access to money	50%
Best repayment terms	47%
Most convenient to get to	33%
Loan size	27%
Trust in a financial institution	19%
Easiest to use	13%
Was desperate / no other options	13%
Met minimum requirements	11%
Recommended by a friend	7%
Have borrowed from them before	7%
Don't know	2%
Other	2%
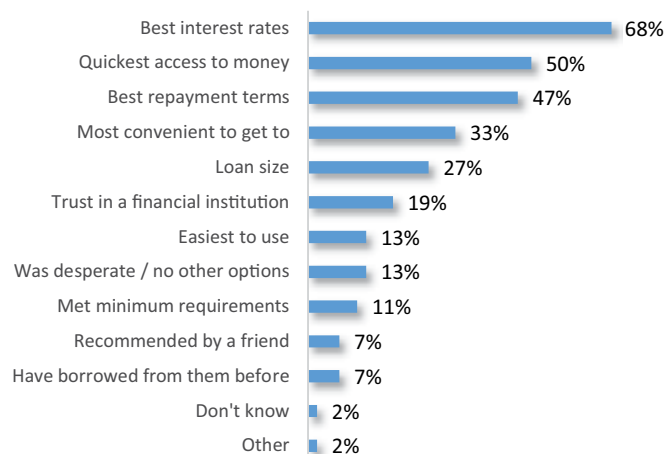
Sample: Smallholder farmers, n=2,795
Multiple responses allowed

FIGURE 155. Do you currently have any loans?

Yes 10%

No 90%
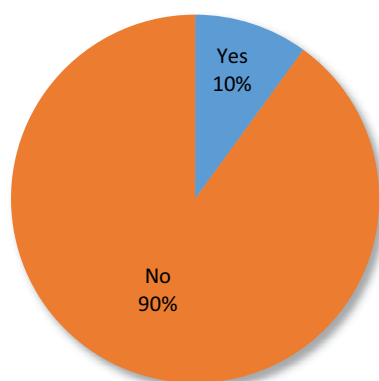
Sample: Smallholder farmers, n=2,795

and consumer interests orient smallholder farmers in Tanzania toward informal financial mechanisms, a number of financial products resonate as important for this group, presenting an opportunity to build meaning and relevance for more formal financial mechanisms.

Very few smallholder farmers in Tanzania currently have any of these products, with the highest percentages at 8 percent and 9 percent for payment and savings plans for inputs, respectively (Figure 158). For those who do not currently have these products, the highest demand is

FIGURE 156. What would be the main reasons for borrowing money?

Reason	%
To start a new business or expand my business	44%
To buy inputs	37%
For emergency expenses	36%
For other agricultural activities	33%
To improve the cash flow situation of my business	21%
To make big purchases such as land or modern equipment	18%
To cover daily expenses	14%
To pay for school fees	13%
Other	5%
Don't know	2%
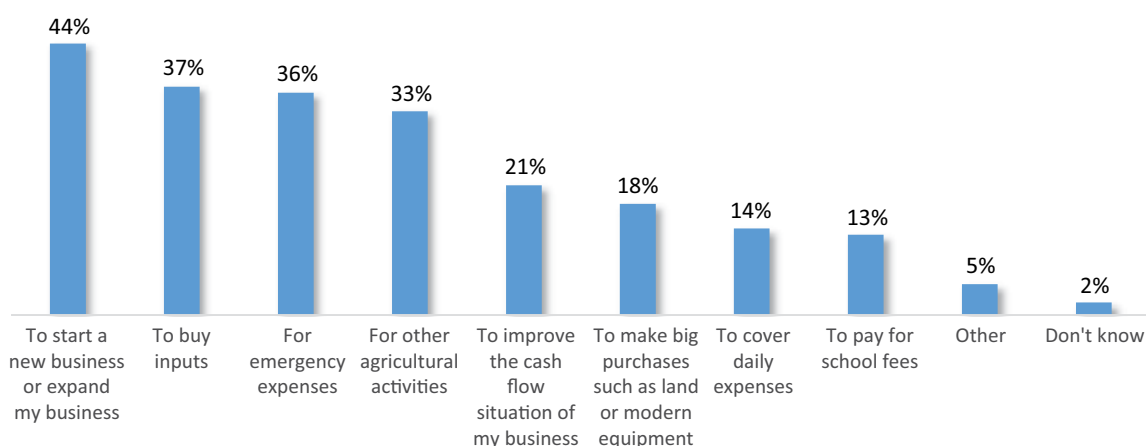
Sample: Smallholder farmers, n=2,795
Multiple responses allowed

FIGURE 157. How important is each of the following products to your agricultural activities?

