

National Survey and Segmentation of Smallholder Households in Bangladesh

**Understanding Their Demand for Financial,
Agricultural, and Digital Solutions**

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TABLE OF CONTENTS

A. INTRODUCTION AND KEY FINDINGS	1
B. ABOUT THE PROJECT	5
C. FINDINGS	10
1. Smallholder Household Dynamics in Bangladesh: Who Are They	10
2. Smallholder Household Dynamics in Bangladesh: Income and Expenses.....	21
3. Tools for Agricultural Risk Mitigation.....	32
4. Mobile Phone Tools.....	43
5. Financial Inclusion among Smallholder Households in Bangladesh.....	48
6. Tools and Financial Inclusion: Segmentation—Bangladesh’s Four Unique Smallholder Farming Household Segments	56
7. Desires and Aspirations.....	90
ANNEX 1. METHODOLOGY AND DESIGN.....	99
ANNEX 2. RANDOM FOREST ALGORITHM	105

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A. INTRODUCTION AND KEY FINDINGS

Introduction

Agriculture has played a key role in Bangladesh, a densely populated country of more than 162 million people (World Population Review 2016). While the sector is changing, impacted by climate change, rural-to-urban migration, and growing demand for labor in the ready-made garment industry and overseas, agriculture remains the country's largest employer. It employs 47 percent of the total labor force in Bangladesh and makes a significant contribution to the national economy, with 16 percent of its gross domestic product (GDP) coming from agricultural production (CIA 2016). Agriculture has also been leveraged to reduce poverty. Growth in farm income accounted for nearly half the reduction in poverty in Bangladesh between 2000 and 2010. Its influence was even sharper later in that decade: farm income growth drove over 90 percent of poverty reduction between 2005 and 2010 (Gautam et al. 2016).

Bangladesh has been a global leader in introducing and expanding the services of nontraditional financial service providers. Microfinance institutions (MFIs)—including ASA, the largest in the world, BRAC, Buro, and Grameen Bank—and mobile money have driven advances in financial services for rural, impoverished populations.

Currently, 45 percent of smallholders in Bangladesh are financially included, meaning that they have a mobile money account or a full-service bank account, NBFIs account, or MFI account in their name. NBFIs and MFIs have facilitated most financial inclusion in this sector (31 percent of smallholders have an NBFIs or MFI account), and now mobile money is driving further gains (19 percent of smallholders have a mobile money account). An additional

22 percent of smallholders have a bank account. While smallholder families are as likely to be as financially included as the general population, their agricultural activities call for a wider range of financial solutions, and the different profiles of smallholder households present some unique opportunities and challenges in the design and delivery of these solutions.

The authors recognize that the Central Bank of Bangladesh does not view MFIs under the broader umbrella of nonbank financial institutions (NBFIs) (Bangladesh Bank 2016). This paper, however, reports MFI and NBFIs data together to facilitate comparability across the series of CGAP's national surveys of smallholder households, because Bangladesh is unique with respect to its distinction between MFIs and NBFIs.

In cooperation with the Bangladesh Bureau of Statistics, CGAP conducted a nationally representative survey of smallholder households in Bangladesh between February and June 2016. This survey sought to comprehensively map the various activities, interests, aspirations, barriers, and pressures that characterize smallholder families to address three questions:

- What does the community of practice need to know or do to support smallholder farmer households in building more resilient, productive livelihoods?
- How can financial mechanisms respond to the needs and desires of smallholder households?
- What types of market strategies and approaches can cultivate uptake and use of financial mechanisms, including digital financial services?

To that end, the questionnaire explored agricultural and nonagricultural household activities, financial practices and

interests, and challenges and aspirations. The study aimed to encompass the entire smallholder household and was structured to detect both agricultural and nonagricultural activities.

This paper begins with an overview of the research approach, core program objectives, research questions, preliminary phases of development, and topics included in the questionnaire. It profiles smallholder farmers in Bangladesh and then examines how households manage their income and expenses. After exploring financial inclusion among smallholders, including essential tools like mobile phones and national identification documents, the paper outlines meaningful segments of the smallholder population in Bangladesh, 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 is included in Annex 1.

This report has three main goals:

- 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.
- Connect readers with the unique realities of smallholder farmers that could otherwise be overlooked, oversimplified, or erroneously generalized from other smallholder farmer markets.
- Catalyze conversations about “what’s next” for smallholder-farmer-centered strategies, products, and approaches that facilitate agricultural, and household finance.

Key Findings and Implications

An analysis of the data from the national survey of smallholder households

identified six key challenges that they face in Bangladesh.

- **The smallholder population is older and aging.** Barely one in 10 heads of households is under 30, and the vast majority is over 40. There are few next-generation farmers in the smallholder population, and there is a preponderance of older farmers with little to no education who have worked the land for decades. The small portion of young farmers in the population shows a desire to prosper, even if that means leaving agriculture should the opportunity arise.
- **Decisions in smallholder households are made largely by male family members.** Women may contribute to decision-making, but they are not typically a household decision maker. This could indicate that the agricultural sector will offer relatively limited opportunities for more women to engage with formal financial service providers.
- **There is heavy dependence on agricultural income among smallholder households.** It is the most important income source for most, and some will supplement their incomes with other means of earning money. Agricultural income and sustenance often hinge on one crop: rice. It is typical for households to grow between one and three crops, and one is almost always rice. Smallholders operate in a cash-based, informal economy and do not have formal contracts for the crops they cultivate.
- **Households are vulnerable to weather-related events that threaten their agricultural activities, and typically they have few, if any, resources at their disposal when these events occur.** In many cases, the result is a loss of income for these

households, and they have no channel or mechanisms for recouping their losses. They cope with unexpected events by selling assets and turning to family or friends or, alternatively, doing nothing in response.

- **A majority of smallholder farmers are not financially included**, meaning they do not have formal financial accounts with a bank, mobile money operator, NBFI, or MFI in their name. The most vulnerable segments of smallholder households are also the least financially included and will be the most challenging to reach.
- **Financial information is mostly informal, unregulated, and potentially unreliable.** Smallholder farmers rely on their own community to circulate information. Few have connectivity to outside channels, or turn to third-party sources such as mass media, financial institutions, or the like for reliable information. They also do not yet see their mobile phones as a tool for financial information.

Balancing those challenges, there are also opportunities in the smallholder household sector.

- **There are models of sustainable, prosperous smallholder households in Bangladesh.** Smallholders who are more economically stable tend to have more income sources and a broader spectrum of farming activities. These households could serve as resources for other agricultural families as part of a peer-to-peer network, and they could play an important role in making the business case for financial solutions relevant to agricultural production.
- **Smallholders look to broader networks for agricultural information**, including channels like television, suppliers, community members, and

government officials. This suggests that meaningful, useful financial information may best reach farmers using existing agricultural information channels and messengers. While financial information is informal, there are networks for circulating agricultural information that may double as channels for learning about financial mechanisms.

- **Smallholders generally show commitment to agriculture.** Whether smallholder households are engaged in agriculture by choice or necessity, they almost universally take pride in it, embrace it, and credit their agricultural activities for supporting them through tough times. There are indications, though, that this trend does not apply to the youngest bracket of smallholders.
- **There are signs of a budding financial ecosystem.** The majority of smallholders has a mobile phone and can envision it as both a banking and an agricultural tool. They put money aside, to the extent that they can, and anticipate expenditures. Those who do have financial accounts tend to be active users (i.e., they use their accounts at least once within 90 days), and would use more advanced financial services, such as goal-savings plans or business/enterprise management solutions, if these were offered by their institutions. What's more, account holders and nonaccount holders, alike, want to use formal financial services in their daily lives.
- **There are opportunities among financially excluded smallholders.** Those without registered, formal financial accounts are likely to meet some preconditions to the use of financial products, including digital financial services. Many have a form

of identification acceptable to open an account and most have access to a mobile phone, if not their own phone. Many are familiar with the concept of mobile money, and this population is predisposed to save.

Taken together, the challenges and opportunities for smallholder households present three big-picture implications.

- **Most older smallholders are committed to farming and need information and tools to plan their agricultural and financial lives.** They do not want to leave farming; instead, they want to take what they do and do it better. They want to move away from uncertainty and life without a safety net, and find a way to build greater economic stability. This could include guidance on good agricultural practices, strategic decisions about land use, and mechanisms that facilitate planning and safety nets to maintain their livelihood in the face of unexpected shocks. Financial service providers do not have to convince smallholders to plan, save, or invest in their future. They do have to provide a realistic means for doing so.
- **Youth need expanded opportunities in agriculture to strengthen and sustain the sector.** Over time, smallholder agriculture could be left with only those farmers who feel they have to remain in agriculture because they have no other options due to a variety of factors, such as a lack of education or available resources. Young people,

who may be better equipped with basic skills and tools than older farmers and more comfortable using technology to inform and advance their agricultural activities, bring unique potential to smallholder farming.

- **Continued expansion of the digital ecosystem could reach both bottom- and top-of-the-pyramid farmers and help increase financial inclusion.** For more economically stable smallholders, this means broadening their digital financial access and giving them more opportunities to transact within their financial accounts. For more vulnerable smallholders, this means participating in the digital ecosystem in a way that matches their household cash flows and needs. Smallholders tend to live near financial access points, they regularly use services once they are on-boarded, and there are leanings toward entrepreneurship, which together suggest opportunity for new product uptake.

This working paper provides a foundational assessment of smallholder families through an analysis of the nationally representative survey and segmentation of smallholder households. The survey and segmentation will inform a range of further inquiries about the agricultural and financial landscape in the country, including, but not limited to, market sizing, value-chain assessments, product positioning, target audience profiling and recruitment, marketing strategy and messaging, and benchmarking and tracking for future growth.

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. This consisted of a survey with an accompanying household listing and a segmentation. The research sought to answer three key questions (Figure 1).

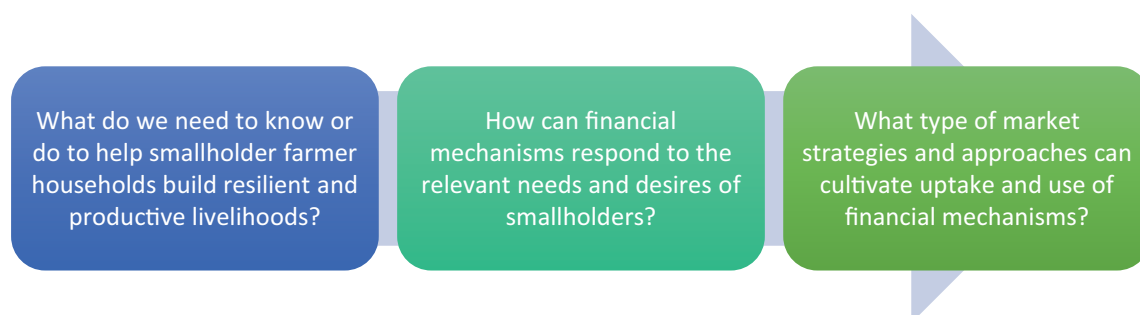
Existing research and stakeholder discussions. Building on other household surveys in South Asia and Sub-Saharan Africa (e.g., agricultural censuses, Living Standards Measurement Study, FinScope, AgFiMS), as well as the 2013 CGAP global segmentation,¹ this methodology and survey instrument were designed to answer a number of questions about smallholder households in Bangladesh:²

- **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 determine how to drive our objectives to complement and expand on them.

FIGURE 1. Main questions for research



¹ See Christen and Anderson (2013).

² CGAP retained the services of InterMedia to manage the survey in partnership with MRB Bangladesh. Additional national surveys and segmentations of the smallholder sector, led by CGAP, were also conducted in Mozambique, Uganda, Tanzania, Côte d'Ivoire, and Nigeria.

Several sources were consulted in the process, including IFC, Dalberg, Finmark Trust, AgFiMS, FinScope, FAO, GIZ, IFAD, and the World Bank. The secondary research brought a series of questions that informed discussions with stakeholders.

BRAC and USAID were close partners in this research with smallholder households because of their central role in advancing financial inclusion and agricultural development. This coordination was important to inform the CGAP research and ensure that the results provide meaningful market information. Several additional stakeholders and organizations also contributed valuable insights and considerations into the design of the research as key informants, including *SafeSave*, IFC, IFPRI, IFAD, Syngenta Foundation, MicroEnsure, WorldFish, FAO, DAI, and CIMMYT.

The extensive secondary research and discussions with stakeholders identified a gap in information about the actual needs, desires, and perceptions of smallholder households. There are data and insights into the habits of smallholder households that examined either their agricultural activities or tracked their financial lives, but nothing to date had

taken a more comprehensive view of the financial and agricultural lives of smallholder households 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 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.³ As a result of both of these lines of investigation, a matrix of each of the key criteria that could be used to distinguish smallholder households from other households was developed (Table 1).

The desk research also found a range of definitions of a smallholder household 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 of 46 hectares in Malaysia. In Bangladesh, research shows that smallholder

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

3 Defining Smallholders: Suggestions for a RSB smallholder definitions; Roundtable on Sustainable Biomaterials; October 2013.

FIGURE 2. Listing criteria to identify relevant smallholder households

Household with up to 5 hectares OR Farmers who have fewer than 50 heads of cattle, or 100 goats/sheep, or 1,000 chickens	AND	Agriculture provides a meaningful contribution to the household livelihood, income, or consumption (self-identified)
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farmers dominate the agricultural sector, with smallholder farmers contributing a majority of total agricultural outputs.

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 data collection, a household listing exercise was conducted to identify all smallholder households. The listing exercise targeted smallholder households with the criteria in Figure 2.

Methodology

The sample for the smallholder survey is a stratified multistage sample. Stratification was achieved by separating each division into urban and rural areas. The urban/rural classification is based on the 2008 agricultural census. Fourteen strata were then created, and the sample was selected independently in each stratum.

In the first stage, enumeration areas (EAs) were selected as primary sampling units, with probability proportional to

size, the size being the number of households in the EAs. Before selection, in each stratum, the list of EAs was sorted by district, subdistrict, wards and unions, and mauzas and mahallas. A household listing operation was conducted in all selected EAs to identify smallholder households and to provide a framework for selecting smallholder households to be included in the sample. MRB Bangladesh, InterMedia's local field partner, conducted the household listing operation between 14 February and 13 March 2016.

The Bangladesh smallholder survey was the fourth survey in the series, which also includes Mozambique, Uganda, Tanzania, Côte d'Ivoire, and Nigeria. It is the first of its kind in South Asia. Fieldwork in previous countries experienced 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 the number of households selected in each EA was increased from 15 to 17 following the household listing operation in all sample EAs. In total, 3,355 households were selected for the survey, of which 3,163 were found to be occupied during data collection. Of these, 3,154 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 drawing from existing survey instruments, considering the objectives and needs of the project, and accounting for stakeholder interests and feedback. 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.

Organization of the survey. The questionnaire was divided into three parts (Table 3) to capture the complexity inside smallholder households, with certain questions asked of all relevant individuals in the household, not just one household member.⁴ It was designed in this way to capture the

complete portrait of the smallholder household, because some members of a household may work on other agricultural and nonagricultural activities independently, without household members' full comprehension of their involvement and responsibilities.

The questionnaire was translated into Bengali 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 17 March to 21 April 2016, using computer-assisted data collection tools that regularly yielded data for analysis and quality control to provide timely feedback to field staff. The Bangladeshi smallholder household survey was implemented by MRB Bangladesh, Inter-Media's local field partner.

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 with shocks		

⁴ The three questionnaires can be found in the user guide that accompanies the data set for this research.

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	<ul style="list-style-type: none"> ■ Basic information on all household members ■ Information about household assets and dwelling characteristics 	<ul style="list-style-type: none"> ■ Demographics ■ Agricultural activities ■ Household economics 	<ul style="list-style-type: none"> ■ Agricultural activities ■ Household economics ■ Mobile phones ■ Formal and informal financial tools

C. FINDINGS⁵

1. SMALLHOLDER HOUSEHOLD DYNAMICS IN BANGLADESH: WHO ARE SMALLHOLDERS?

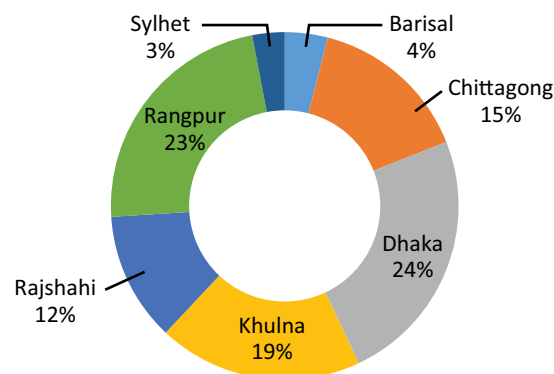
Smallholder households span the country and are primarily led by middle-age or older men.

The 2011 Bangladeshi census divides the country into 64 districts nested under seven administrative divisions.⁶ The sample frame for this survey drew a proportional sample from each division. The divisions are Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Rangpur, and Sylhet.

Smallholder households are primarily concentrated in the Dhaka and Rangpur divisions, with these divisions seeing relatively equal distribution. A smaller proportion of smallholder families is located in Khulna, Chittagong, and Rajshahi (Figure 3). Just 4 percent of smallholder households are located in Barisal, and 3 percent are in Sylhet.

Men typically manage smallholder households in Bangladesh. They are heads of households nine times as frequently as women (Figure 4). Female heads of households tend to be widowed. While households are male-dominated,

FIGURE 3. Division

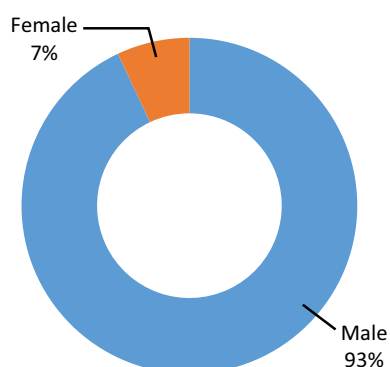


Sample: Smallholder households, n=3,154.

women do play an important, if not critical, decision-making role when it comes to the agricultural activities of the household.

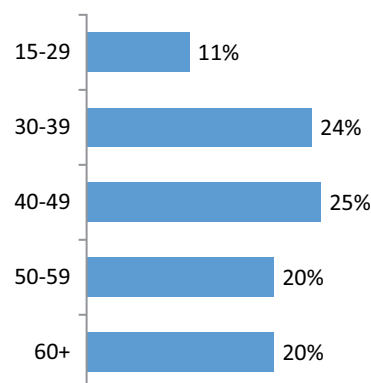
The heads of households in smallholder families tend to be middle-age or older. Forty-nine percent of smallholder heads of households are between 30 and 49 years old, and 40 percent are 50 or older, leaving a relatively small youth population (Figure 5). With only 11 percent of the population of

FIGURE 4. Gender of head of household



Sample: Smallholder households, n=3,154.

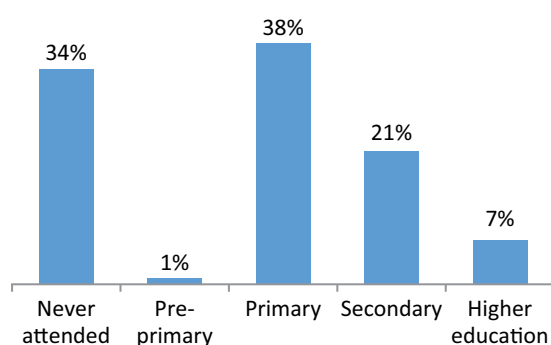
FIGURE 5. Age of head of household



Sample: Smallholder households, n=3,154.

⁵ Graphs and tables in the main body of the report include references to the unweighted base size and, therefore, sometimes will not look proportional to graphs that show subsets of other graphs. Due to rounding, not all percentages in charts total 100. Due to rounding, percentages in the text that combine two or more categories represented in the subsequent graph may vary by a percentage point.

⁶ An eighth division was added in September 2015.

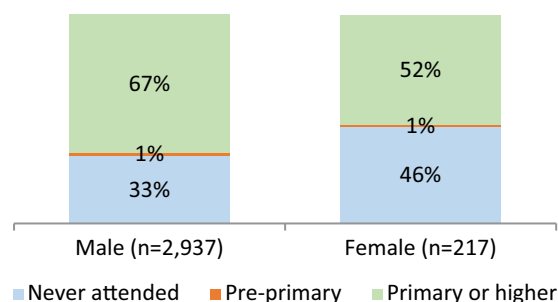
FIGURE 6. Highest education attended, by head of household

Sample: Smallholder households, n=3,154.

smallholder farmer heads of households under the age of 30, Bangladesh has a relatively small “next generation” of farmers.

The heads of households in smallholder families typically have not advanced in formal education beyond primary school. Over one-third (34 percent) have not completed a primary education, and 38 percent have completed only primary school (Figure 6). About one-fifth (21 percent) have completed secondary school, and 7 percent have completed some form of higher education.