	Very important	Somewhat important	Not important	Don't know
A savings plan for inputs	71%	16%	12%	1%
A payment plan for inputs	70%	17%	12%	1%
A credit plan for school fees	59%	18%	21%	2%
A goal savings plan or contractual savings plan for school fees	57%	21%	21%	2%
A mobile money account that came with a smartphone	45%	23%	29%	2%
A pre-paid card to make payments	41%	20%	35%	4%
A pre-paid card for receiving income	40%	19%	37%	4%
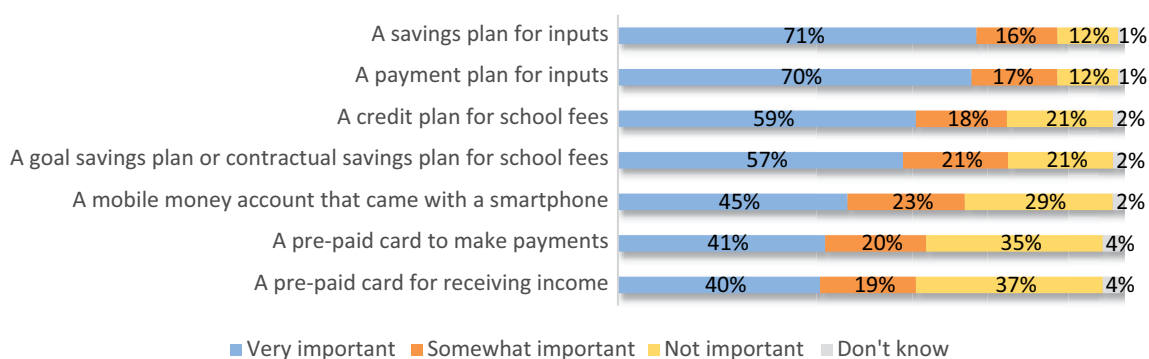
Sample: Smallholder farmers, n=2,795

FIGURE 158. Do you currently have any of the following products for your agricultural activities? Do you want to have any of the following products for your agricultural activities?

	Currently have	Want
Pre-paid card for receiving income	2%	44%
Pre-paid card to make payments	2%	45%
Mobile money account that came with a smartphone	3%	51%
Goal savings or contractual savings plan for school fees	5%	58%
Credit plan for school fees	4%	59%
Payment plan for inputs	8%	69%
Savings plan for inputs	9%	70%
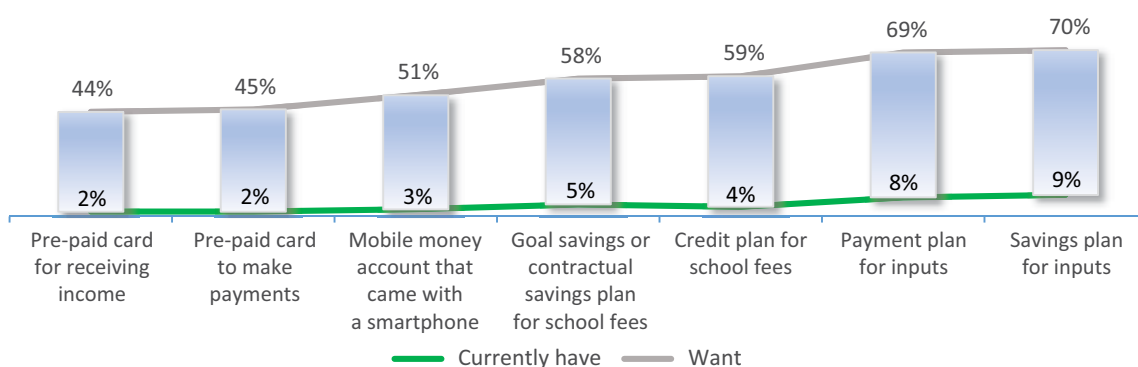
Sample: Smallholder farmers, n=2,795

FIGURE 159. **How important is each of the following products to your agricultural activities**

	Very important	Somewhat important	Not important	Don't know
A loan that came with an insurance plan	68%	14%	17%	1%
A loan that came with a bank account	65%	17%	17%	1%
A loan that is accessed directly through a bank account	61%	20%	18%	1%
A loan that is accessed through a mobile money account	56%	22%	20%	2%
A loan that came with a mobile money account	56%	22%	21%	2%
A loan that is accessed through a mobile money account and linked to a bank account	54%	21%	23%	2%

Sample: Smallholder farmers, n=2,795

for payment and savings plans for inputs, showcasing how important these are to their agricultural activities. School fees present an important opportunity, as 69 percent of smallholder farmers want a credit or layaway plan to address school fees. This comports with what we know about the smallholder's economic cycle. Income is cyclical with the agricultural cycle, while various payments are due more regularly.