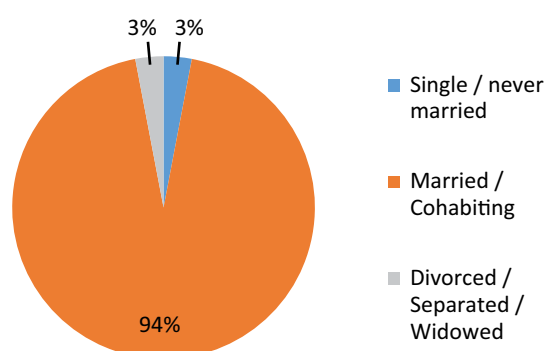
Female heads of households tend to be much less educated than their male counterparts: 46 percent of female heads of households have never attended school, compared to one-third of men who are heads of households (Figure 7). While

FIGURE 7. Highest education attended, by gender of head of household

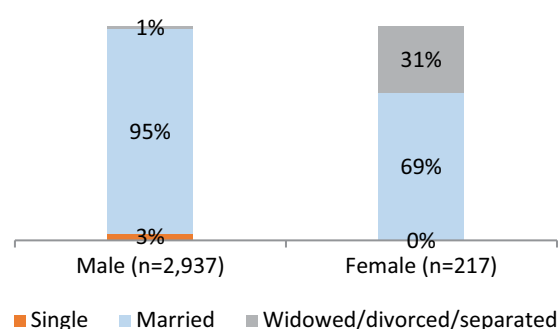
Sample: Smallholder households.

general school attendance (i.e., have attended or not) is consistent across geographic settings, urban smallholder heads of households have greater rates of higher education attainment. Two in 10 (19 percent) urban smallholder heads of households have completed secondary or higher education, compared with 12 percent of their rural counterparts.

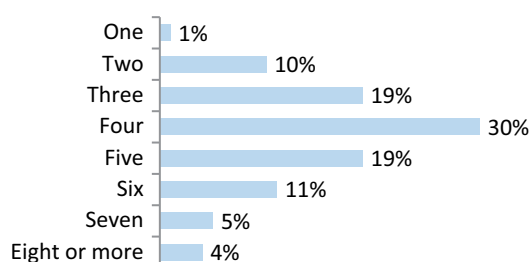
Bangladeshi smallholders are primarily married or cohabitating; only 6 percent are single, divorced, separated, or widowed (Figure 8). Women overwhelming make up the proportion of smallholder heads of households that are unmarried, usually as a result of being widowed. There is a sharp contrast in the marital status of heads of households across gender. Men are almost always married, in contrast to the one-third of women who are widowed, divorced, or separated (Figure 9).

FIGURE 8. Marital status of head of household

Sample: Smallholder households, n=3,154.

FIGURE 9. Marital status, by gender of head of household

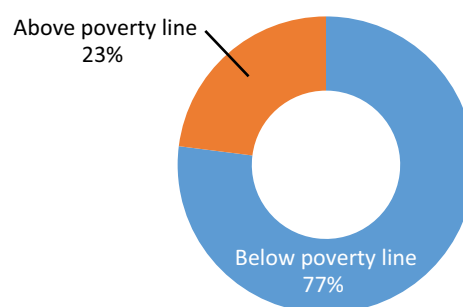
Sample: Smallholder households.

FIGURE 10. Number of people in household

Sample: Smallholder households, n=3,154.

Household size varies across smallholder households, and can be large. Forty percent of Bangladeshi smallholder households have five or more people in the household. Only 11 percent have one or two individuals; 20 percent of households have six or more household members (Figure 10).⁷

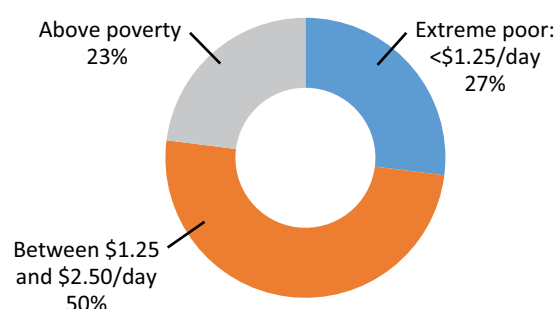
These large household sizes are also significant because a majority of households fall below the poverty line (i.e., living on less than \$2.50/day) (Grameen Foundation 2013). Less than a quarter of smallholder households are above the poverty line, in contrast to over a quarter of the households living below the extreme poverty line (figures 11 and 12). Smallholder households live without

FIGURE 11. Poverty status of household

Sample: Smallholder households, n=3,154.

much of a cushion to absorb additional expenses.

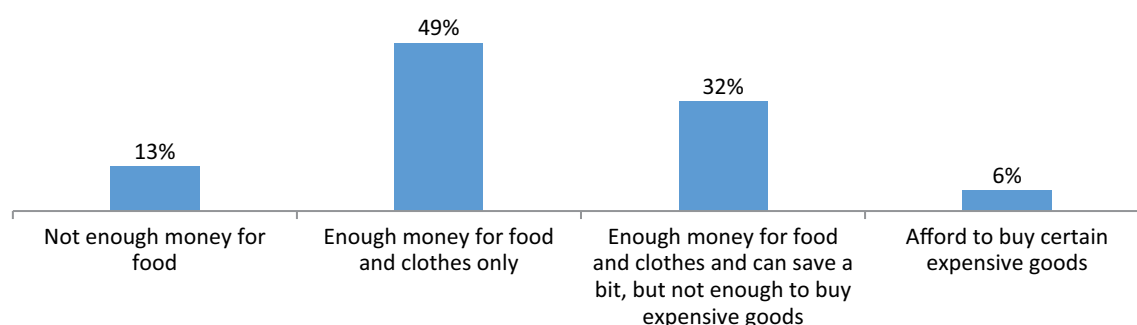
Smallholder households face difficult living circumstances, with half of the households having only enough money for basic necessities (Figure 13). This is mainly because smallholder households farm for their own subsistence, and the little money they get from selling what they grow goes to buying the food that is not available or things to cook with the food they grow, further relegating other basic needs and luxuries. Roughly a third of the population of smallholder households run counter to this characterization. These households are comparatively well-off and can afford to save a bit; some can even afford costlier goods.

FIGURE 12. Extreme poverty status of household

Sample: Smallholder households, n=3,154.

The characteristics of the heads of households for these relatively well-off smallholder households are dissimilar to heads of households from their less fortunate counterparts. Well-off households tend to be led by individuals who are more educated. Seventy-three percent of well-off heads of households have attended school, and 34 percent have some secondary or higher schooling, where 62 percent of nonwell-off have attended school and 24 percent have some secondary or

⁷ 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, therefore, are not 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.”

FIGURE 13. Household's current financial situation (self-assessed)

Sample: Smallholder households, n=3,154.

higher education. These well-off households are more entrepreneurial; 16 percent run their own businesses, compared with 9 percent of the nonwell-off who run a business. The well-off households are also notably more patriarchal. Across the majority of decision categories, well-off households feature male-led decision-making the majority of the time, where nonwell-off households feature less male-led decision-making and more joint decision-making. This is not to say, however, that a patriarchal dynamic in and of itself is a predictor of a household's financial well-being.

Smallholder farmers value hard work and achievement. Characterized by limited means and economic vulnerability, they actively look for opportunities to improve their situation and achieve their goals and aspirations (Figure 14). There is an undercurrent of impulsivity

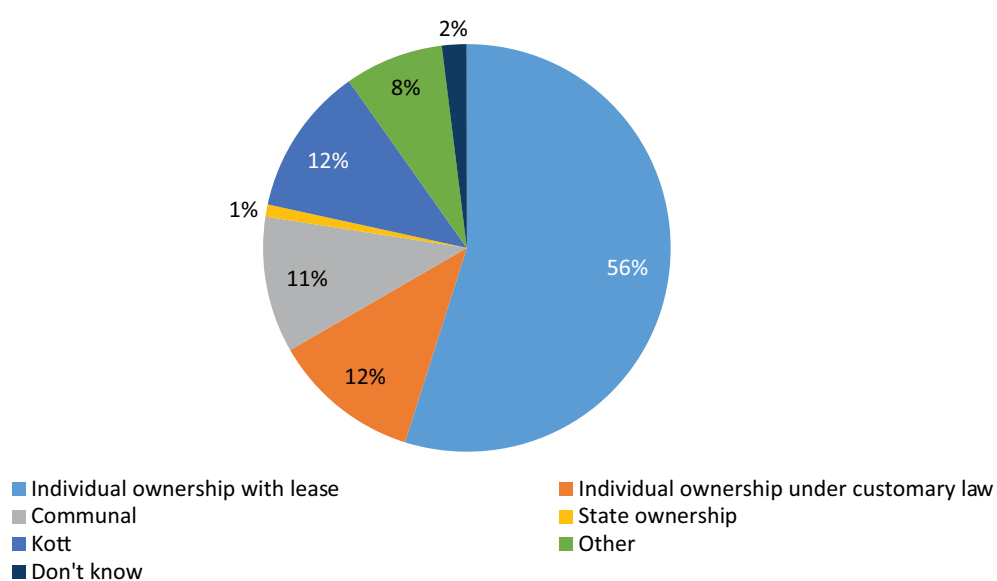
and pessimism in the population. About three-quarters acknowledge saying things without thinking them through, with half characterizing themselves as impulsive. This inclination to speak quickly is tempered by a deliberateness in action, where 93 percent report doing things after giving them much thought. Nearly 70 percent consider planning too far ahead to be sometimes unwise.

Farm as income, source for subsistence, and sale

Smallholder farmers typically own their land (Figure 15). More than half of smallholders possess a lease or certificate, with 12 percent possessing their land according to customary law (Table 4). These groups are good candidates for financial services given their proof and documentation of assets. Eleven percent of smallholders

FIGURE 14. Do you agree or disagree with the following statements?

Sample: Smallholder farmers, n=3,095.

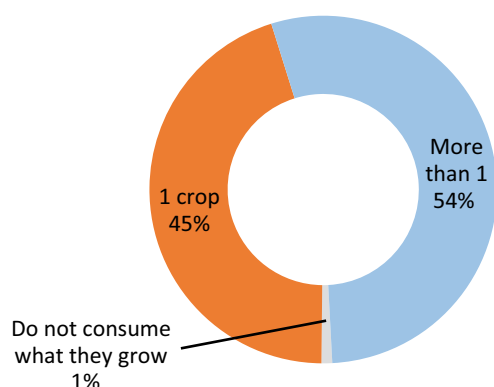
FIGURE 15. What is the form of ownership of your land?

Sample: Smallholder households who participate in agricultural activities reported land n=3,951.

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

	Total (%) n=3,951	Barisal (%) n=447	Chittagong (%) n=443	Dhaka (%) n=716	Khulna (%) n=460	Rajshahi (%) n=573	Rangpur (%) n=942	Sylhet (%) n=370
Individual ownership with lease or certificate	56	47	33	53	68	62	60	55
Individual ownership under customary law	12	10	11	7	2	20	18	1
Communal (resources are shared)	11	14	16	18	14	6	5	1
State ownership	1	0	2	0	1	0	0	0
Kott (i.e., traditional land leasing)	12	14	21	16	9	8	5	37
Other	8	12	14	6	6	1	9	5
Don't Know	2	3	3	0	0	3	3	0

Sample: Smallholder farmers who participate in agricultural activities, by division, n=3,951.

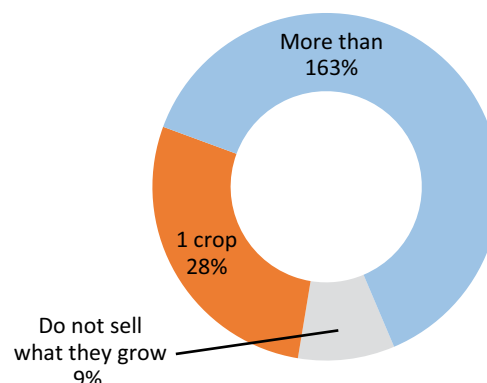
FIGURE 16. Number of crops grown for consumption

Sample: Smallholder farmers who grow crops, n=3,866.

have communal land. This ownership share is primarily concentrated in the Chittagong and Dhaka divisions.

Smallholder properties are small plots.⁸ Nine in 10 smallholders own or rent less than 1 hectare of land and nearly a one-tenth own between 1 and 2 hectares.

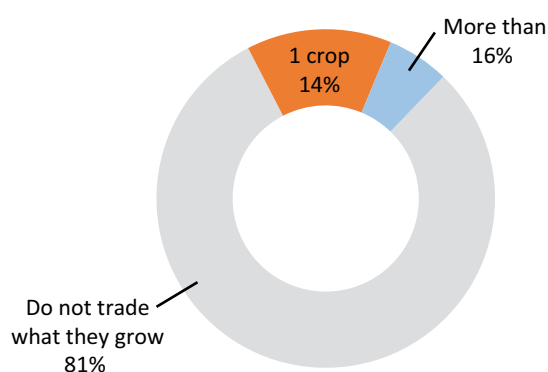
Smallholder farms are divided between those that exhibit a moderate degree of crop diversity and those that grow only one crop per season. More than half of Bangladeshi smallholders grow more than one crop for both consumption and

FIGURE 17. Number of crops grown for selling

Sample: Smallholder farmers who grow crops, n=3,866.

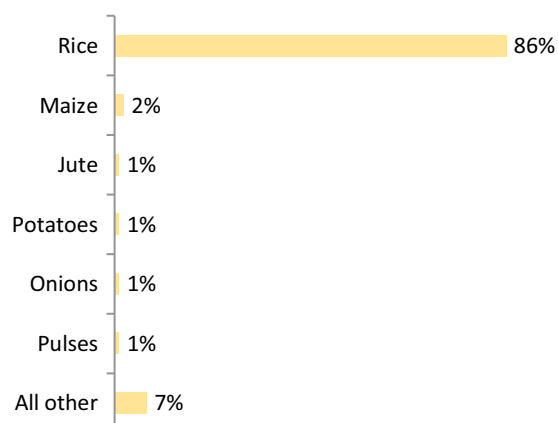
selling (figures 16 and 17). Specifically, 12 percent of smallholders grow three crops and 12 percent grow four crops, for either selling or consumption. The average Bangladeshi smallholder farmer, if engaged in growing for consumption or sale, typically grows 3.05 crops for consumption and 3.40 crops for sale. At the same time, a substantial segment of smallholder farmers is monocropping, growing one crop on the same land, without rotating crops; 45 percent of smallholders grow only one crop for consumption, and 28 percent grow only one crop for selling. Nineteen percent grow crops for trade, with the majority of these individuals growing one crop (rice, primarily) for this purpose (Figure 18). The average farmer engaged in growing crops for trade grows 1.56 crops.

Smallholders rely heavily on one crop: rice. Rice is clearly considered the most important crop to smallholders, in terms of what is grown and sold (Figure 19 and Table 5). Nearly all smallholders who grow crops to consume report that, of the crops they grow, they consume rice the most (95 percent). Just over half of smallholders report that rice provides

FIGURE 18. Number of crops grown for trading

Sample: Smallholder farmers who grow crops, n=3,866.

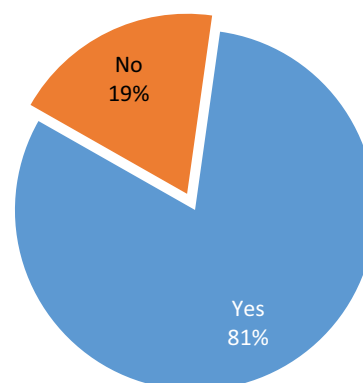
⁸ Land size is difficult to measure accurately. Many recent examinations of land measurement say that using farmer estimates of land size usually leads to errors (Carletto, Gourlay, and Winters 2013). The goal in this body of work was to specifically rely on what farmers perceive to be their own land size to better understand their way of thinking and processing agricultural and household decision-making.

FIGURE 19. Which of the following crops that you grow is the most important to you and your family?

Sample: Smallholder farmers participating in agriculture who grow at least one crop, n=3,866.

the most revenue. This dependency on rice is a vulnerability, given the frequency of extreme weather events in Bangladesh.

A large majority (81 percent) of smallholders who participate in agricultural activities raise livestock, as well as crops

FIGURE 20. Do you have any livestock, herds, other farm animals, or poultry?

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

(Figure 20). Livestock are kept for both consumption and income generation. Poultry, specifically chicken (layers), is the most commonly kept livestock, followed by cattle, ducks, and goats (Table 6). Generally, there is a sharp divide between which animals are kept for consumption and which are kept for generating income. For example, over

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

	Consumption (n=3,812)*	Selling (n=3,430)
Rice	95	52
None	1	2
Chilies	0.4	4
Pumpkins	0.4	2
Tomatoes	0.3	1
Wheat	0.3	1
Potatoes	0.2	7
Pulses	0.2	3
Eggplant	2	1
Maize	0.1	7
Radishes	0.1	n/a
Jute	0	7
Mangos	0	0.4
Bananas	0	1

Sample: Smallholder farmers participating in agriculture who grow and consume/sell at least one crop.

*Responses ranked by consumption and later by sales.

TABLE 6. Which of the following do you rear?

Chickens—layers	82
Cattle—beef	60
Duck	47
Cattle—dairy	41
Goats—meat	31
Fish	26
Goats—dairy	22
Pigeon	12
Sheep	2
Buffalo	2
Chickens—broilers	2

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

Multiple responses allowed.

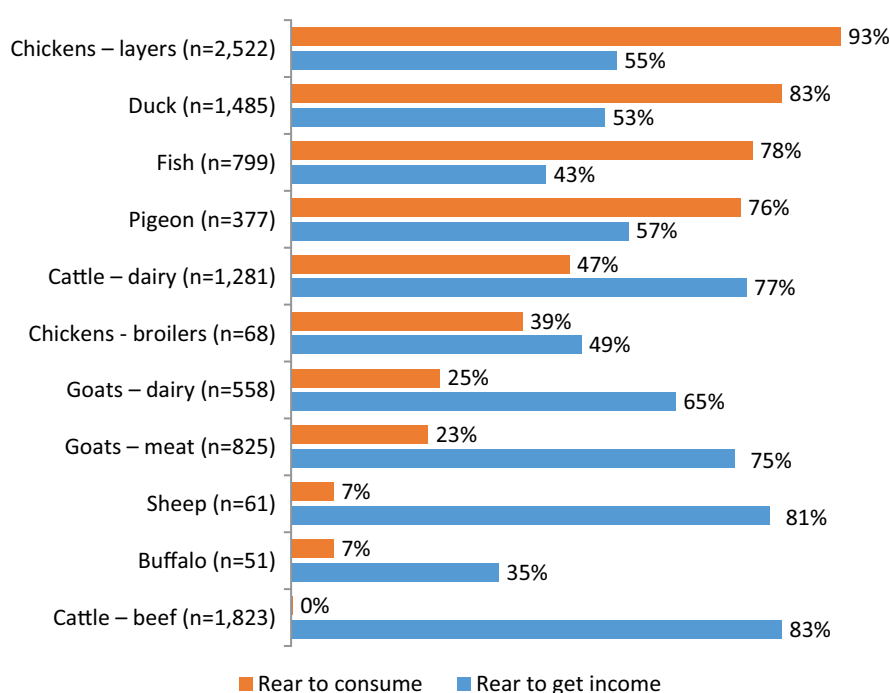
90 percent of smallholder households consume poultry compared to 55 percent who sell it; 23 percent raise goats for their own consumption compared to 75 percent of smallholders who raise goats (meat) for income (Figure 21).

Household decisions are typically made by men, even when women have a significant say in decisions.

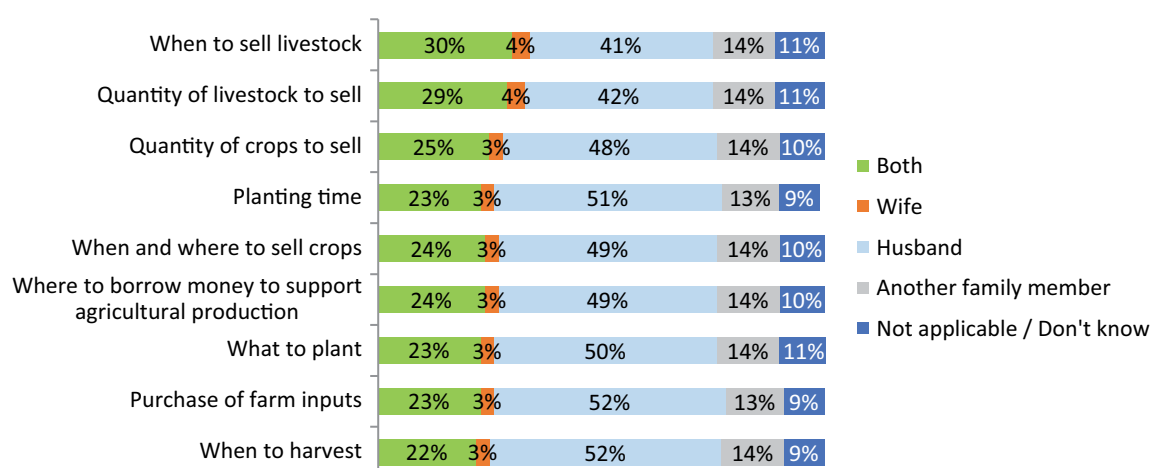
Men primarily lead households (Figure 4), and this is reflected in the distribution of responsibility for agricultural decision-making. Half of most agricultural decision-making falls solely on the male family member (Figure 22). While most household decision-making is male-led, a substantial segment of smallholder households exercises joint decision-making between husband and wife; one-fifth to one-third of households make their decisions jointly. Joint decision-making is mostly oriented around livestock-related decisions.

Dedicated to agriculture and looking to expand their activities

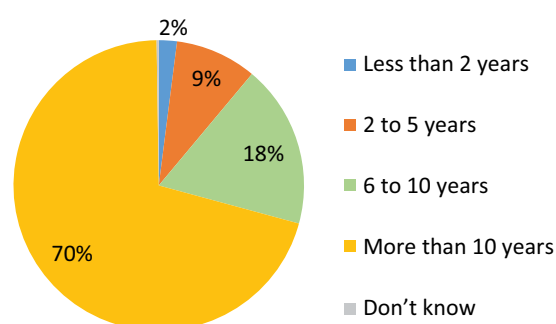
Smallholder farmers are highly tenured and experienced. Seven in 10 smallholder farmers have been farming for more than 10 years, and nearly 20 percent

FIGURE 21. Which of the following do you rear and get income/consume?

Sample: Smallholder farmers who have any livestock, herds, other farm animals or poultry. Multiple responses allowed.

FIGURE 22. Agricultural decision-making

Sample: Smallholder households, n=3,154.

FIGURE 23. How many years have you been farming?

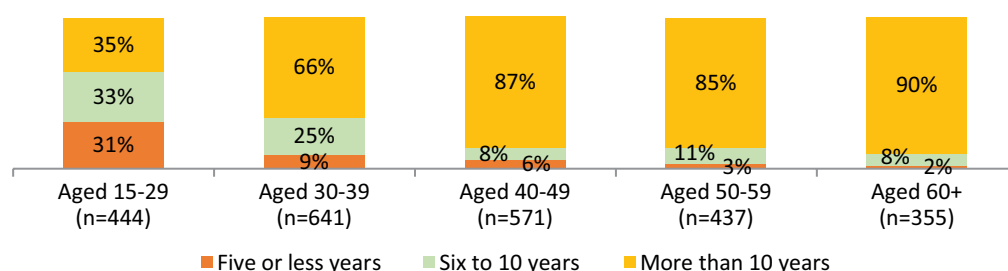
Sample: Smallholder farmers who participate in agricultural activities, n=4,742.

have been farming for six to 10 years (Figure 23). There are few new entrants among these smallholders. Less than 10 percent have been farming for two

to five years, and 2 percent have been farming for less than two years.

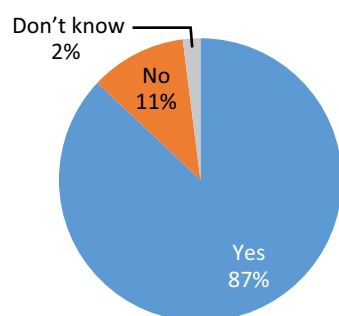
Even the youngest generation appears to have spent their life in farming. Thirty-five percent have been farming for more than 10 years; an additional 33 percent have been farming for between six and 10 years (Figure 24). This suggests that agriculture is a generational pursuit. When agriculture is passed down through the family, it is difficult to measure the precise number of years in that occupation.

Most smallholders intend to remain in agriculture. Approximately one-tenth of the population, however, did voice an eventual plan to exit (Figure 25). This intention is inconsistent across tenure

FIGURE 24. How many years have you been farming? By age of respondent

Sample: Smallholder farmers, n=2,638.

(Smallholder farmers who participate in household's agricultural activities and in each age category)

FIGURE 25. Do you intend to keep working in agriculture?

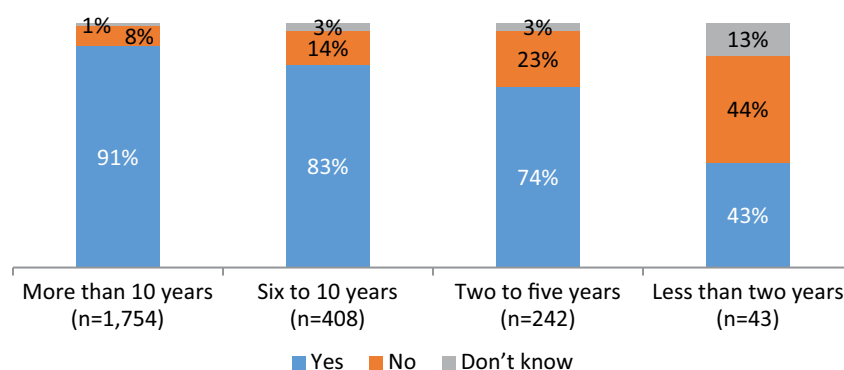
Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.

and seen more in younger and financially better-off smallholders. Specifically, less established farmers make up the majority of those who intend to exit (Figure 26). These farmers may regard agriculture as a temporary solution to

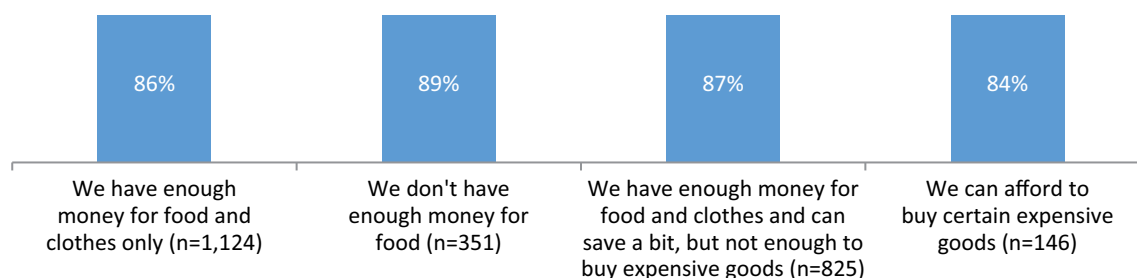
their financial needs. This is reflected by a high level of faith in agriculture as an income provider; despite difficult circumstances, farmers intend to remain in agriculture (Figure 27). Adherence to agriculture can be due to enjoyment of it, dependence on it, and lack of perceived other options (figures 28 and 29).

Bangladeshi farmers are ambitious and dedicated and have their eyes open for new opportunities

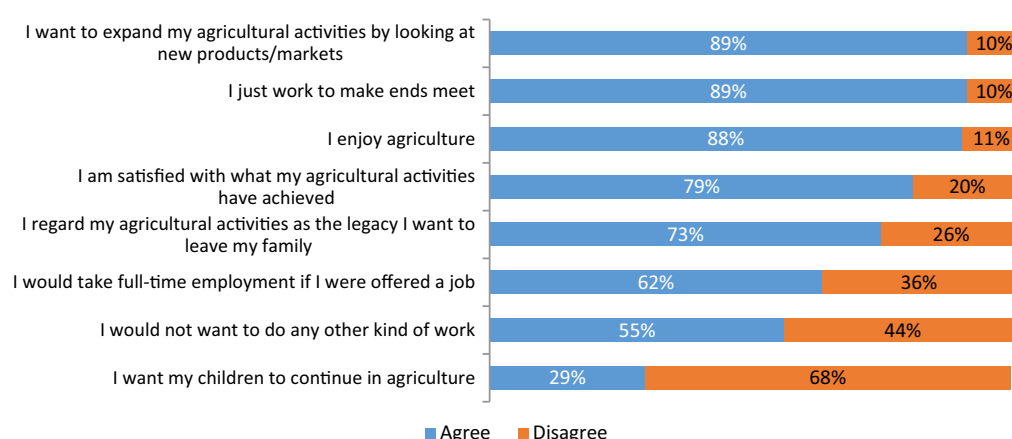
Smallholder farmers enjoy agriculture and are satisfied with their agricultural activities. This satisfaction is manifested in a strong desire to expand their agricultural activities (Figure 28). That said, smallholders' reticence to see their children remain in farming, their willingness to change industries, and

FIGURE 26. Do you intend to keep working in agriculture? By number of years in farming

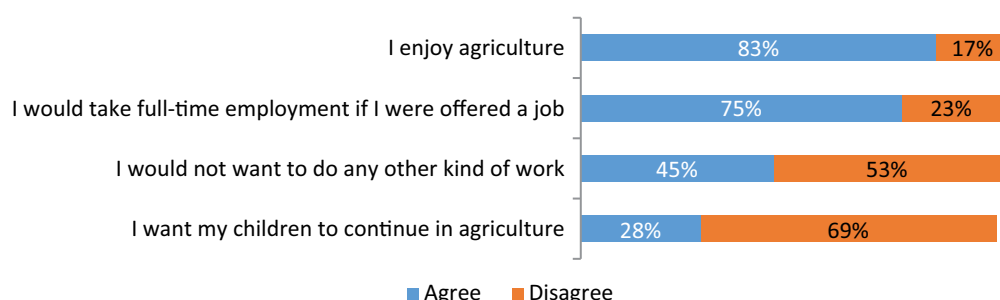
Sample: Smallholder farmers who participate in household's agricultural activities.

FIGURE 27. Do you intend to keep working in agriculture? By household's current financial situation (self-assessed)

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

FIGURE 28. Do you agree or disagree with the following statements?

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.

FIGURE 29. Do you agree or disagree with the following statements?

Sample: Smallholder farmers aged 15–29 who participate in household's agricultural activities, n=637.

their perception of agriculture solely as a financial vehicle (i.e., as an income generator and not a passion) contradicts this enthusiasm. When viewed together, these perceptions suggest that smallholders are dedicated to advancement and financial betterment itself and while working in agriculture is acceptable, it is not alluring enough to warrant sacrificing other opportunities. Smallholders recognize that there may be less risky or volatile methods for earning income, and if these methods were available, smallholders would not forgo them.

These perceptions are pronounced across the youngest generation of farmers, with these farmers being even more willing to leave agriculture than their older counterparts. Seventy-five percent would be willing to leave agriculture for a full-time position if given the opportunity (Figure 29). Given the relatively small share of young smallholder farmers, these perceptions, coupled with the lack of intention to remain in agriculture among unexperienced farmers, suggest that flight from agriculture is a possibility.

2. SMALLHOLDER HOUSEHOLD DYNAMICS IN BANGLADESH: INCOME AND EXPENSES

Farming Activities Determine Household Income

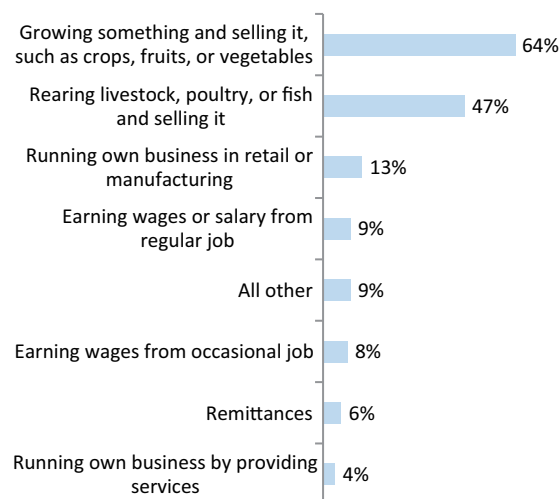
Smallholder households generate the most income from growing and selling crops and rearing and selling livestock (Figure 30). In addition to these agricultural activities, smallholder households generate income through owning a business and wage labor. Smallholder families do not typically rely on remittances for income, with only 6 percent reporting remittances, domestic or international, as an income source.

Agriculture makes a meaningful contribution to the household for farmers, and 66 percent consider it their primary occupation. In comparison, 81 percent of Tanzanian smallholders report agriculture as their primary job. Approximately one-third of smallholders consider something other than farming as their primary source of income (Figure 31). Ten percent of smallholders report “laborer” as their primary job, nearly 10 percent report business ownership, and 14 percent report some other source.

Growing crops and rearing livestock are reported as smallholders’ most important income sources, at 50 and 17 percent, respectively (Table 7). Growing crops is also the most reliable and most enjoyable income-generating activity, underscoring its importance to this population. These perspectives suggest that smallholders typically equate their most important income source with their most reliable and enjoyable income source.

Smallholders also engage in nonproduction-related agricultural activities, albeit to a lesser degree. Nine percent engage in product processing, and 8 percent are landlords of agricultural land (Figure 32). This subsection of smallholders represents a potential niche

FIGURE 30. Do you generate income from any of the following sources?

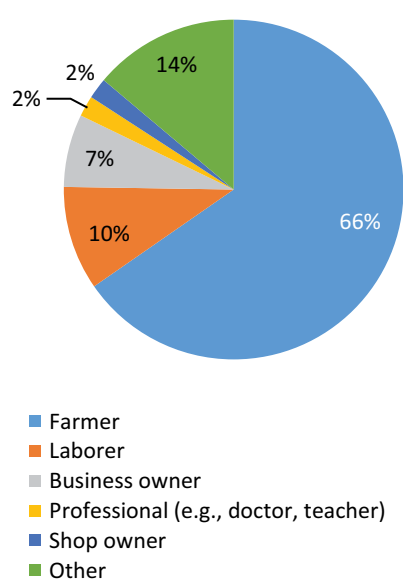


Sample: Smallholder farmers, n=5,124.
Multiple responses allowed.

market for financial enterprises focused on Bangladeshis involved in agriculture.

Only 2 percent of smallholders receive payments from the government in the form of welfare, pension, etc. (Figure 33).

FIGURE 31. What is your primary job?



Sample: Smallholder farmers, n=5,124.

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	50	51	51
Rearing livestock, poultry, fish, or bees and selling them	17	17	16
Running own business in retail or manufacturing (selling or making goods)	8	8	8
Earning wages or salary from regular job	7	7	7
Other	6	5	3
Earning wages from occasional jobs	4	4	4
Getting money from family or friends	4	3	4
Running own business by providing services	3	3	3
Getting a grant, pension, or subsidy of some sort	0	0	0
Don't know	1	1	1

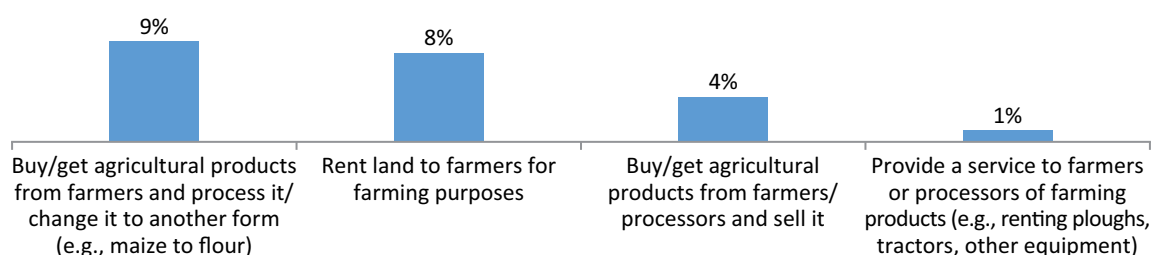
Sample: Smallholder farmers, n=5,214.

Of the few who do receive payments, they primarily receive them through a direct deposit into a bank account or cash pick-up (Figure 34).

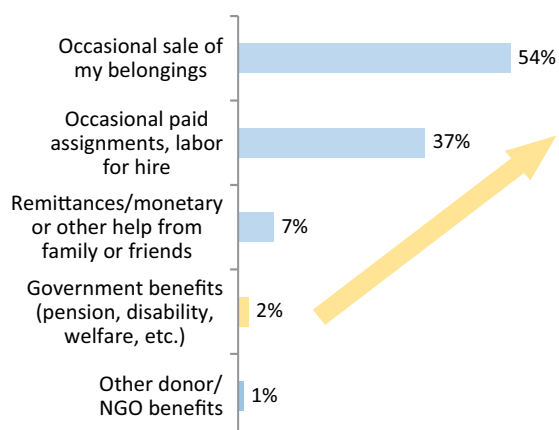
Self-Reported Expense Requirements Match Smallholders' Economic Situation

Most smallholders (77 percent) live below the poverty line (i.e., below

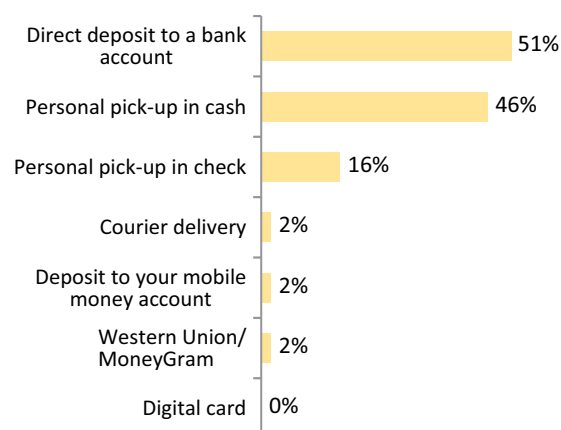
\$2.50/day), with roughly a quarter living below the extreme poverty line (i.e., \$1.25/day) (figures 11 and 12). Nearly 30 percent of smallholders report they need less than 5,000 TK (\$66) a month to cover expenses, with most smallholders requiring between 5,000 and 10,000 TK (\$127) (Figure 35). Nearly a quarter of smallholders require more than 10,000 TK per month.

FIGURE 32. Are there any other ways that you get income?

Sample: Smallholder farmers, n=5,214.
Multiple responses allowed.

FIGURE 33. Do you receive income from any of the following?

Sample: Smallholder farmers, n=5,214.
Multiple responses allowed.

FIGURE 34. How do you usually get this government payment?

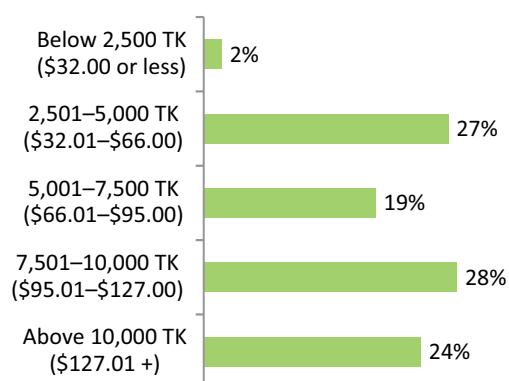
Sample: Smallholder farmers who receive income from government benefits, n=82
Multiple responses allowed.

Smallholders in Bangladesh primarily generate enough income to match or even exceed their expense requirements. In all necessary expense categories, nearly two-thirds or more of smallholders report having a surplus at the end of the month (Figure 36). These households with monthly expense surpluses are prime candidates for a range

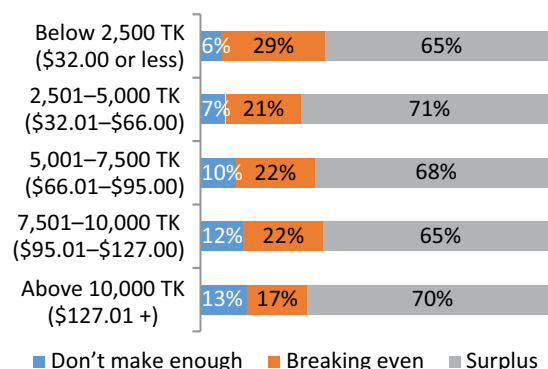
of financial mechanisms, particularly those related to saving.

Traditional Spending Framework and Prudent Spending

Smallholder households tend to incur smaller expenses more regularly than larger expenses (Figure 37), reflecting what is considered a more traditional

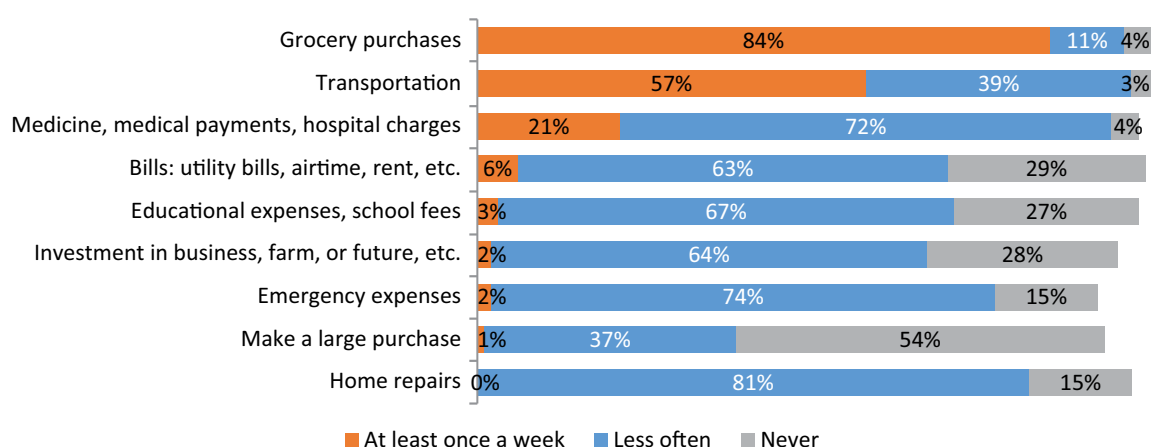
FIGURE 35. What is the minimum amount your household needs to survive per month (for personal expenses)? Quintile

Sample: Smallholder households who gave a minimum amount for households' survival n=3,148.

FIGURE 36. What is the minimum amount your household needs to survive per month (for personal expenses) and is your income sufficient?

Sample: Smallholder households, n=3,137.

9 Expense question in Figure 37 did not include agricultural inputs, such as seed and fertilizer, specifically, and instead focused on broad-based household needs.