Smallholders report moderate to high importance on loans that come with a particular service or accounts. Close to

seven in 10 identify a loan bundled with an insurance plan as the most important. This is followed closely by a range of other credit products, including a loan that comes with a bank account, a loan that can be accessed through a bank account, a loan that can be accessed through a mobile money account, a loan bundled with a mobile money account, and a loan that can be accessed through a mobile money account and linked to a bank account (Figure 159).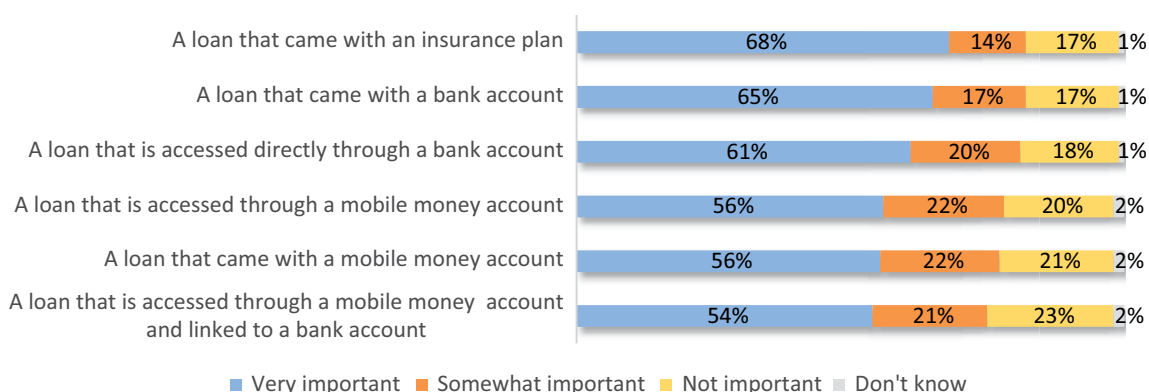 Very few smallholder farmers in Tanzania currently have any of these loans, yet large numbers say they want them (Figure 160).

FIGURE 160. **Do you currently have any of the following products for your agricultural activities? Do you want to have any of the following products for your agricultural activities?**
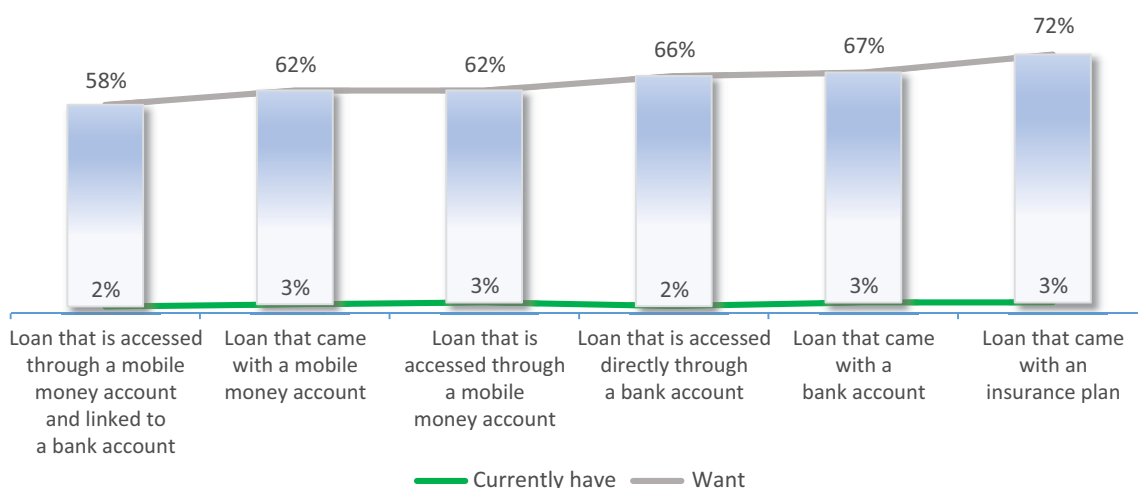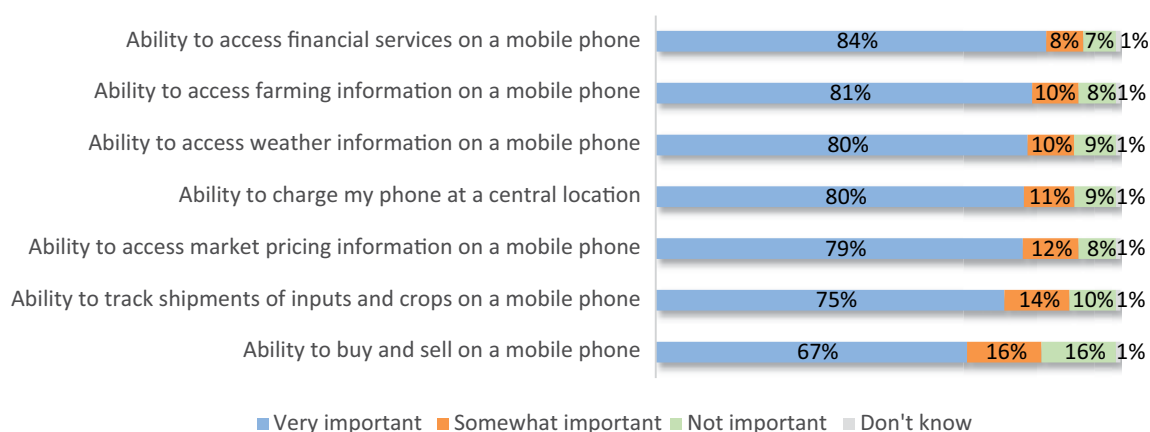