FIGURE 37. How often do you pay each of the following expenses?

Sample: Smallholder households, n=5,214.

spending framework.⁹ The most frequent expense in smallholder households is groceries, with 84 percent of the population purchasing groceries at least once a week. Transportation follows grocery expenses; 57 percent of smallholder households spend money on transportation at least once per week. These expense categories could be part of a merchant channel for expanding digital finance, given their prevalence in the population. Their value is not in the size of each individual transaction, but in the frequency of transactions and how common the transactions are (e.g., a digital financial services-transportation-linked product).

Conversely, bills (e.g., utility bills, rent) are incurred much less frequently, if at all. Twenty-nine percent of smallholders report not incurring these expenses at all, and only 6 percent of households made these expenses on a weekly basis. While bill pay has successfully driven the adoption of digital financial services in other countries, notably Kenya, the environment in Bangladesh does not seem as receptive to this strategy.

Men and women in smallholder households exhibit relatively similar spending

patterns with respect to overall category prioritization (i.e., both genders have the same order of expense categories they incur most frequently); however, men tend to incur expenses on a more frequent timescale (i.e., once a week) than do women (Table 8). Men purchase items at least once a week at a rate higher than that of women. Additionally, men tend to spend on a given category, at least occasionally, more frequently than women, who more frequently report “never spending” on each expense. This suggests that men control household finances, given that they are making more purchases overall and more frequently than women.

Smallholders conduct transactions related to bill payment, including mobile phone minutes, utility bills, and school fees, most frequently. These transactions are largely conducted using nondigital means. Half of smallholders have conducted these activities in the past month, with over 80 percent of smallholders purchasing airtime in the past month (Figure 38). Smallholders use a financial service for storage (i.e., deposits and withdrawals) less frequently. Smallholders deposit on shorter timescales than they withdraw, potentially indicating

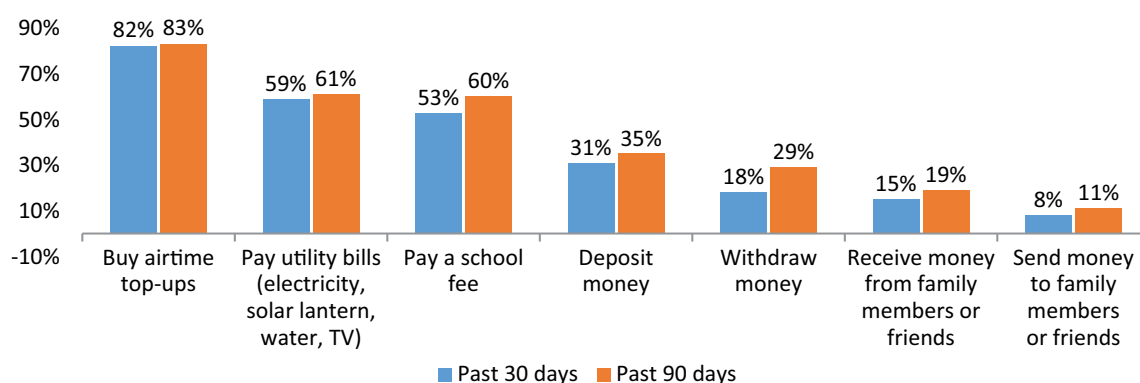
¹⁰ Similar findings emerged in recent research on integrating digital financial services into agricultural value chains in Bangladesh (see Leshar 2016).

TABLE 8. Expenses, by demographics

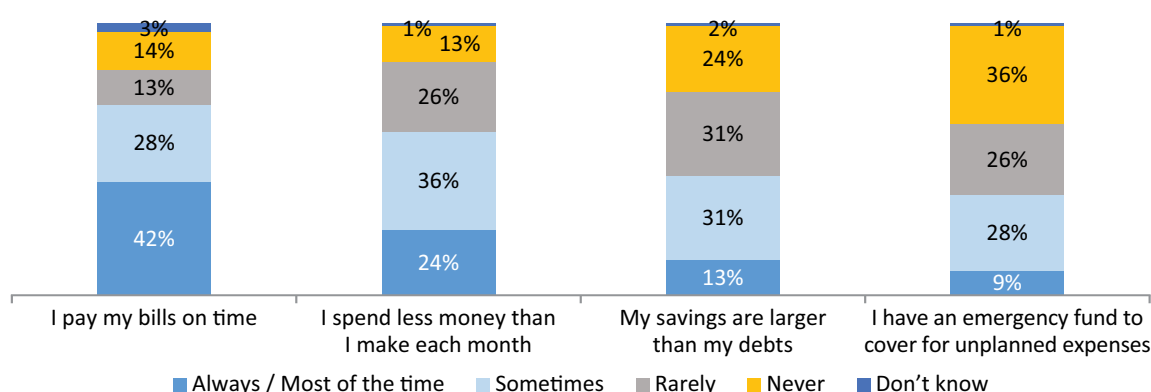
Expense	At Least Once a Week/ Less Often/Never Gender (%)						Setting (%)					
	Male (n=3,833)			Female (n=1,381)			Rural (n=4,967)			Urban (n=247)		
Grocery purchases	90	9	1	70	17	11	84	11	4	90	7	3
Transportation	65	34	1	37	52	8	57	39	3	74	24	2
Medicine, medical payments, hospital charges	21	75	1	21	65	11	21	72	4	11	87	2
Bills: utility, airtime, rent, etc.	6	67	25	4	53	39	5	63	29	11	65	23
Educational expenses, school fees	3	70	25	4	60	33	3	67	27	4	65	29
Emergency expenses	2	77	13	2	67	20	2	74	15	0	84	11
Investment in business, farm, or future	2	68	26	2	55	35	2	64	28	1	54	41
Large purchases; such as a TV, house, etc.	1	39	53	0	33	57	1	37	54	1	33	63
Home repairs	1	84	12	0	72	23	0	81	15	0	69	25

Sample: Smallholder households, n=5,214

Note: Due to rounding, percentages within demographic may not equal 100%.

FIGURE 38. Did you do the following activities AT LEAST ONCE in the past 30/90 days?

Sample: Smallholder farmers, n=2,795.

FIGURE 39. How often does the following apply to you?

Sample: Smallholder farmers, n=3,095.

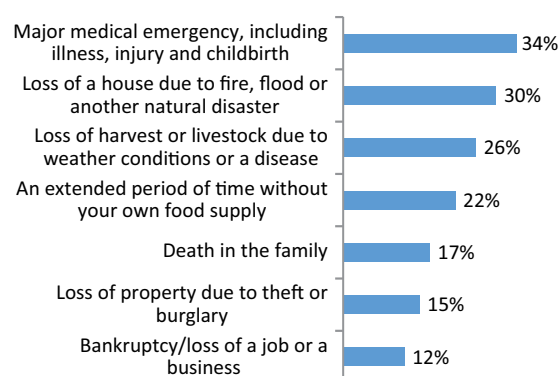
that a segment of the population is engaged in active and successful savings.¹⁰

Sound Money Management Practices That Could Be Undone by Unaddressed Vulnerabilities

Smallholder farmers generally have sound money management practices—they frequently pay their bills on time, keep expenditures below income and, for many, have savings that exceed debts. These smallholders minimize their debt and expenses, affording them the opportunity to save—this is an opportunity the smallholder population generally seizes. However, smallholders are exposed to vulnerabilities that threaten to undo their generally positive practice.

Eighty-three percent of smallholders report paying their bills on time with a degree of regularity (i.e., at least occasionally bill payments are on time). Eighty-six percent keep expenditures below income, and 75 percent have savings that exceed debts with regularity (Figure 39). However, only 42 percent always pay their bills on time, and 24 percent always keep expenditures below income. Smallholders generally do not put money aside to address unplanned expenses; 62 percent of smallholders rarely or never set aside money in an emergency fund for unplanned expenses.

Most smallholders do not have plans to manage common unexpected expenses. Roughly one-third of smallholders have plans for managing either the loss of a harvest because of weather conditions or an extended time without a self-supplied food source (Figure 40). Additionally, only 12 percent of smallholders have a plan to deal with bankruptcy, which can be a consequence of other events, such as losing a harvest. Smallholders' reliance on growing crops as an income source, the prevalence of monocropping, and Bangladesh's vulnerability to extreme weather events exacerbate the negative effects of this lack of planning.

FIGURE 40. Does your family have a plan to manage these unexpected expenses, which might result from the following?

Yes answers.

Sample: Smallholder farmers, n=3,095.

TABLE 9. Saving methods, by demographics

Number of Savings Methods	Total (%)	Gender (%)		Education (%)	
		Men n=2,458	Women n=637	Attended n=2,205	Did Not Attend n=890
0	24	25	22	22	29
Net (1 ⁺)	76	75	78	78	71
1	29	30	28	30	29
2	26	25	27	26	24
3	12	12	13	14	10
4	5	5	4	5	4
5	2	2	2	2	2
6	1	0	2	1	2
7	1	1	2	1	0

Sample: Smallholder farmers, n=3,095.

Note: This table does not display multiple incidences of the same savings tools (e.g., a respondent with two accounts at an MFI is counted as using one savings method).

Bangladeshi Smallholders Are Frequent Savers, but Saving Is Largely Relegated to Informal Channels

While most smallholders do not have explicit savings plans for unexpected events, they are saving and using a variety of channels to do so. In the past year, most smallholders have saved money (Table 9):

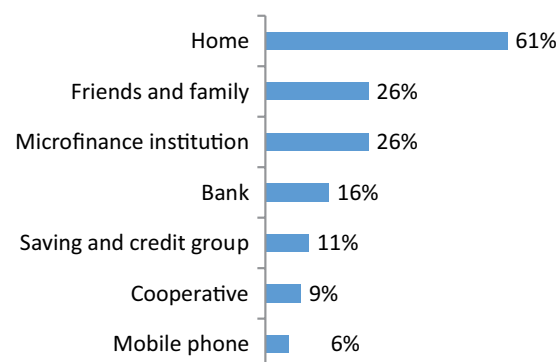
- Seventy-six percent report saving with at least one mechanism (e.g., saving at home, with an MFI, with a bank).
- Twenty-one percent report saving with three or more mechanisms.
- The average number of savings channels used among smallholders is 1.58.

Most smallholders who save use informal channels: 61 percent report saving at home, and 26 percent report saving with friends and family (Figure 41). While informal channels are most common, there is also a high degree of engagement with formal saving channels. A quarter of smallholders report saving with an MFI, and 16 percent report saving with a bank.

Female smallholders save more frequently than male smallholders. In the

population of smallholders who save with at least one mechanism, 75 percent of men and 78 percent of women save with at least one mechanism (Table 9). Women also tend to save with more mechanisms. In terms of the influence of education on the number of savings mechanisms in use among smallholders, those with at least some schooling save at higher and more diverse rates than smallholders who have not been to school.

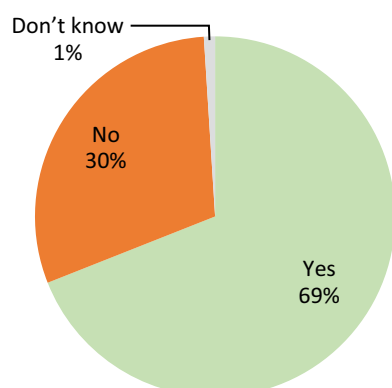
FIGURE 41. In the past 12 months, have you saved money with any of the following mechanisms?



Yes answers.

Sample: Smallholder farmers, n=3,095.

FIGURE 42. In the event of an emergency, could you get extra money through relatives sending money or by selling assets?



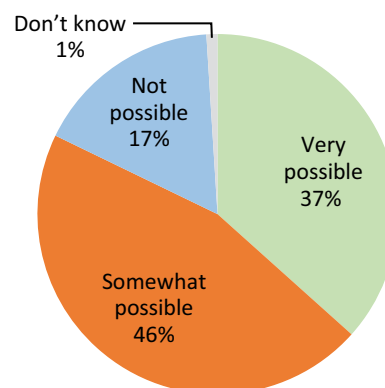
Sample: Smallholder farmers, n=3,095.

Three in 10 Bangladeshis do not have the liquidity to cover emergency expenses (Figure 42). Specifically, if asked to mobilize 4,180 TK (~\$50) in the event of an emergency, only 37 percent of smallholders believe they could do so within a month (Figure 43).¹¹ Nearly half of smallholders consider it “somewhat possible.” Those who consider it “very or somewhat possible” would primarily access these funds through family, relatives, or friends (45 percent). This lack of liquidity, paired with the tendency to rely on informal sources, suggests that short notice, short-tenure digital credit products may be valuable to smallholders.

Frequent Exposure to Unexpected and Agriculture-Threatening Events

Seventy-four percent of smallholders report having experienced at least one unexpected, expense-incurring event in the past 12 months (Figure 44). Specifically, 57 percent of smallholders report experiencing a medical emergency, and 30 percent report needing to

FIGURE 43. Imagine that you have an emergency and you need to pay 4,180 TK. How possible is it that you could come up with 4,180 TK within the next month?

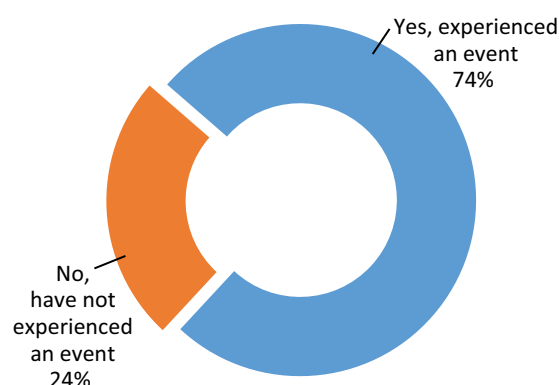


Sample: Smallholder farmers, n=3,095.

conduct housing repair or construction (Figure 45).

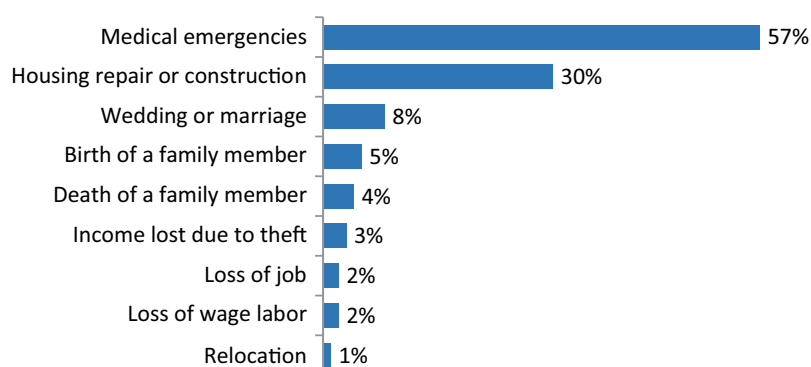
Smallholders are most concerned about the impact of an extreme weather event on their agricultural activities; 73 percent of smallholders consider this the most significant risk to their crops and livestock (Figure 46). Only 8 percent are concerned with pests or disease, which is surprising given that 53 percent have

FIGURE 44. In the past 12 months, have you experienced any expense-incurring events?



Sample: Smallholder farmers, n=3,095.

¹¹ This question mirrors one in the Findex survey. The amount of the funds in question corresponds roughly to 1/20th Bangladesh gross national income per capita.

FIGURE 45. In the past 12 months, have you experienced any of these events?

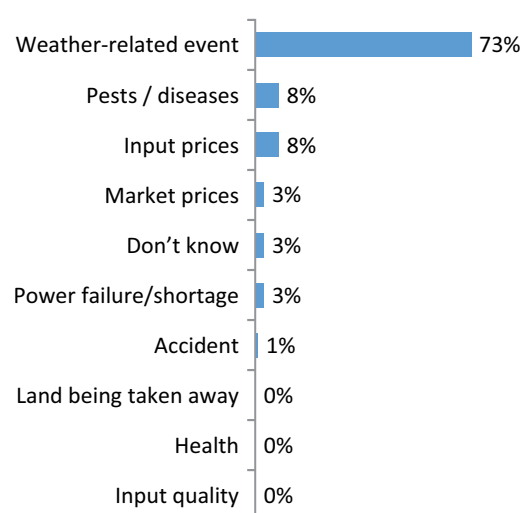
Sample: Smallholder farmers, n=3,095.
Multiple responses allowed.

had their agriculture activities impacted by pests or disease (Figure 47). The rate of concern for weather events is more aligned with rate of exposure. When viewed in tandem with the difference in concern/exposure for pests or disease, this suggests that weather events are the most impactful to a smallholder's well-being and, perhaps, there is not an accessible tool to mitigate the impact of this risk (e.g., rainfall forecasting application).

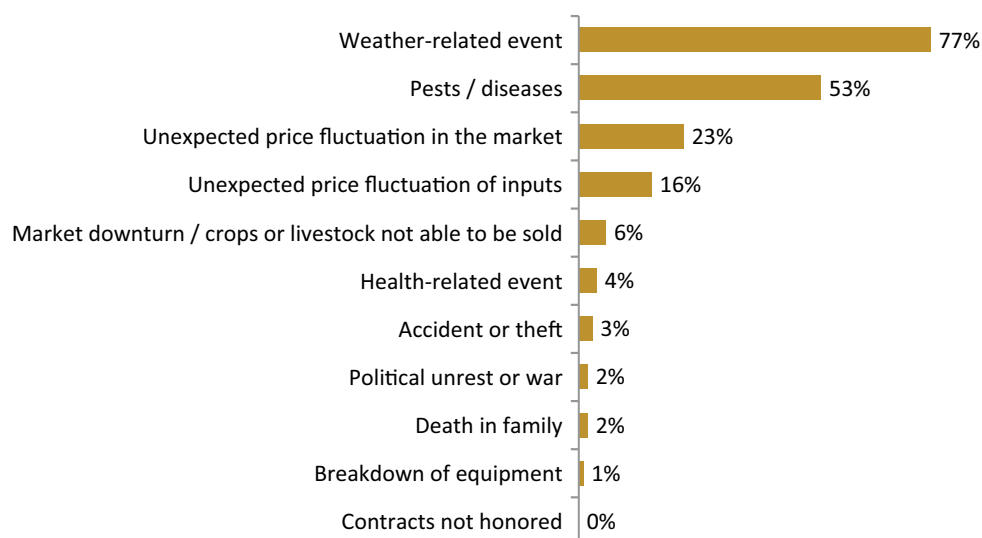
The seven Bangladeshi divisions experience similar event types, with regional variations in frequency. Serious weather events (as perceived by respondents) are prevalent across the country, with approximately 90 percent of smallholders from each of four of the divisions reporting that their agricultural activities have been impacted by weather (Figure 48). Pests or disease had a varied impact on agricultural activities across divisions. The percentage of smallholders reporting their agricultural activities had been seriously impacted by pests and diseases ranges from 42 percent of smallholders in Rangpur to 76 percent of smallholders in Barisal. The share of the sample coping with unexpected market-price fluctuation also varies substantially across divisions, ranging from 9 percent in Barisal to 35 percent in Rajshahi. The high rates of exposure to unexpected price fluctu-

ations highlights a potential consumer segment—one that could benefit from financial solutions that help to smooth household cash flows.

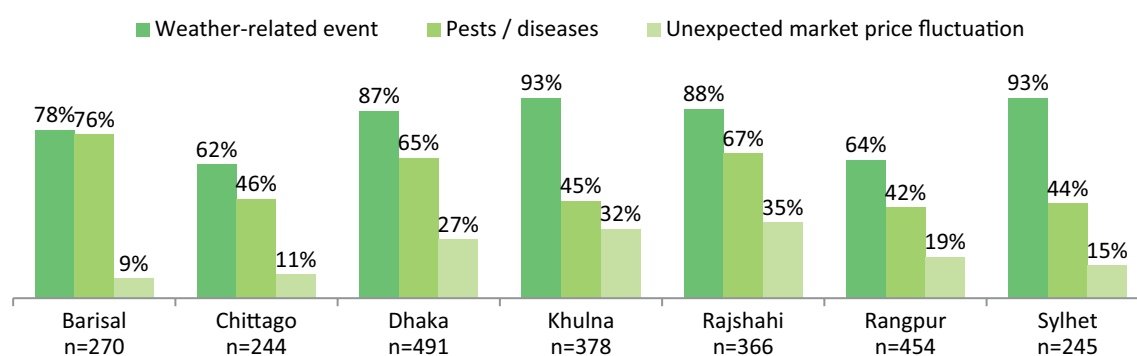
When they were impacted by these events, smallholders primarily turned to informal borrowing (on average, 29 percent) to cope, as opposed to their own savings (8 percent) (Figure 49). Furthermore, roughly 8 percent of smallholders who had been impacted by an event did not have a specific response to address and cope with the

FIGURE 46. What poses the most significant risk to your agricultural activities?