	Loan that is accessed through a mobile money account and linked to a bank account	Loan that came with a mobile money account	Loan that is accessed through a mobile money account	Loan that is accessed directly through a bank account	Loan that came with a bank account	Loan that came with an insurance plan
Want	58%	62%	62%	66%	67%	72%
Currently have	2%	3%	3%	2%	3%	3%

Sample: Smallholder farmers, n=2,795

FIGURE 161. How important is each of the following abilities to your household's agricultural activities?

Ability	Very important	Somewhat important	Not important	Don't know
Ability to access financial services on a mobile phone	84%	8%	7%	1%
Ability to access farming information on a mobile phone	81%	10%	8%	1%
Ability to access weather information on a mobile phone	80%	10%	9%	1%
Ability to charge my phone at a central location	80%	11%	9%	1%
Ability to access market pricing information on a mobile phone	79%	12%	8%	1%
Ability to track shipments of inputs and crops on a mobile phone	75%	14%	10%	1%
Ability to buy and sell on a mobile phone	67%	16%	16%	1%

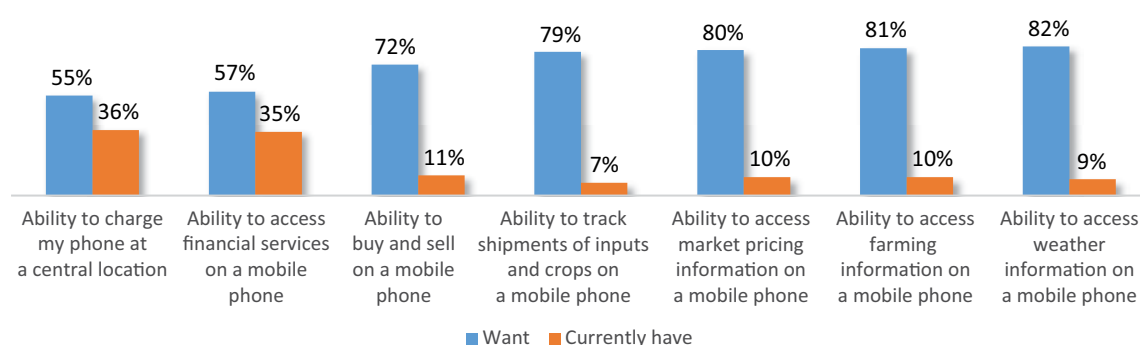■ Very important ■ Somewhat important ■ Not important ■ Don't know

Sample: Smallholder farmers, n=2,795

Desires and aspirations: Mobile products conjure interest

Smallholder farmers can see the importance of leveraging their mobile phone as a tool for their agricultural activities. About eight in 10 state that it would be very important to access financial services, farming information, and weather on their mobile phone. The same number believe that being able to access mobile services by having a centralized charging location for their phones as important. Close to eight in 10 identify the ability to access to market prices and track shipments as important (Figure 161). The ability to buy and sell on a mobile phone ranked lowest, perhaps because it may be difficult to visualize.

In Tanzania, most smallholder households lack the ability to access most of this services, with the highest ability being a third who can charge their phones and access financial services (Figure 162). Generally, six to eight in 10 stated that they would want to have these abilities on a mobile phone.

FIGURE 162. Do you currently have any of the following abilities for your agricultural activities? Do you want to have any of the following abilities for your agricultural activities?

Ability	Want	Currently have
Ability to charge my phone at a central location	55%	36%
Ability to access financial services on a mobile phone	57%	35%
Ability to buy and sell on a mobile phone	72%	11%
Ability to track shipments of inputs and crops on a mobile phone	79%	7%
Ability to access market pricing information on a mobile phone	80%	10%
Ability to access farming information on a mobile phone	81%	10%
Ability to access weather information on a mobile phone	82%	9%

■ Want ■ Currently have

Sample: Smallholder farmers, n=2,795

8. CONCLUDING OBSERVATIONS

This working paper is designed to provide a foundational assessment of the core findings with the deep and robust nationally representative survey and segmentation of smallholder households in Tanzania. The survey and segmentation itself will sustain any number of inquiries about the agricultural and financial landscape of smallholder farmers in the country. This includes, but is not limited to market sizing, value chain assessments, product positioning, target audience profiling and recruitment, and marketing strategy and messaging, as well as benchmarking and tracking for future growth.

Through the process of analyzing the data for this working paper, the research team identified five challenges within the smallholder population in Tanzania.

- The smallholder population in Tanzania is older and aging. And young smallholders are trapped in a more vulnerable segment of the population, living in extreme poverty, dependent on their land, with little income diversity and very few financial tools to help them manage their lives. Smallholder farmers are heavily concentrated on three to four crops: maize, cassava, beans, and sweet potatoes. There is little diversity in what smallholders cultivate.

- There is a heavy dependence on agricultural income among smallholder households in Tanzania, and limited other income sources. Only small portions of the smallholder sector have multiple income streams and, even then, farming is still reported to be the biggest.

- The 51 percent of smallholder households in Tanzania who are not financially included are fairly distanced from financial inclusion. They lack mobile phones for digital access and knowledge of mobile money providers, have never been in a bank, and do not perceive formal financial tools as important.

- Few information channels reach smallholder households in Tanzania. The community shares small amounts of information, mostly through word-of-mouth based on experience or hearsay.

Within those challenges, there are opportunities:

- There are models of sustainable, prosperous smallholder households in Tanzania. Some success has come to smallholders who are more diverse and thoughtfully manage their land, crops and livestock, and income streams, showing that the sector can yield positive experiences.

- This is a mobile money-driven market. Mobile phones are a key connectivity tool for digital finance. The financially included embrace that connection, see a phone as a communications tool, and want to do more with it to foster their financial and agricultural lives.

- There are signs of a budding digital financial ecosystem. Those who have digital financial services, specifically mobile money, are using their accounts frequently and starting to experiment with more advanced uses. They value having a mobile money account for savings and transacting purposes and want to be able to use it in more ways than they currently are.

Combined, the challenges and opportunities for smallholder households in Tanzania have three big-picture implications.

- There is a real need to continue cultivating the digital financial ecosystem.

No other formal channel can compete with mobile money. Without it, many smallholders would not be financially included. They need this type of access to formal financial services to work.

- The retention and even recruitment of young farmers has to be a critical imperative for sustaining Tanzania's agricultural sector. There are few young heads of households within the farming community, and any mass attrition could impact the future of farming for the country.

- Smallholder households need information and tools to plan their agricultural and financial lives. Insurance and savings mechanisms are critical to guard smallholders from the shocks that most of them experience. And it is especially important for those households where so much of their income depends on so few crops. With proper sensitization and product development, these services will be attractive to smallholder households and offer them a credible safety net. Households that depend on what the market will bear may also need some insurance against price fluctuations. The provision of credit services is critical as both a facilitation tool for smallholder household planning and as an incentive or motivation to invest. This could catalyze new product adoption, or even additional financial services, such as savings products to offset a line of credit.