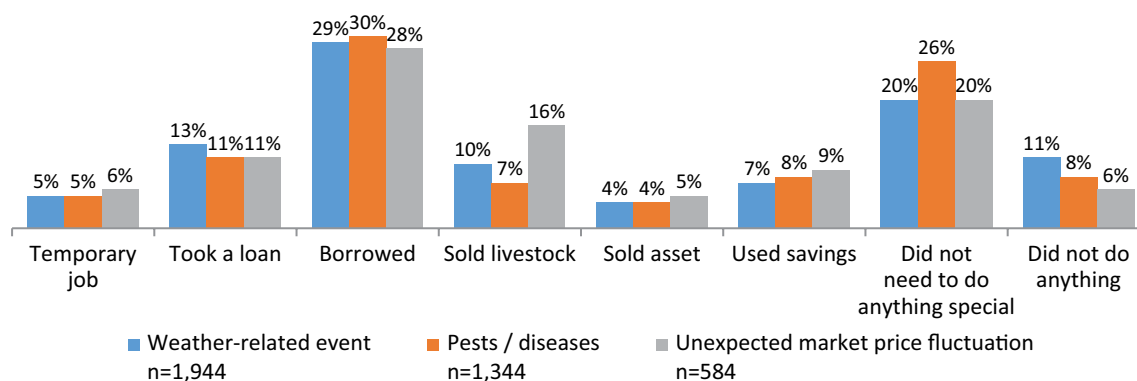
Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.

FIGURE 47. Have your agricultural activities been seriously affected by any of the following events in the past three years?

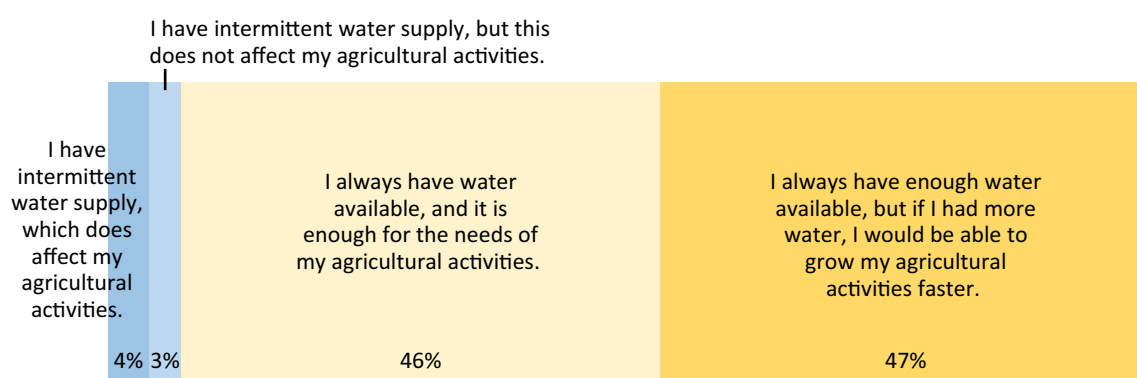
Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.
Multiple responses allowed.

FIGURE 48. Have your agricultural activities been seriously affected by any of the following events in the past three years?

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

FIGURE 49. How did you mainly cope when this happened?

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

FIGURE 50. Which of the following best describes your water situation?

Sample: Smallholder farmers who participate in household's agricultural activities, n=3,951.

situation. This reflects the reported lack of formal financial planning to anticipate unexpected expenses.

Enough Water Supply, Encouraging Growth

Smallholders largely do not face challenges related to the availability of water

to support their agricultural activities. Almost all (96 percent) have a water supply that does not affect their crops and livestock (Figure 50). That, however, is not to say their water supply is sufficient. Forty-six percent of smallholders report that increased water availability would facilitate growth in their agricultural activities.

3. TOOLS FOR AGRICULTURAL RISK MITIGATION

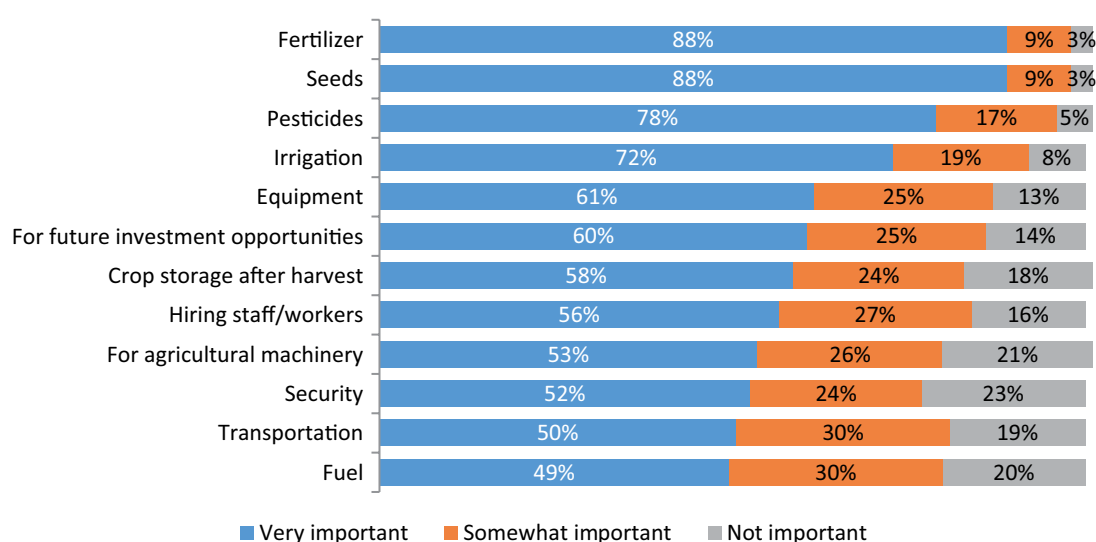
Preparedness

Smallholders assign great importance to setting aside money for a wide range of agricultural needs. Direct crop inputs, such as fertilizer, seeds, and pesticides, were considered the most vital needs for which to save.¹² Unlike African farming systems, the water-intensive rice farming practiced by most smallholders means that setting aside money to pay for irrigation is also considered extremely important to agricultural success. Similar to Tanzania, the more an agricultural input is related to immediate crop success, the more likely smallholders were to acknowledge the importance of saving for it. Forward-looking activities, such as future investment opportunities and post-harvest crop storage, were perceived as more important than some logistical expenses, such as security, transportation, and fuel (Figure 51).

Smallholders' savings aspirations and their actual saving behaviors mirror the level of importance they assign to each agricultural need. Over half of smallholders involved in agricultural activities put money aside for direct seasonal crop inputs, including seeds, fertilizer, pesticide, and irrigation. Beyond that, a substantial proportion—over 30 percent—save for a number of other agricultural needs (e.g., equipment, labor, transportation) (Figure 52). A gap remains between what smallholders want to save for and what they currently keep money aside for, ranging from 32 percent to 39 percent, depending on the particular agricultural expense. This gap, though large, is considerably less in absolute and proportional terms than what was seen in Tanzania (Anderson, Musiime, and Marita 2016).

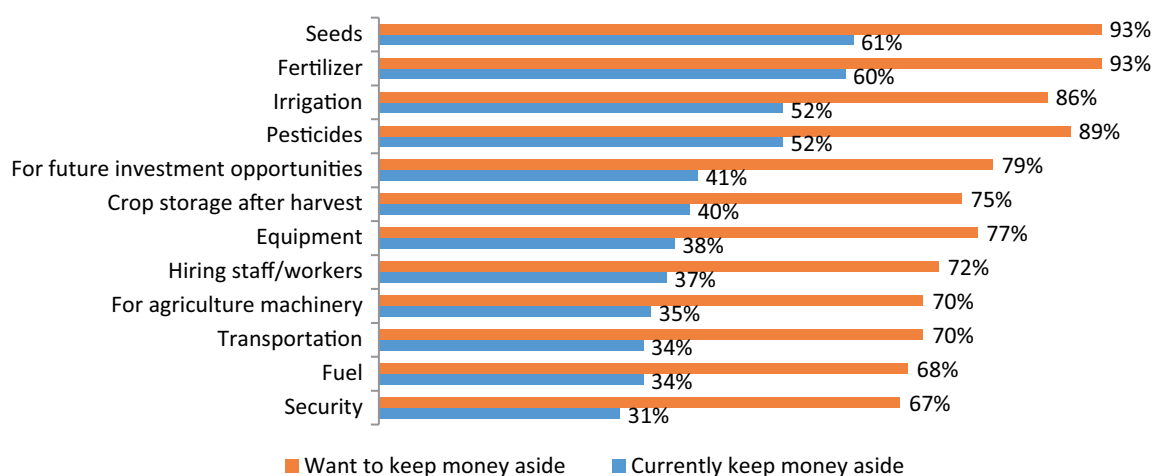
More than seven in 10 smallholders set aside money for at least one agricultural expense, primarily through informal

FIGURE 51. How important is it to keep money aside for the following agricultural needs?



Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.

¹² Similar findings emerged in recent research on integrating digital financial services into agricultural value chains in Bangladesh (see Leshner 2016).

FIGURE 52. 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?

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.

channels. A sizeable portion (16 percent) save for all 12 expenses that were explored in the survey. Interestingly, despite known gender disparities in many aspects of Bangladeshi life, there was

relatively little gender disparity around agricultural savings patterns. Differences, particularly between savers and non-savers, were more pronounced when comparing those who attended school to

TABLE 10. Keeping aside money for agricultural expenses or pursuits, by demographics

Number of Expenses	Total (%) n=2,448	Gender		Education	
		Male (%) n=2,028	Female (%) n=420	Attended (%) n=1,696	Did Not Attend (%) n=752
None	30	30	31	28	36
Net (1+)	70	70	69	72	64
1	5	6	5	5	7
2	3	4	3	3	4
3	4	4	5	5	3
4	6	6	4	6	5
5	6	5	6	6	5
6	8	7	10	8	7
7	4	5	3	5	4
8	4	4	3	4	2
9	4	4	3	4	4
10	4	4	4	5	3
11	5	5	5	5	5
12	16	16	17	17	15

FIGURE 53. Regression of number of savings channels on number of expenses or pursuits money kept aside for (n=3,095)

	Coefficient	T	P	95% CI
Savings channels	0.171	4.96	<0.001	0.104-0.240

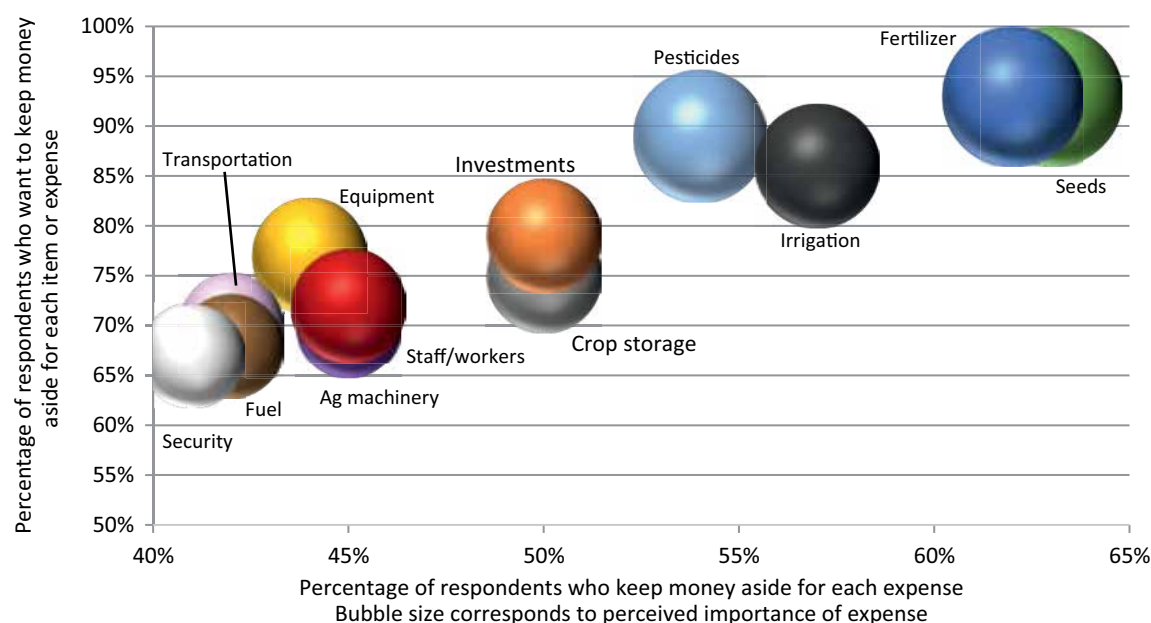
those who did not. Nearly three-quarters of those with some formal education saved for at least one agricultural expense, while two-thirds of those who had not attended school saved for at least one agricultural expense (Table 10).

The data also show a relationship between the number of savings channels a smallholder has and the number of agricultural expenses or pursuits for which he or she is saving money. However, unlike in Tanzania, this relationship is not substantive enough to suggest that there may be some perceived targeted savings mechanisms (Anderson, Musiime, and Marita 2016). That is, these data do not suggest that certain mechanisms may aid setting

aside money for specific agricultural expenses. A linear model suggests that, all else being equal and not adjusting for other factors, every increase in the number of savings channels corresponds with only a 0.17 increase in the number of agricultural expenses or pursuits for which money is set aside (Figure 53).

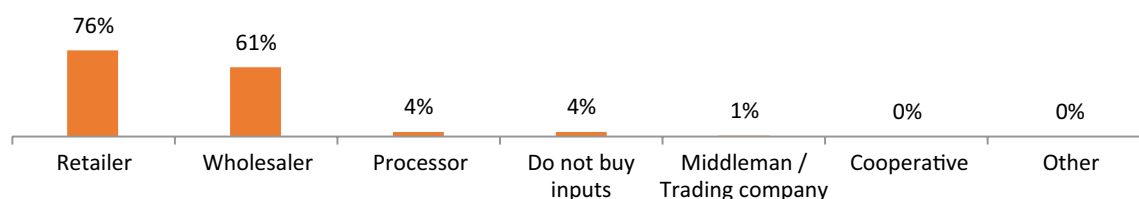
Opportunities for Broadening Savings as a Risk Mitigation Tool

Figure 54 combines all three dimensions of these agricultural expenses: (1) the reported importance of saving, (2) their desire to save, and (3) their current practices.¹³ The reported importance

FIGURE 54. Perceptual map: Importance, desires, and possession of agricultural expense

Sample: Smallholder farmers, n=3,095.

¹³ 1 refers to the question "How important is it to keep money aside for the following agricultural activity?" and 2 refers to "Do you want to keep money aside for the following agricultural activity?"

FIGURE 55. Who do you normally purchase your agricultural and livestock inputs from?

Sample: Smallholder farmers who participate in household's agricultural activities, n=3,951.
Multiple responses allowed.

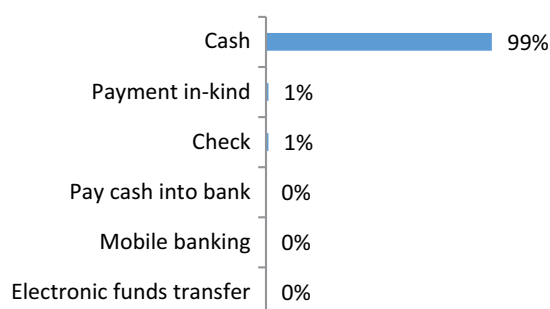
of the item is represented in the size of the bubble on a 10-point index, with the largest bubbles being perceived as the most important. The current savings practices are shown as a percentage on the X (horizontal) axis, and the reported desire to keep money aside for that purpose is represented as a percentage on the Y (vertical) axis.

Arranged graphically as in Figure 54, it is clear that there are several categorical priorities in smallholder farming aspirations and behaviors. Seeds and fertilizer are the most highly prioritized and most direct farming inputs. Those are followed closely by pesticides and irrigation. Future planning activities—investments and crop storage—make up the next tier, followed by a cluster of

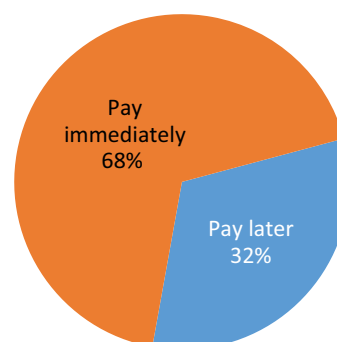
somewhat less direct agricultural support expenses, including labor, equipment, transportation, and security.

Preparedness: Purchasing inputs and contracts

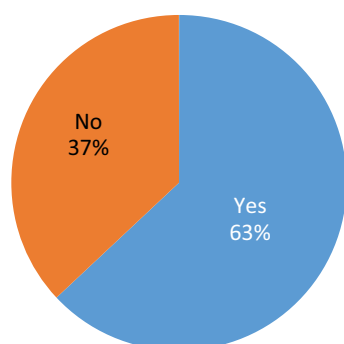
A majority of smallholders turn to retailers and wholesalers to purchase agricultural inputs. Few smallholders, comparatively, buy inputs directly from processors or do not purchase inputs at all (Figure 55). Echoing findings from the smallholder household surveys in Africa, nearly all payments for agricultural inputs are made in cash, with only a handful of smallholder respondents reporting making agricultural input payments via check or in-kind (Figure 56). About one-third of smallholders reported that

FIGURE 56. How do you usually pay your suppliers of inputs?

Sample: Smallholder farmers who purchase main agricultural and livestock inputs, n=3,838.
Multiple responses allowed.

FIGURE 57. Do your suppliers give you the option to pay them later or do you have to pay immediately?

Sample: Smallholder farmers who pay suppliers for inputs, n=3,838.

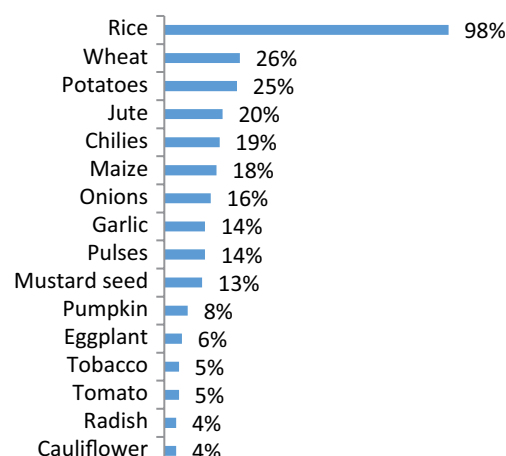
FIGURE 58. Do you currently store any of your crops after the harvest?

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.

suppliers give them the option to pay for inputs at a later date (Figure 57). Outstanding bills are primarily settled during Halkata, or the beginning of the Bengali year, although this repayment structure is becoming less common in some localities.

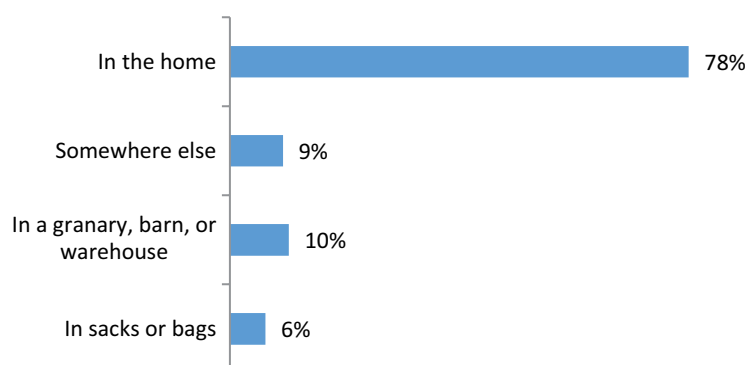
Monetization: Storing and Selling Goods

About two-thirds of smallholders store crops after the harvest (Figure 58). Thanks to its importance in the smallholder agricultural systems, rice is the most

FIGURE 59. Which crops do you normally store?

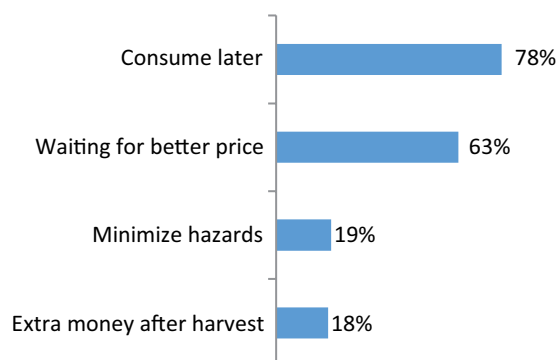
Sample: Smallholder farmers who currently store any crops after harvest, n=1,403.

commonly stored crop by a wide margin: 98 percent of the smallholders who store crops store rice. It is the most commonly grown crop and stores well. Other staples such as wheat and potatoes are stored by about one-quarter of smallholder farmers surveyed (Figure 59). Most smallholders who stored crops did so at home; a small minority used separate facilities, such as granaries, barns, or warehouses (Figure 60).

FIGURE 60. Where do you store your crops?

Sample: Smallholder farmers who currently store any crops after harvest, n=1,402. Multiple responses allowed.

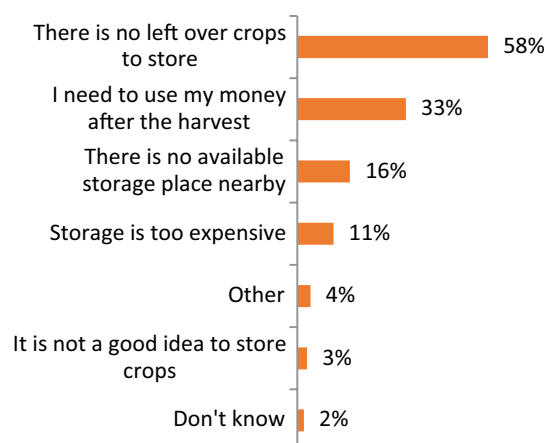
14 Similar findings emerged in recent research on integrating digital financial services into agricultural value chains in Bangladesh (see Ivan and Haque 2016).