ANNEX 1: METHODOLOGY AND DESIGN

The smallholder household survey in Tanzania is a nationally representative survey with a target sample size of 3,000 smallholder households. The sample was designed to provide reliable survey estimates at the national level.

Sampling Frame

The sampling frame is the list of enumeration areas (EAs) containing agricultural households. These EAs were created in preparation for the 2012 population and housing census. The census questionnaire included a question on whether any household member operated any land for agricultural purposes during the 2011–2012 agricultural year. The information collected led to the identification of agricultural households during the census. Table 1 shows the distribution of agricultural households according to the zone and urban–rural classification.

Sample allocation and selection

For the sample allocation, regions were combined into the following zones:

- Border: Ruvuma, Iringa, Mbeya, Rukwa, and Kigoma

- Coastal: Tanga, Pwani, Dar es Salaam, Lindi, and Mtwara

- Inland: Dodoma, Arusha, Kilimanjaro, Morogoro, Singida, Tabora, Manyara, Njombe, and Katavi

- Lake: Shinyanga, Kagera, Mwanza, Mara, Simiyu, and Geita

- Zanzibar: all islands

To take nonresponse into account, the target sample size was increased to 3,158 households assuming a nonresponse rate of 5 percent observed in similar national household surveys. The total sample size was first allocated to the zones proportionally to the number of agricultural households in the sampling frame. Within each zone, the resulting sample was then distributed to urban and rural areas proportionally to their number of agricultural households (Table A1-2).

Given that EAs were the primary sampling units and 15 households were selected in each EA, a total of 212 EAs were selected (Table A1-3).

The sample for the smallholder survey is a stratified multistage sample. Stratification was achieved by separating each zone into urban and rural areas. The urban–rural classification is based on the 2012 population census. Therefore, 10 strata were created and the sample was selected independently in each stratum.

In the first stage, EAs were selected as primary sampling units with probability proportional to size, the size being the number of agricultural households in the EAs. A household listing operation

TABLE A1-1. Distribution of agricultural households

Zone	Rural	Urban	Total
Border	1,236,971	471,788	1,708,759
Coastal	953,697	1,386,499	2,340,196
Inland	2,178,697	633,648	2,812,345
Lake	1,643,881	437,164	2,081,045
Zanzibar	137,662	112,550	250,212
Tanzania	6,150,908	3,041,649	9,192,557

Source: Database from East African Statistical Training Center

TABLE A1-2. Proportional allocation of the sample

Zone	Rural	Urban	Total
Border	425	162	587
Coastal	328	476	804
Inland	748	218	966
Lake	565	150	715
Zanzibar	47	39	86
Tanzania	2,113	1,045	3,158

TABLE A1-3. Number of EAs to select

Zone	Rural	Urban	Total
Border	28	11	39
Coastal	22	32	54
Inland	50	15	65
Lake	38	10	48
Zanzibar	3	3	6
Tanzania	141	71	212

was carried out in all selected EAs to identify smallholder households and to provide a frame for the selection of smallholder households to be included in the sample. In the second stage, 15 smallholders were sampled in each EA with equal probability.

In each sampled household, a household questionnaire was administered to the head of the household, the spouse or any knowledgeable adult household member to collect information about household characteristics. A multiple respondent questionnaire was administered to all adult members in each sampled household to collect information on their agricultural activities, financial behaviors and mobile money use. In addition, in each sampled household only one household member was selected using the Kish grid and was administered the single respondent questionnaire.

Household listing

The household listing operation was conducted in all selected EAs between 7 December 2015 and 20 January 2016. For this purpose, Intermedia developed a manual describing the listing and mapping procedures. This manual was used for the training of 25 listing teams held in Dar es Salaam. Each listing team consisted of one supervisor, one lister, and one mapper recruited from Ipsos's pool of enumerators. The training

involved both classroom sessions as well field practice.

The household listing was done on smartphones and this required IPSOS to develop a script in Dooblo SurveyToGo software for the listing forms. The script was field tested and validated before it was used for the listing operation.

Sampling weights

The sample for the smallholder survey is not self-weighting, therefore, sampling weights were calculated. The first component of the weights is the design weight based on the probability of selection for each stage of selection. The second component uses nonresponse rates at both household and individual levels.

The design weights for households were adjusted for nonresponse at the household level to produce adjusted household weights. Sampling weights for the multiple respondent data file were derived from adjusted household weights by applying to them nonresponse rates at the individual level. For the single respondent data file, the same process was applied after taking into account the subsampling done within the household.