FIGURE 61. Why do you store your crops?

Sample: Smallholder farmers who currently store any crops after harvest, n=1,403.
Multiple responses allowed.

Storing crops with the intention to consume them later was the most common reason for crop storage (78 percent). In addition, more than six in 10 cited waiting for a better price as a motivation for storing crops, the farmers' strategy to maximize the monetary profits of their crops (Figure 61).¹⁴

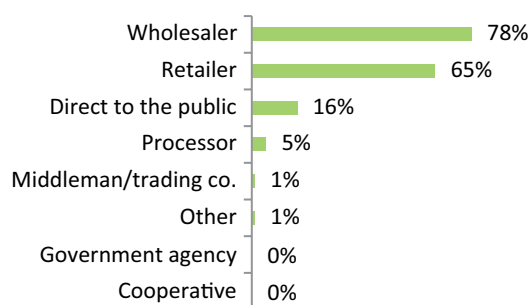
Among smallholders who did not store crops, the most commonly cited reasons were that there is no excess harvest to store or they need to use all the money the crops could generate immediately after harvest. Only a small handful of respondents (3 percent) believed it was not a good idea to store crops (Figure 62).

FIGURE 62. Why do you not currently store any of your crops?

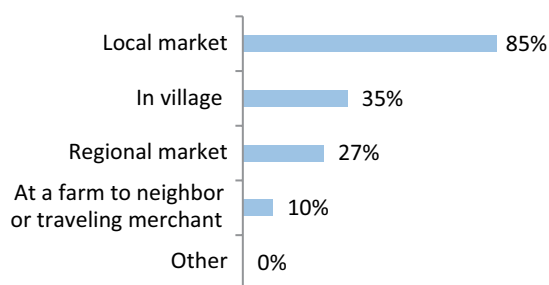
Sample: Smallholder farmers who currently do not store any crops after harvest, n=1,045.
Multiple responses allowed.

Similar to input purchasing patterns, most smallholders sell their crops and livestock to wholesalers (78 percent) or retailers (65 percent). A substantial minority of smallholders (16 percent) also reported selling directly to the public (Figure 63). Sales were normally conducted at local markets but over a third and over a quarter, respectively, sold crops or livestock in the village or at regional markets (Figure 64).

Approximately eight in 10 smallholders believe the site at which they sold their crops gave them the best price.

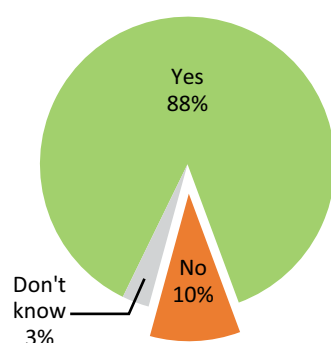
FIGURE 63. Who do you sell your crops and livestock to?

Sample: Smallholder farmers who grow and sell crops, n=3,430.
Multiple responses allowed.

FIGURE 64. Where do you normally sell your crops and livestock?

Sample: Smallholder farmers who grow and sell crops, n=3,430.
Multiple responses allowed.

FIGURE 65. When you sell your crops and livestock, do you get the current market price?



Sample: Smallholder farmers who grow and sell crops, n=3,430.

Substantial minorities of respondents also highlight the difficulty of accessing alternative markets (26 percent) and the lack of information about prices in these other markets (14 percent) (Table 11).

Nearly nine in 10 smallholders believe they are getting the current market price for their crops and livestock, which implies they are both aware of prevailing markets prices and have relatively little difficulty realizing those rates in the sale of their crops and livestock (Table 11 and figures 65 and 66).

When smallholder farmers sell their crops and livestock, they do so under informal conditions. Ninety-five

percent of smallholder farmers sell their goods outside of a contract, and 99 percent are paid for their goods in cash (Figures 67 and 68). This prevailing transaction structure gives providers and stakeholders an opportunity to leverage the stability and safety of digital financial solutions to conduct transactions; however, doing such would require an ecosystem that keeps funds within digital channels, because digital to cash or vice versa can drastically increase transaction costs.

Smallholders use livestock as a means to mitigate risk. Nearly half of smallholders have invested in livestock (Figure 69). Of those who invest in livestock, the majority (76 percent) currently have a livestock investment.

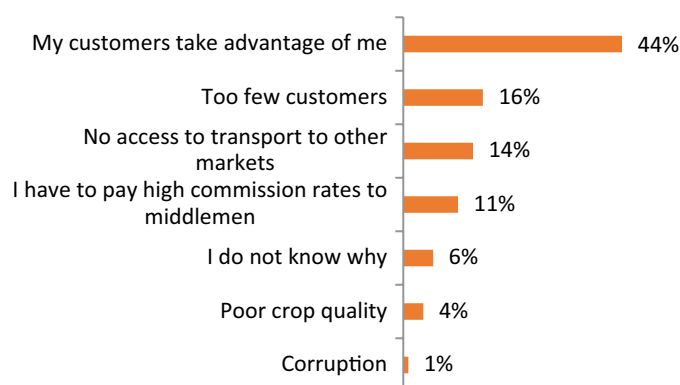
Land Maintenance: Resources

Smallholders rely most heavily on family labor for their agricultural pursuits. Eighty-two percent of smallholders report using family labor, attesting to the essential role that the household plays in smallholder agriculture (Figure 70). This is in contrast to the previously noted lack of youth in the smallholder farming population. In addition to family labor, smallholders used daily wage labor to a large degree (39 percent). Given the prevalence of agriculture in Bangladesh, this common employment

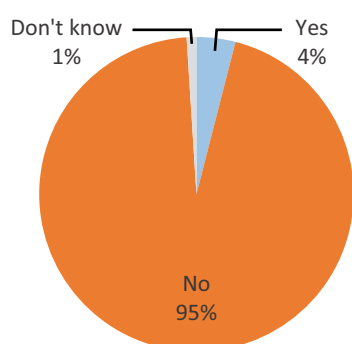
TABLE 11. Why do you sell your crops and livestock at this location?

I get the best price at this market	78%
I do not have access to transport to other markets	26%
Poor road conditions to other markets	20%
I don't produce enough to transport to a bigger market	15%
I am not aware of prices at other markets	14%
Other reason	1%
Don't know	0%

Sample: Smallholder farmers who know where crops and livestock were sold, n=3,401.
Multiple responses allowed.

FIGURE 66. Why do you not get the current market price?

Sample: Smallholder farmers who do not get current market price crops and livestock sold, n=327.
Multiple responses allowed.

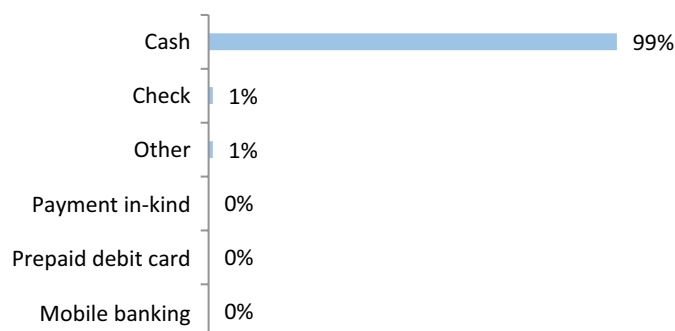
FIGURE 67. Do you have a contract to sell any of your crops or livestock?

Sample: Smallholder farmers who grow and sell crops, n=3,430.

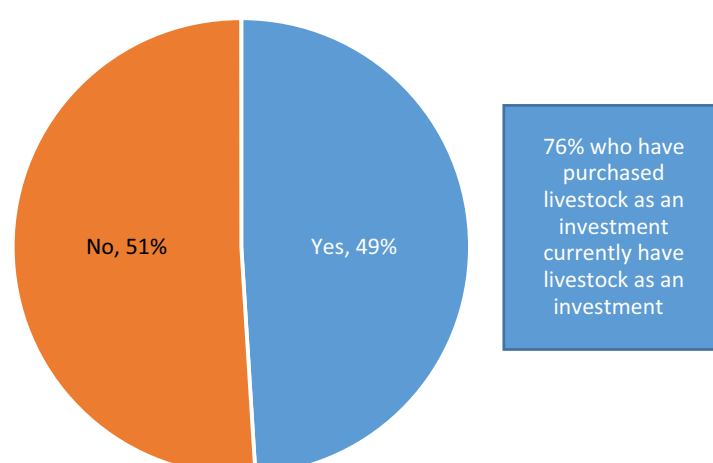
of day laborers suggests large-scale currency movement across the country, which can be facilitated by digital financial services. Smallholders use labor for a variety of purposes, most notably those related to cultivation and production (Figure 71).

Knowledge Gathering: Information Sources

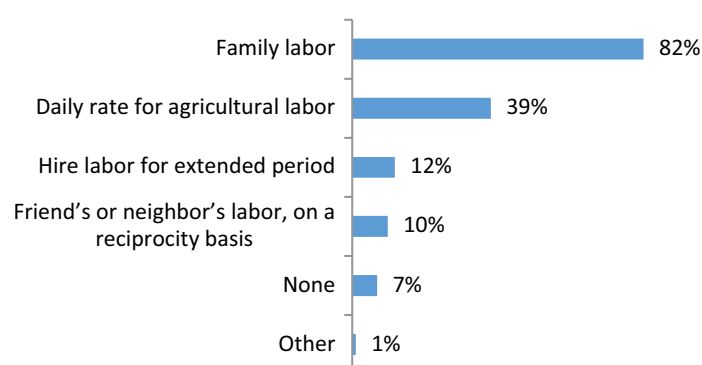
Smallholder farmers rely most heavily on their friends or family members for sources of agricultural information. Friends and family are the most commonly and

FIGURE 68. How do you usually get paid for what you sell?

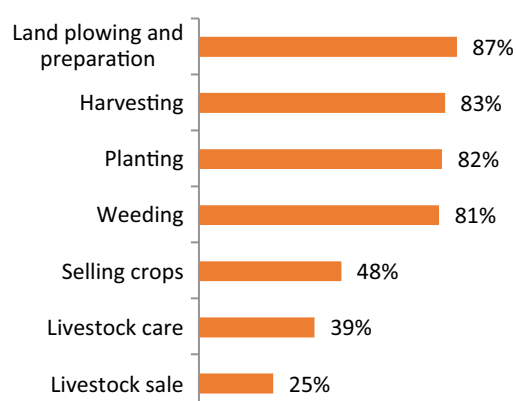
Sample: Smallholder farmers who grow and sell crops, n=3,430.
Multiple responses allowed.

FIGURE 69. Have you ever purchased livestock as an investment?

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.

FIGURE 70. For managing the land and livestock, what types of labor do you use?

Sample: Smallholder farmers who participate in household's agricultural activities, n=3,951.
Multiple responses allowed.

FIGURE 71. What do you use the labor for?

Sample: Smallholder farmers who use labor for managing land and livestock n=3,724.
Multiple responses allowed.

frequently used sources of information, with 19 percent of smallholders querying them daily and 79 percent receiving information for agricultural activities from at least one source (Table 12). Smallholders frequently use television sources and, to a lesser degree, newspaper and radio, indicating channels to outside sources. Most notably, though, input suppliers provide information on some basis to 54 percent of smallholder farmers. The prevalence of this provider-supplier channel is a unique case.

This trust in one's family and friends extends to financial- and income-related advice as well. Over two-thirds of small-

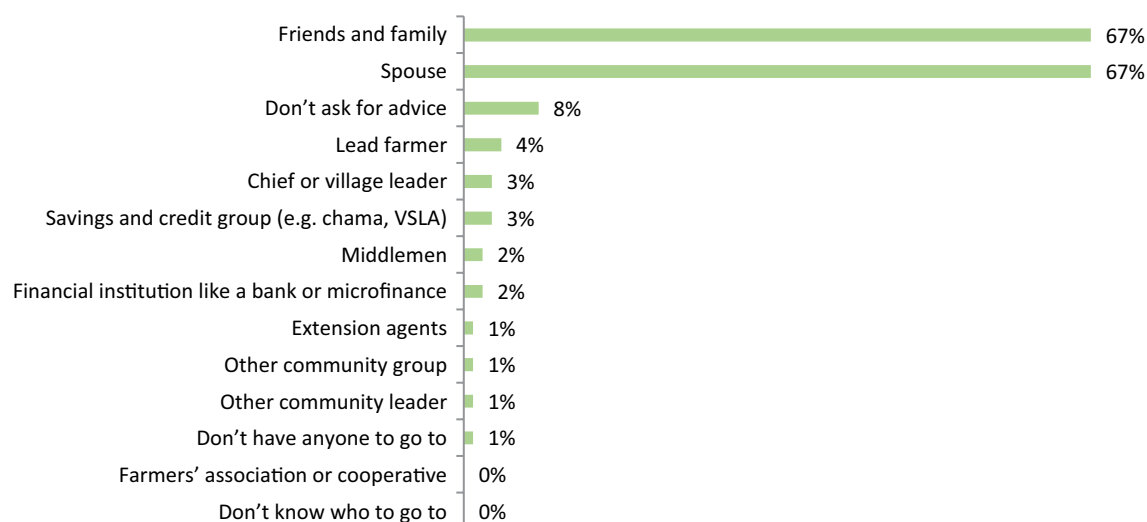
TABLE 12. How often do you use each of the following sources of information for agricultural activities?

	Daily %	Weekly %	Monthly %	More Than Monthly %	Never %
Friends or family members	19	25	18	18	19
Television	14	19	11	13	42
Cell phone/SMS	7	11	8	8	62
Community members	5	12	17	18	44
Newspapers/magazines	2	5	5	5	79
Radio	2	7	6	6	76
Religious leaders	2	6	8	9	71
Intermediaries/middlemen	1	2	5	8	77
Merchants	1	3	6	14	70
Input suppliers	1	6	19	28	43
Internet	1	1	3	3	86
Rural development agents/NGOs	1	2	12	14	67
School teachers	1	3	7	10	75
Government officials	0	2	15	28	51

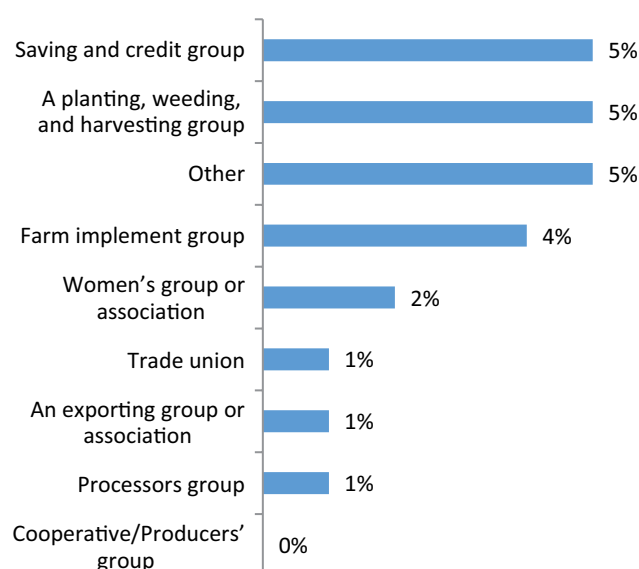
Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.

holders seek financial advice from their spouse, family, or friends (Figure 72). Financial institutions are rarely sought out to answer questions about financial matters, and formal financial

institutions even less so. Additionally, only a small portion of smallholders belong to agriculture-related groups or associations. Only 5 percent of smallholders belong to a savings and credit

FIGURE 72. When it comes to financial or income-related advice, who do you regularly talk to?

Sample: Smallholder farmers, n=3,095.
Multiple responses allowed.

FIGURE 73. Are you a member of any of the following groups or associations?

Sample: Smallholder farmers who participate in household's agricultural activities, n=2,448.
Multiple responses allowed.

group, and only 5 percent belong to a planting, harvesting, and weeding group (Figure 73). These groups are the most frequently joined information-sharing groups among smallholders.

Smallholder farmers rely heavily on informal, personal communication networks for both agricultural and financial advice; this may limit their exposure to relevant news and information, particularly information from institutional channels. The low rate of access to

nonpersonal network information channels, paired with the high rate of access to personal network information channels, raises a concern about unofficial information gatekeepers and information recycling. That is, these results suggest that information is shared through relatively closed networks, with new information being input by a select group of individuals. This raises the risk of poor advice entering through a gatekeeper and being passed around the network in perpetuity.

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.

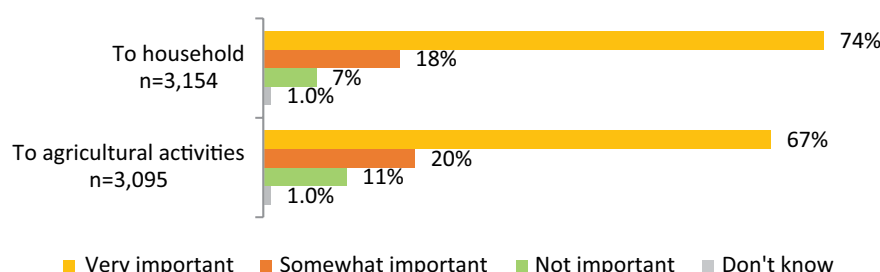
Nationwide, 96 percent of all Bangladeshis have used a mobile phone, and 67 percent of those who have used a phone have their own phone,¹⁵ making Bangladesh a country with higher relative mobile phone ownership. Smallholder farmers reflect these national trends on access to mobile phones: 73 percent of smallholders currently have their own mobile phone, and 82 percent have used a phone. In contrast, only 46 percent of smallholder farmers in Uganda (Anderson, Leach, and Gardner 2016) and 33 percent in Mozambique have their own phone (Anderson and Leach 2016).¹⁶

There is widespread, known importance and interest in owning a mobile phone among smallholder farmers. That is, smallholder farmers, even if they do not own a phone, largely recognize a phone's importance and would like to own one. Smallholder farmers recognize the relevance of mobile phones to their agricultural activities. In some cases, they even 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, Relevance to Farming

Smallholders highly value the mobile phone: 81 percent of smallholders agree with the statement, “A mobile phone is important.” This perception indicates that they see mobile phones as a valuable tool for both the household in general and the household's agricultural activities. Ninety-two percent of smallholder farmers believe a mobile phone is at least somewhat important to the household's

FIGURE 74. Regardless of what you have, how important is it to your household/ agricultural activities to have a mobile phone?



Sample: Smallholder households, n=3,154; Smallholder farmers, n=3,095.

15 InterMedia Bangladesh 2015 (Wave 3) Financial Inclusion Insights Tracker survey (N = 3,001, 15+) September to October 2015. See <http://finclusion.org/country/asia/bangladesh.html>

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

activities (Figure 74). Eighty-eight percent believe a mobile phone is at least somewhat important to the household's agricultural activities.

Comparatively speaking, Bangladesh falls in the middle to high end of countries with respect to this perception of mobile phones. 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. In Mozambique, 67 percent of smallholder farmers say a mobile phone is very important to the household, and 68 percent say it is very important to its agricultural activities.

This widespread recognition is a necessary precursor to adopting digital financial services and indicates that, generally, the population is at least somewhere along the user journey, through which an unaware nonuser transitions to an active, registered user. Smallholder farmers in Bangladesh do not have to be convinced that a mobile phone can help their daily and agricultural activities to at least some degree.

While recognition that mobile phones are important is nearly universal, this recognition is primarily related to personal communicative features. Three times as many smallholders recognize the personal communicative benefits of phone ownership than recognize more advanced applications and nonpersonal communication (e.g., conducting financial transactions, getting information related

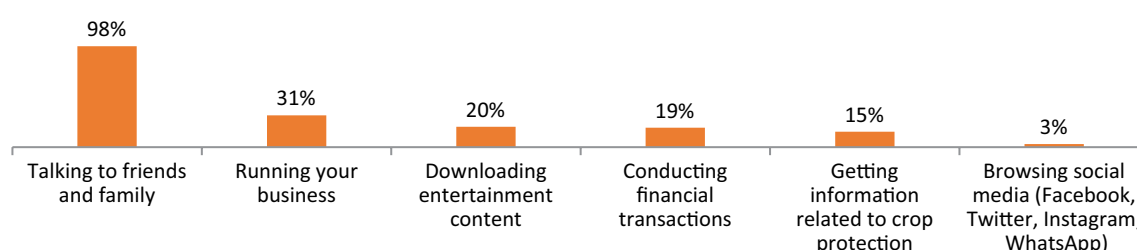
to crop production) (Figure 75). A not insignificant proportion of the population recognizes the advanced financial capabilities of a phone. Thirty-one percent believe a benefit of owning a phone is that it helps in running a business, and 19 percent recognize the benefit of being able to conduct a financial transaction. Paired with the importance smallholders place on being entrepreneurial and owning a business, these perceptions hint at a potential niche market—mobile products for business owners. A proportion of smallholders value owning or expanding a business while a partially intersecting proportion recognizes that advanced mobile-based products can facilitate owning or expanding a business. The intersection of these two groups may reveal use cases for digital financial services.