Finally, household and individual sampling weights were normalized separately at the national level so the weighted number of cases equals the total sample size. The normalized sampling weights were attached to the

respective data files and used during analysis.

Sampling errors

The sample design for the smallholder survey is a complex sample design featuring clustering, stratification and unequal probabilities of selection. For key survey estimates, sampling errors taking into account the design features will be produced using either the SPSS Complex Sample module or STATA based on the Taylor series approximation method.

Questionnaire

To capture the complexity of smallholder households, the questionnaire consisted of three parts, with certain questions asked of all relevant individuals in the household, not just one household member (see Table A1-4).

In each selected household, a Household questionnaire was administered to the head of the household, the spouse, or any knowledgeable adult household member aged 15 and over to collect

TABLE A1-4. Smallholder household survey in Tanzania: Questionnaire sections, respondents, and content

Questionnaire section	Household respondent(s)	Achieved Sample size	Content
1. Household Survey	Head of the household, their spouse, or a knowledgeable adult	n=2,933	• Basic information on all household members (e.g., age, gender, education attainment, schooling status) • Information about household assets and dwelling characteristics to derive poverty status
2. Multiple-Respondent Survey	All household members over 15 years old who contributed to the household income or participated in its agricultural activities	n=5,034	• Demographics (e.g., land size, crop and livestock, decision-making, associations and markets, financial behaviors) • Agricultural activities (e.g., selling, trading, consuming crops, livestock, suppliers) • Household economics (e.g., employment, income sources, expenses, shocks, borrowing, saving habits, investments)
3. Single-Respondent Survey	One randomly selected adult in the household	n=2,795	• Agricultural activities (e.g., market relationships, storage, risk mitigation) • Household economics (e.g., expense prioritization, insurance, financial outlook) • Mobile phones (e.g., use, access, ownership, desire and importance) • Formal and informal financial tools (e.g., ownership, usage, access, importance, attitudes toward financial service providers)

information about household characteristics. Basic information such as age, gender, education attainment, schooling status, and relationship with the household head was collected on all household members. The Household questionnaire also collected information on whether each household member contributes to the household income or participates in the household's agricultural activities. This information was later used to identify all household members eligible for the other two questionnaires. Information on household assets and dwelling characteristics was also collected to derive the socioeconomic/poverty status of households.

A Multiple-Respondent questionnaire was administered to all eligible adult members in each selected household to collect information on their agricultural activities, financial behaviors, and mobile money use. In addition, in each selected household only one eligible household member was selected using the Kish grid and was administered the Single-Respondent questionnaire.

All three questionnaires were translated in Swahili and pretested. After the pretest, debriefing sessions were held with the pretest field staff and the questionnaires were modified based on the observations from the pretest. Following the finalization of questionnaires, a script was developed to support data collection on mobile phones. The script was tested and validated before it was used in the field. The questionnaire are found in the user guide accompanying the datasets for this household survey.

Main training, fieldwork, and data processing

InterMedia's local field partner recruited the interviewers and supervisors for the main fieldwork, taking into account their language skills. Following the recruitment of field staff, a centralized training session was conducted in Dar es Salam from 27 January to 2 February 2016. Each training session consisted of instructions on interview techniques and field procedures, a detailed review of the survey questionnaires, mock interviews between participants in the classroom, and a field practice with real respondents in the areas outside the sampled EAs. Five independent field quality control (QC) staff, directly hired by InterMedia also attended the training.

Twenty-four interviewing teams carried out data collection for the survey on mobile phones. Each team consisted of one supervisor and four to five interviewers. Four staff members from Intermedia's local field partner coordinated and supervised fieldwork activities in addition to the independent QC team hired by Intermedia. The QC team stayed with the survey teams during fieldwork to closely supervise and monitor them. Data collection took place from 6 February to 8 March 2016.

The final data file was checked for inconsistencies and errors by InterMedia, and corrections were made as necessary and where possible.

Deviations in the sample design

The smallholder survey in Tanzania is the third survey in the series following the surveys in Mozambique and Uganda. Fieldwork in those two countries has experienced a lot of failed call backs where identified eligible households and household members could not be interviewed during the time allocated to fieldwork in each country. As a result, the final sample size fell slightly short of the target. For this reason, in Tanzania the number of households selected in each EA was increased from 15 to 17

following the household listing operation in all sample EAs

Response rates

The Tables A1-5, A1-6, and A1-7 show household and household member response rates for the Tanzania smallholder household survey. A total of 3,503 households were selected for the survey, of which 3,020 were found to be occupied during data collection. Of these, 2,993 were successfully interviewed, yielding a household response rate of 99.1 percent.