Widespread Phone Ownership and Use

Eighty-two percent of smallholders have used a mobile phone (Figure 76). Of the smallholders that have used a mobile phone, 89 percent own a mobile phone. This exceeds the national population overall for ownership, although advanced phone ownership (i.e., smartphone) lags behind the national population.

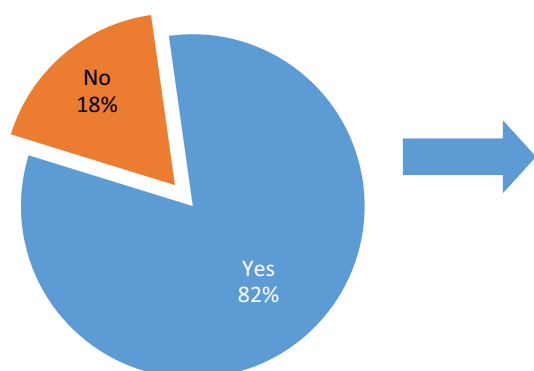
Most smallholder farmers have used a basic phone without internet or app capability (Figure 77). This reflects cross-country smallholder access trends. What differs, though, is smallholders' access to feature phones (i.e., phones

FIGURE 75. What are the benefits to having your own mobile phone or SIM card?

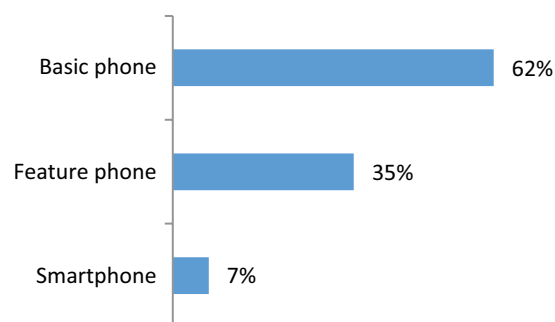


Sample: Smallholder farmers who have ever used a mobile phone, n=2,593.

Multiple responses allowed.

FIGURE 76. Have you ever used a mobile phone?

Sample: Smallholder farmers, n=3,095.

FIGURE 77. What type of phone have you used?

Sample: Smallholder farmers who have ever used a mobile phone, n=2,593.

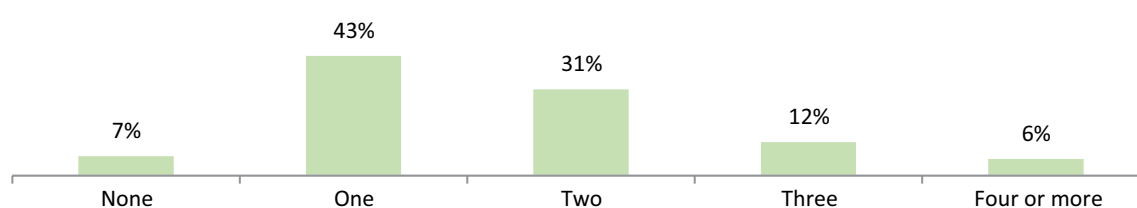
with radio and multimedia capability). Over a third of smallholders who have used a mobile phone have access to a feature phone, compared with the 13 percent of Tanzanian smallholders with feature-phone access (Anderson, Musiime, and Marita 2016).

Smallholder households frequently own multiple devices; roughly half of smallholder households own more than one phone (Figure 78). This further highlights smallholders' recognition of a mobile phone's utility.

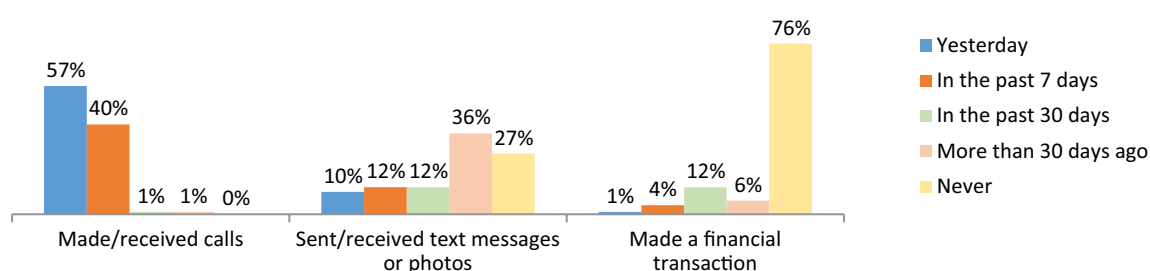
Mobile phone ownership is disproportionately allocated within demographic categories. Smallholder men more frequently own a mobile phone compared to smallholder women. Seventy-nine percent of smallholder men own a phone compared to 56 percent of smallholder women. Similarly, 84 percent of urban smallholders own a mobile phone compared to 73 percent of rural smallholders who own a mobile phone.

In line with smallholders' recognized benefits of mobile phone ownership and access, smallholders primarily restrict their frequent-use activities to communication. Nearly all smallholders with phone access made or received calls within the week before their interview for this survey, and 34 percent texted within a month before their interviews (Figure 79). A comparatively smaller group of smallholders with mobile phone access have used their phones for financial transactions, at some point, with only 5 percent of smallholders using a mobile phone for financial transactions within the week before their interviews.

Male smallholders used texting more recently, relative to the time of the survey, and at a greater rate than female smallholders. Nineteen percent of smallholder men report sending or receiving SMS in the week before the interview, whereas 13 percent of women report SMS use within the week before the interview. Thirty-eight percent of smallholder men have never

FIGURE 78. Number of mobile phones owned by household members?

Sample: Smallholder farmers, n=3,154.

FIGURE 79. 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=2,505.

texted, compared to 53 percent of women. For more advanced phone uses, such as completing a financial transaction, men and women demonstrate similar use rates.

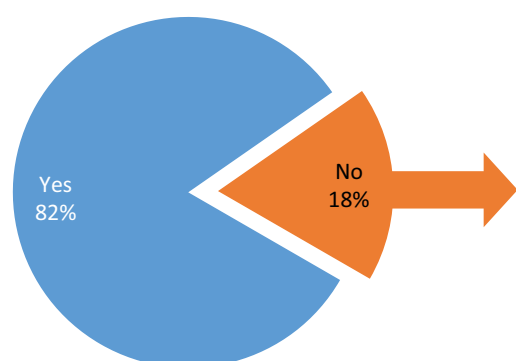
Urban smallholders tend to be more advanced phone users compared to rural smallholders. Thirty-one percent of urban smallholders have also used a mobile phone to complete a financial transaction in comparison to 18 percent of rural smallholders. Of those who have completed a financial transaction, 34 percent of urban smallholders have done so in the week before the interview compared to 23 percent of rural smallholders.

Interest in Phone Ownership

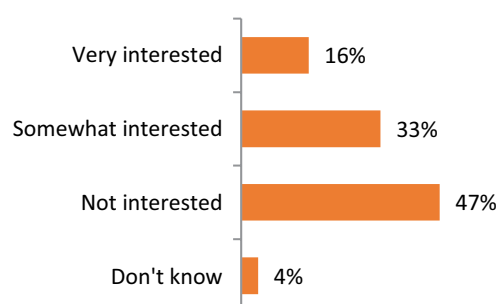
Eighteen percent of smallholders have not used a mobile phone (Figure 80). This group without access is divided into two camps: interested and disinterested. Bangladesh is unique in that its smallholder farmers

without mobile phone access largely have no interest in gaining mobile phone access; 47 percent of smallholders without access have no interest in gaining access (Figure 81). Comparatively, 82 percent of Tanzanian smallholders are very interested in gaining mobile phone access (Anderson, Musiime, and Marita 2016). This wide lack of interest suggests that stakeholders and providers have so far been partly unable to demonstrate the relevant value of mobile phones to a notable segment of the population.

The smallholders who have used a mobile phone but do not own a mobile phone largely understand the value of ownership. However, these smallholders face financial barriers to ownership. Thirty-seven percent of nonowners with access report cost as their greatest barrier to ownership (Table 13). Smallholders reporting a financial barrier intend to overcome it. Of the smallholders

FIGURE 80. Have you ever used a mobile phone?

Sample: Smallholder farmers, n=3,095.

FIGURE 81. How interested would you be in using a mobile phone?

Sample: Smallholder farmers who have never used a mobile phone, n=502.

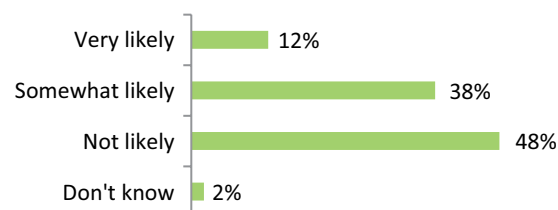
TABLE 13. What is the main reason you do not have a mobile phone?

I don't have money to buy phone	37%
I don't have a need to use a phone	36%
No specific reason	7%
I am not allowed to use a phone by my spouse or family	6%
I don't have money to pay for airtime	3%
Using a phone is against my religion	2%
There is no place to charge a phone	1%
There is no network where I live/work	0%
Other	7%

Sample: Smallholder farmers who currently do not own a phone but have used a phone, n=210

who report not having enough money to purchase a phone, 68 percent describe their odds of purchasing a phone in the next 12 months as at least somewhat likely. This high self-reported probability indicates that smallholders who do not own a phone but who have access to one are already willing to take concrete steps to overcoming difficult financial barriers to ownership. Addressing these barriers could increase adoption rates.

While barriers to ownership are primarily financial, over a third of smallholders with mobile phone access report that

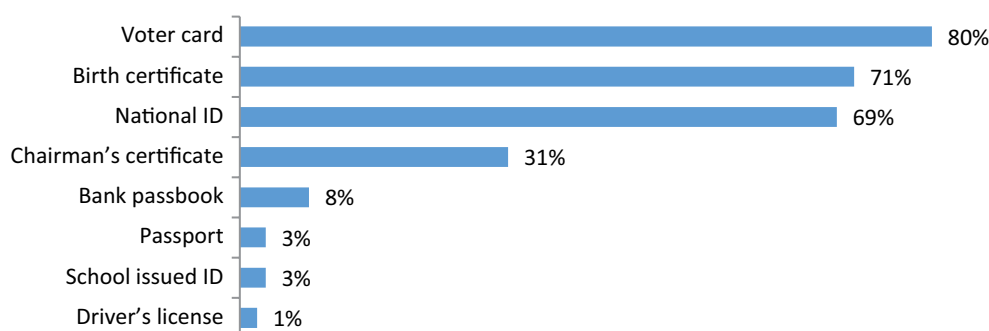
FIGURE 82. How likely are you to purchase a mobile phone in the next 12 months?

Sample: Smallholder farmers who currently do not own a phone but have used a phone, n=210.

they don't own a phone because they do not see the value in owning one. However, providers and stakeholders are not facing an insurmountable obstacle. Of the smallholders who report a lack of need as their primary reason for not owning a mobile phone, 38 percent believe they are at least somewhat likely to purchase a phone in the next year (Figure 82). This suggests that utility, or at least future possible utility, is recognized to some degree.

Most Smallholders Have the Necessary ID to Open an Account

Having a formal form of identification is a crucial requirement for financial inclusion. Smallholder farmers have widespread access to various types of formal identification. Most smallholders have a voter card (80 percent) or birth certificate (71 percent), followed by a national ID (69 percent) and Chairman's certificate (31 percent) (Figure 83).

FIGURE 83. Do you have any of the following types of official identification?

Sample: Smallholder farmers, n=5,214.
Multiple responses allowed.

5. FINANCIAL INCLUSION AMONG SMALLHOLDER HOUSEHOLDS IN BANGLADESH

Financial inclusion in Bangladesh historically has been driven by MFIs, such as ASA (the largest MFI in the world), BRAC, BURO, and Grameen Bank, along with NBFIs (as defined by the Central Bank of Bangladesh). NBFIs and MFIs remain the most prominent drivers of financial inclusion, but mobile money is making rapid inroads. The 2015 Financial Inclusion Insights (FII) study in Bangladesh shows use of NBFIs, MFIs, and mobile money grew rapidly in 2015.^{17, 18}

FII 2015 data show the following:

- 43 percent of adults in Bangladesh have a registered financial account of some kind, up from 37 percent of adults in 2014 (17 percent increase).
- 24 percent of adults have an NBFI or MFI account, up from 20 percent in 2014 (23 percent increase).
- 9 percent of Bangladeshi adults have a mobile money account, up from 5 percent in 2014 (75 percent increase).
- 19 percent of adults in Bangladesh have a full-service bank account, up from 18 percent in 2014 (5 percent increase).

Though financial inclusion is growing in Bangladesh, this expansion is not unfolding equally across demographic divides. Frequently marginalized demographic segments are not seeing increased inclusion at the rate of their nonmarginalized counterparts.

FII 2015 data also show the following:

- Overall inclusion for those above the poverty line increased from

38 percent to 52 percent, compared to the 36–40 percent increase for those below the poverty line.

- Men saw their inclusion increase from 38 percent to 48 percent, dwarfing women's increase of 35 percent to 38 percent.
- 49 percent of urban Bangladeshis are financially included, up from 41 percent, compared to 40 percent of rural Bangladeshis, up from 34 percent.

Smallholder farmers show generally similar trends. Data from the national survey of smallholder households show the following:

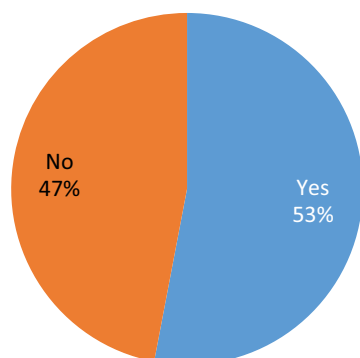
- 45 percent of smallholders are financially included.
- Similar to the general population, this inclusion is driven by NBFI and MFI use. Thirty-one percent of smallholders report having an NBFI or MFI account, exceeding the general population.
- Smallholders have adopted digital financial services at a higher rate than the population, as well. Forty-four percent of smallholders have used mobile money services, and 19 percent report having a registered account with at least one mobile provider.

Smallholders Recognize the Benefits of Formal Banks, but Adoption Remains Low

Most smallholders have been inside a bank (Figure 84). Smallholders generally recognize the security afford-

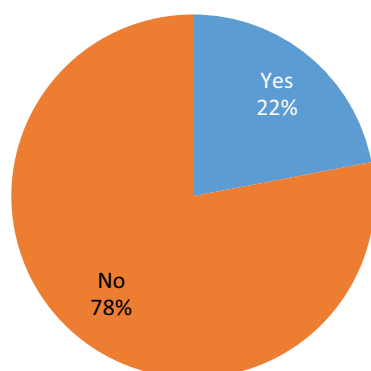
17 InterMedia Bangladesh Financial Inclusion Insights (FII) Tracker survey Wave 3 (N = 3,001, 15+), July–August 2015. See <http://finclusion.org/country/asia/bangladesh.html>

18 FII groups MFIs and NBFIs together to facilitate cross-country comparability, as in this report.

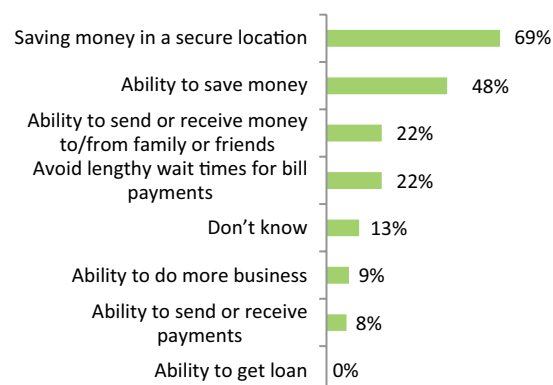
FIGURE 84. Have you ever been inside a bank?

Sample: Smallholder farmers, n=3,095.

ed by a bank (69 percent) and the benefit it offers as a place to save money (48 percent) (Figure 85). Smallholders, however, do not recognize the benefits of a bank's more advanced, full-service range of products. Less than 1 percent of smallholders recognize that account ownership provides the benefit of getting a loan, and only 9 percent recognize an account's role in facilitating business. Smallholders have a propensity toward entrepreneurship, and their financial behaviors reveal they prioritize opening, expanding, or investing in a business. Raising awareness of how bank accounts can benefit one's business activities may provide a new user channel.

FIGURE 86. Do you personally have a bank account that is registered in your name?

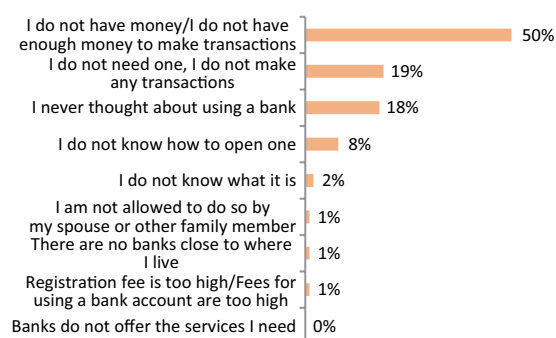
Sample: Smallholder farmers, n=3,095.

FIGURE 85. What are the benefits to having an account with a formal financial institution?

Sample: Smallholder farmers, n=3,095.

Multiple responses allowed.

Slightly over a fifth of smallholders have a registered bank account in their names (Figure 86). Among those who do not have an account, nearly half believe they lack the funds necessary to both have a bank account and conduct transactions (Figure 87). An additional 19 percent of smallholders report that a bank account is unnecessary because they do not conduct transactions. Eighteen percent report, "I never thought about using a bank." These barriers are largely oriented around the perception of what a bank is and what using it entails compared to reality. That is, perceived barriers (e.g., cannot afford an account)

FIGURE 87. What is the main reason you do not have a bank account?

Sample: Smallholder farmers who don't have a bank account, n=2,310.

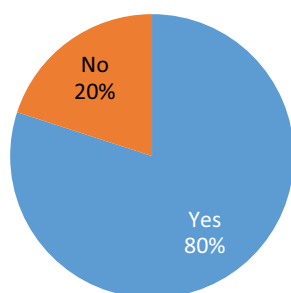
are not actual barriers (i.e., no-balance accounts are available).

Smallholder farmers with bank accounts tend to use their accounts at least once a month. Nearly half of smallholders with bank accounts have used their accounts within 30 days before the interview. Twenty-four percent are inactive users, while over 20 percent have lapsed completely.

Demographic Observations—Bank Accounts

Bank account ownership varies within demographic categories. However, these distributions are not all statistically significant. That is, they do not vary from an expected distribution; there is not an observable, distinct pattern in distributions across all demographic categories. Twenty-three percent of smallholder men are bank account holders, compared to 20 percent of smallholder women. Twenty-eight percent of urban smallholders have a bank account, compared to 22 percent of rural smallholders. A substantively stark and statistically significant difference occurs between educated and noneducated smallholders. Eleven percent of smallholders who have not attended school hold a registered bank account; in contrast, 26 percent of smallholders who have attended school hold an account.

FIGURE 88. Have you ever heard of something called mobile money?



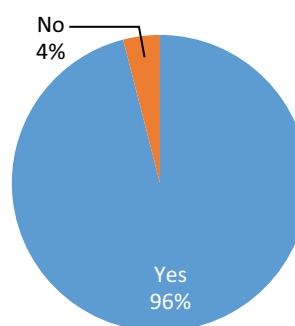
Sample: Smallholder farmers, n=2,795.

Financial Inclusion: High Awareness of Mobile Money

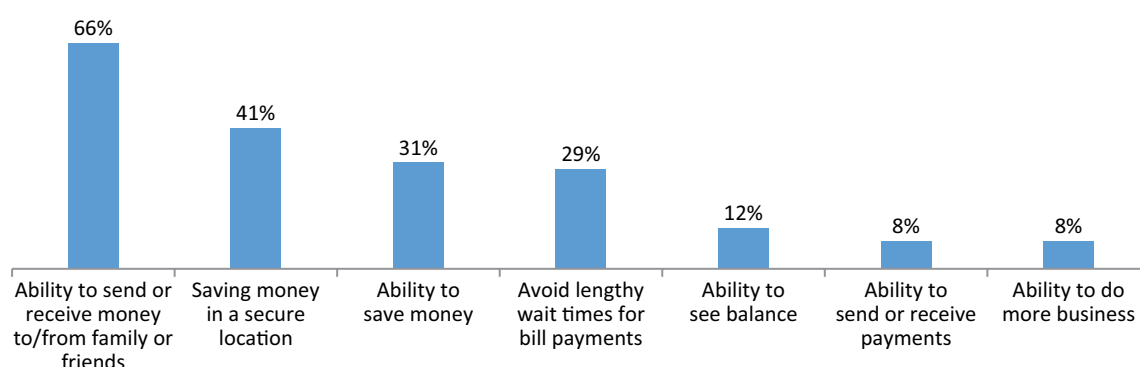
Eighty percent of smallholder farmers in Bangladesh are familiar with the concept of mobile money (Figure 88). Smallholders who are aware of mobile money overwhelmingly recognize the range of benefits from mobile money account ownership (Figure 89). Most smallholder farmers who believe that mobile money is beneficial recognize mobile money's person-to-person transfer capabilities (Figure 90). A third of these smallholders recognize mobile money as a tool to not only save money, but to save money securely. Forty-one percent of smallholders specify security as a mobile money benefit. Smallholder farmers largely do not recognize the benefits of mobile money for business transactions, further attesting to the need to develop business-related use cases for formal financial services.