In the interviewed households 5,935 eligible household members were identified for the multiple respondent questionnaire. Completed interviews were conducted with 5,034 of them thus yielding a response rate of 84.8 percent for the Multiple Respondent questionnaire.

Among the 2,993 eligible household members selected for the Single Respondent questionnaire, 2,795 were successfully interviewed, corresponding to a response rate of 93.4 percent.

TABLE A1-5. Response Rate for the Household Questionnaire

	Border	Coastal	Inland	Lake	Zanzibar	Rural	Urban	Total
Households selected	659	857	1,098	816	73	2,364	1,139	3,503
Households occupied	601	680	960	710	69	2,092	928	3,020
Households interviewed	600	676	940	710	67	2,073	920	2,993
Household response rate	99.8%	99.4%	97.9%	100.0%	97.1%	99.1%	99.1%	99.1%

TABLE A1-6. Response Rate for the Multiple Respondent Questionnaire

	Border	Coastal	Inland	Lake	Zanzibar	Rural	Urban	Total
Eligible household members	1,132	1,250	1,972	1,468	113	4,193	1,742	5,935
Eligible household members interviewed	1,020	1,039	1,622	1,261	92	3,588	1,446	5,034
Response rate	90.1%	83.1%	82.3%	85.9%	81.4%	85.6%	83.0%	84.8%

TABLE A1-7. Response Rate for the Single Respondent Questionnaire

	Border	Coastal	Inland	Lake	Zanzibar	Rural	Urban	Total
Eligible household members	600	676	940	710	67	2,073	920	2,993
Eligible household members interviewed	558	629	886	664	58	1,929	866	2,795
Response rate	93.0%	93.0%	94.3%	93.5%	86.6%	93.1%	94.1%	93.4%

ANNEX 2: RANDOM FOREST

A Random Forest consists of a collection or ensemble of simple tree predictors, each capable of producing a response when presented with a set of predictor values.[41] For classification problems, this response takes the form of a class membership, which associates, or classifies, a set of independent predictor values with one of the categories present in the dependent variable. Alternatively, for regression problems, the tree response is an estimate of the dependent variable given the predictors. The Random Forest algorithm was developed by Breiman.

A Random Forest consists of an arbitrary number of simple trees that are used to determine the final outcome. For classification problems, the ensemble of simple trees vote for the most popular class. In the regression problem, their responses are averaged to obtain an estimate of the dependent variable. Using tree ensembles can lead to significant improvement in prediction accuracy (i.e., better ability to predict new data cases).

Technical details

The response of each tree depends on a set of predictor values chosen independently (with replacement) and with the same distribution for all trees in the forest, which is a subset of the predictor values of the original data set. The optimal size of the subset of predictor variables is given by $\log_2 M + 1$, where M is the number of inputs.

For classification problems, given a set of simple trees and a set of random predictor variables, the Random Forest method defines a margin function that measures the extent to which the average number of votes for the correct class exceeds the average vote for any other class present in the dependent variable. This measure provides us not only with a convenient way of making predictions, but also with a way of associating a confidence measure with those predictions.

For regression problems, Random Forests are formed by growing simple trees, each capable of producing a numerical response value. Here, too, the predictor set is randomly selected from the same distribution and for all trees. Given the above, the mean-square error for a Random Forest is given by:

$$\text{mean error} = (\text{observed} - \text{tree response})^2$$

The predictions of the Random Forest are taken to be the average of the predictions of the trees:

$$\text{Random Forest Predictions} = \frac{1}{K} \sum_{K=1}^{K} K^{th} \text{ tree response}$$

where the index k runs over the individual trees in the forest.

Typically, Random Forests can flexibly incorporate missing data in the predictor variables. When missing data are encountered for a particular observation (case) during model building, the prediction made for that case is based on the last preceding (nonterminal) node in the respective tree. So, for example, if at a particular point in the sequence of trees a predictor variable is selected at the root (or other nonterminal) node for which some cases have no valid data, then the prediction for those cases is simply based on the overall mean at the root (or other nonterminal) node. Hence, there is no need to eliminate cases from the analysis if they have missing data for some of the predictors, nor is it necessary to compute surrogate split statistics.

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41 See documentation on Random Forest Algorithm at http://www.statsoft.com/Textbook/Random-Forest.