Smallholders' recognition of these services is in line with perceived benefits for basic activities. Sixty percent of smallholders who are aware of mobile money as a concept know mobile money can be used to do cash-in-cash-out transactions, and 52 percent of these smallholders know mobile money can be used for person-to-person transfers (Figure 91). However, smallholders are

FIGURE 89. Are there benefits to having a mobile money account?



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

FIGURE 90. What are the benefits to having a mobile money account?

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

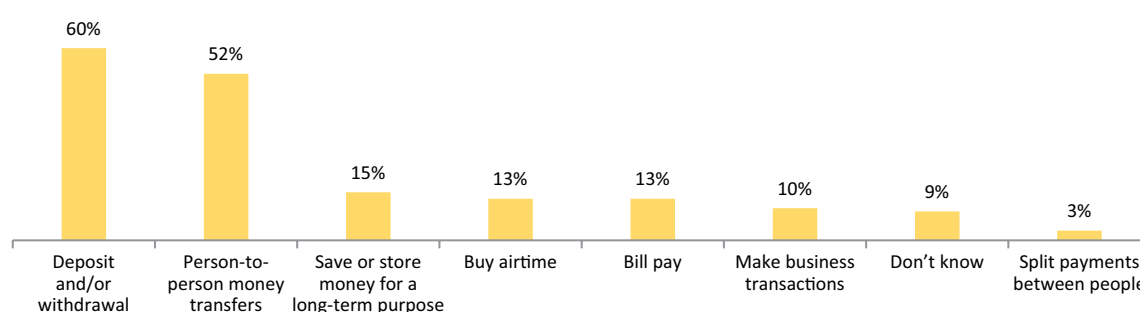
Multiple responses allowed.

not confident in mobile money's ability to manage more advanced financial transactions, such as long-term storage (15 percent), airtime purchasing (13 percent) and bill pay (13 percent).

Forty-four percent of smallholders have used mobile money services. Nineteen percent of smallholders report having a registered account with at least one mobile provider. Most notable, though, is the high conversion rate from awareness to registration, a consequence of widespread awareness of mobile money paired with strong recognition of mobile money services and their value. Of the smallholders who are aware of mobile money, 55 percent have used mobile money. Of those who have used mo-

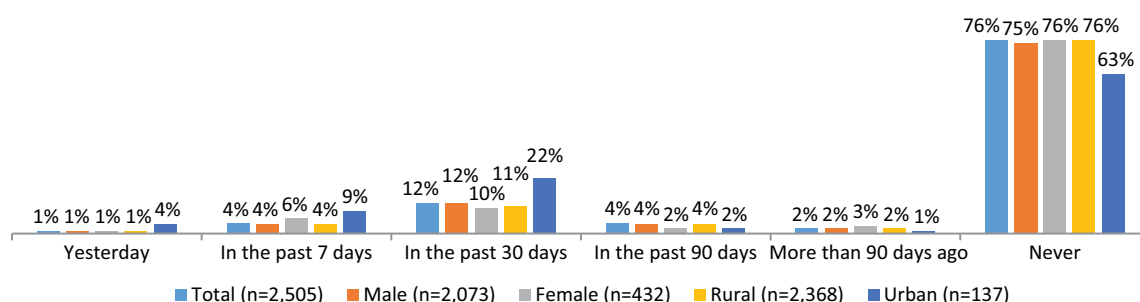
bile money, 43 percent have a registered account.

Smallholders who use mobile money services tend to do so regularly. Seventy-nine percent of smallholders who have used mobile money (over-the-counter or registered use) have done so within the 90 days before the survey (signifying active use). Eighty-nine percent of smallholders with a registered mobile money account are active users. These rates indicate that once smallholders are on-boarded to mobile money, regardless of whether this comes through over-the-counter or registered use, they tend to become deeply engaged with the service. This suggests that access, not registration, is a crucial barrier.

FIGURE 91. To the best of your knowledge, for what types of financial activities can you use mobile money?

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

Multiple responses allowed.

FIGURE 92. When was the last time you made a financial transaction such as send/receive money, pay debt, or make a banking transaction on your mobile phone

Sample: Smallholder farmers who currently own a phone or can borrow/pay to use a phone, in each case.

Few smallholders use mobile phones for financial transactions on at least a monthly basis (Figure 92). Seventeen percent of smallholders have used their phones for a financial transaction within the past 30 days, while 6 percent have completed a financial transaction on their phone more than 30 days before the interview. Time since the last transaction is consistent across genders. Urban smallholders use their phones for financial transactions more frequently, and have used them more recently, than have rural smallholders.

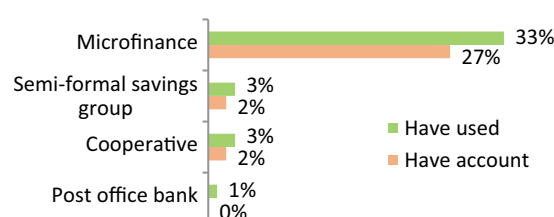
Demographic Observations— Mobile Money

There are substantive and statistically significant differences in mobile money account ownership for smallholders within geographic settings and educational levels. Thirty-one percent

of urban smallholders have a mobile money account, compared to 18 percent of rural smallholders. Twenty-two percent of smallholders who have attended school have a mobile money account, compared to 11 percent of individuals who have not attended school. Account ownership is consistent across gender.

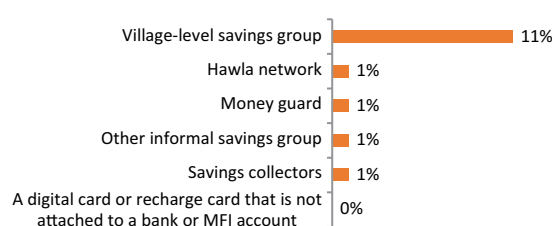
Financial inclusion: Use of Nonbank, MFIs, and Informal Financial Institutions Is Widespread among Smallholder Farmers¹⁹

Smallholder farmers use nonbank or informal financial institutions at a greater rate than other financial institution types. Thirty-one percent of smallholder farmers have a registered account with an NBFi or MFI. Among smallholders, MFIs dominate Bangladesh's nonbank/nonmobile money landscape.

FIGURE 93. 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=3,095.

¹⁹ The authors recognize that the Central Bank of Bangladesh does not categorize MFIs as NBFIs. These two institution types are grouped in this report to facilitate cross-country comparability with results from the five other national surveys of smallholder households in Mozambique, Uganda, Tanzania, Côte d'Ivoire, and Nigeria.

FIGURE 94. Have you ever used any of the following?

Sample: Smallholder farmers, n=3,095.

Twenty-seven percent of smallholder farmers have an account with an MFI, compared to 2 percent of smallholders who hold an account with a savings group (Figure 93). MFIs are also quite successful at customer conversion: 84 percent of smallholders who report having used an MFI at least once before the interview report currently holding an account with an MFI.

Smallholder farmers generally do not use informal financial services, such as a money guard or savings collector, with the exception of village-level savings groups. Eleven percent of smallholder farmers have used an informal village-level savings group (Figure 94).

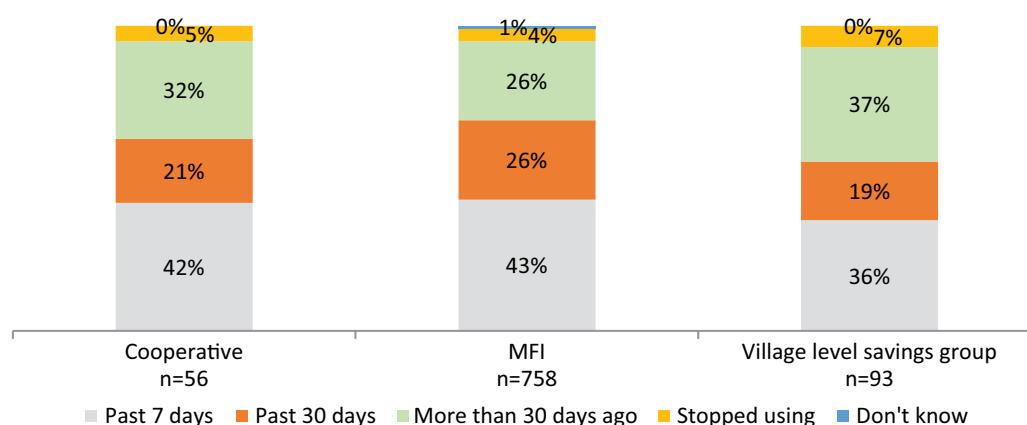
Smallholders used informal, NBFi, or MFI services more recently than they used other financial institutions. Over half of smallholders with accounts at the three most frequently used informal, NBFi, or

MFI services used the respective services within the past month, since the time of the interview (Figure 95). Two-fifths of smallholders with cooperative or MFI accounts used these services within the week before the interview.

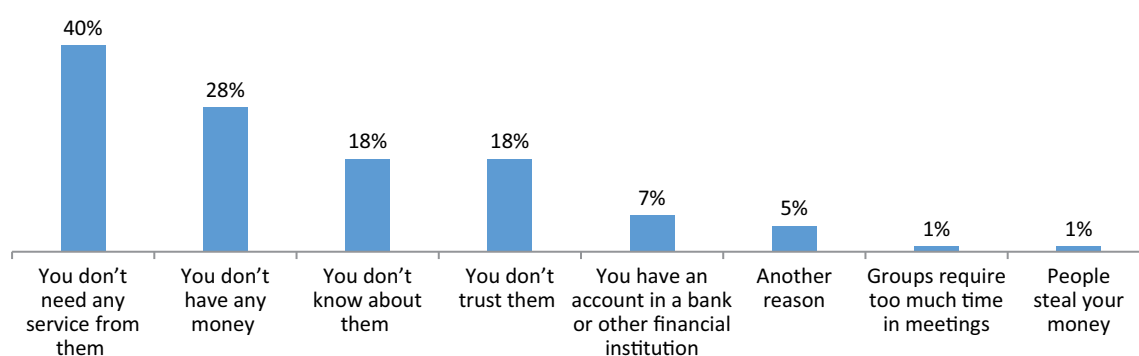
Smallholder farmers do not use informal financial service providers primarily because these providers do not meet their needs, or, if capable of meeting their needs, have not raised awareness. Forty percent of smallholders report they do not use an informal financial services provider because the provider does not offer relevant services (Figure 96). Eighteen percent report they don't know about a provider.

Demographic Observations—NBFIs and MFIs

NBFIs and MFIs are used by historically marginalized groups more than any other

FIGURE 95. Apart from today when was the last time you used your account with these services or service providers for any financial activity?

Sample: Registered users for each category.

FIGURE 96. Why do you not have a membership with any of these groups?

Sample: Smallholder farmers who do not have never used an informal financial service provider, n=2,660.

Multiple responses allowed.

type of financial institution. Twenty-nine percent of smallholder men have an NBFi or MFI account compared to 37 percent of women. Twenty-five percent of urban smallholders hold an NBFi or MFI account compared to 31 percent of rural smallholders. Smallholders who have not attended school have NBFi or MFI accounts at roughly the same rate as smallholders who have attended school (30.8 and 31.1 percent, respectively).

There is little traction for financial planning products.

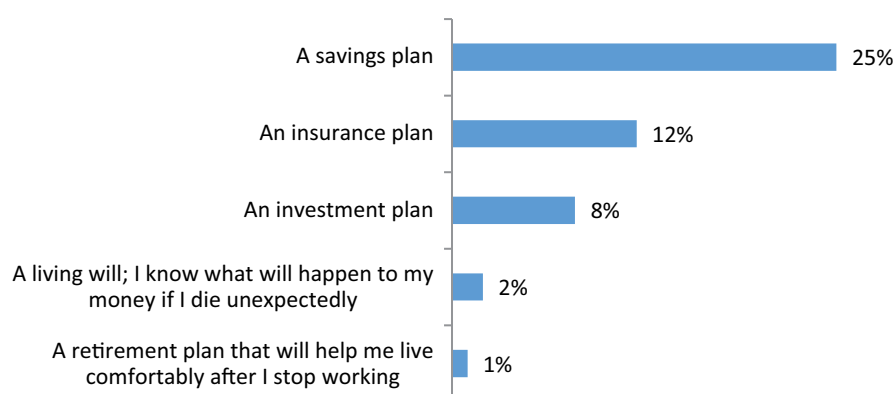
Formal financial planning tools have gained relatively little traction among smallholder farmers. A quarter of smallholders have savings plans (Figure 97). Other planning tools are less frequently

used. Only 12 percent of smallholders have an insurance plan/policy, and 8 percent have an investment plan.

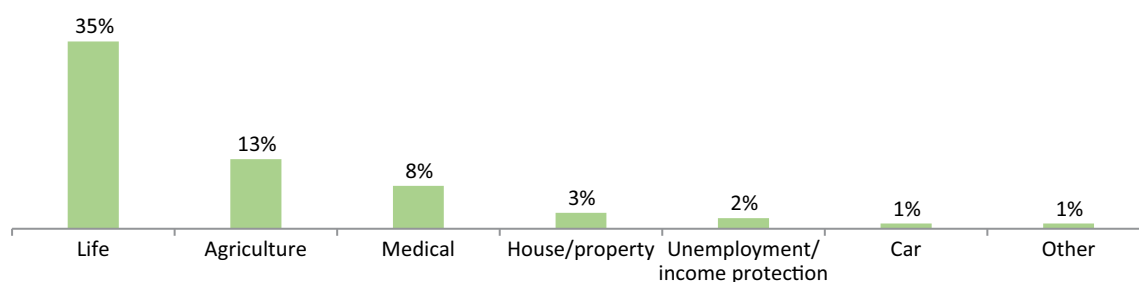
Smallholders value a variety of insurance types, with life, agriculture, and medical insurance being the most valued. Over a third of smallholder farmers believe life insurance is the most important insurance type for a household. Thirteen percent believe agriculture insurance is the most needed, and 8 percent believe medical insurance is the most needed (Figure 98).

High trust in financial institutions highlights an opportunity for smallholders.

Smallholders overwhelmingly trust their financial institutions, particularly

FIGURE 97. Do you have any of the following?

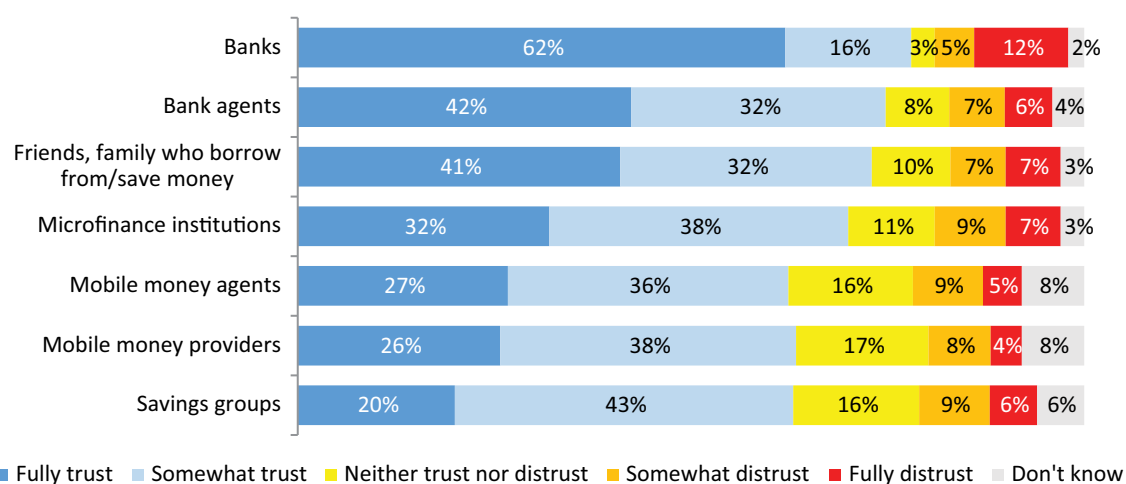
Sample: Smallholder farmers, n=3,095.

FIGURE 98. Which of the following types of insurance do you feel your household needs the most?

Sample: Smallholder farmers, n=3,095.

formal financial institutions, such as banks and MFIs. The combined rates of “somewhat trust” and “fully trust” for financial institutions range from 63 to 79 percent, depending on the institution (Figure 99). Banks and bank agents are the most trusted overall (i.e., have the highest rate of combined “fully trust” and “somewhat trust” rates).

Seventy-nine percent of smallholders trust banks to some degree; 62 percent fully trust them. Seventy-one percent of smallholders trust MFIs to some degree, slightly less than they trust family and friends (74 percent). The majority of smallholders trust mobile money, albeit to a lesser degree than other formal institutions.

FIGURE 99. How much do you trust each of the following as financial sources?

Sample: Smallholder farmers, n=3,095.

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

Phases of the smallholder household segmentation²⁰

Predicting Corollary Values

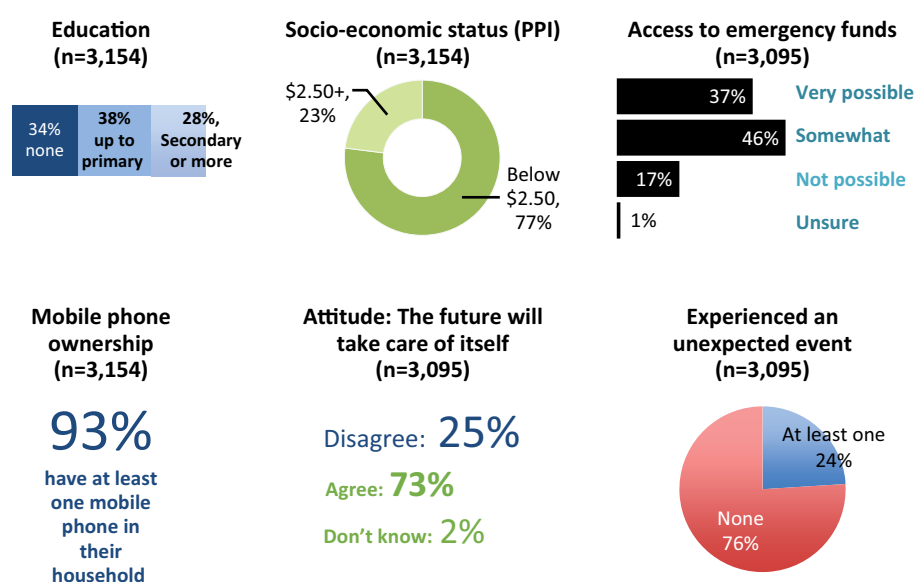
The first phase of the segmentation analysis involved a machine learning algorithm called Random Forest²¹ that assessed the individual factors that most correlate with formal financial account ownership (mobile money, bank, NBFI, or MFI). The six most predictable and discerning measures of financial account ownership are as follows:

- Educational attainment of the head of household
- Socioeconomic status or PPI of head of household
- Access to emergency funds

- Mobile phone ownership
- Attitude toward the future
- 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 variables collected by the surveys. The model showed that listed variables (Figure 100) correlated the most with the tendency to have a formal financial account. None of the agriculture or land-specific questions correlated with formal financial account ownership (mobile money, bank, NBFI, or MFI)

FIGURE 100. Bangladeshi smallholder farmers



Sample: All smallholder farmers.

²⁰ 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.

²¹ See Annex 2 and <http://www.statsoft.com/Textbook/Random-Forest> for documentation on the Random Forest Algorithm.

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 Bangladesh was, in fact, manifesting itself in the models. 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 are digital, or loans are more formal, you might see some more direct correlations. Here, correlations manifest themselves through socioeconomic elements, including education, PPI, access to funds, phone ownership, etc.

Forming segments

The second phase of the segmentation analysis was to explore the degree to which these factors together explain the variation within the population, and form meaningful cleavages within it, carving out distinct personas. Individually, these measures are the strongest predictors of financial inclusion and are useful to help determine the likelihood of becoming part of the formal 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 exercise, the clustering analysis produced a four-segment solution, delineating four unique segments of smallholder households (see Figure 101):

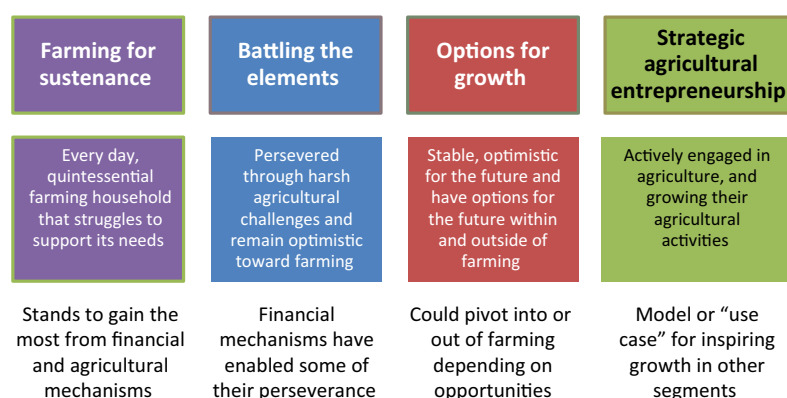
- Farming for sustenance
- Battling the elements
- Options for growth
- Strategic agricultural entrepreneurship

Since the sample was randomly selected and represents the population of smallholder farmers and households across Bangladesh, we can reasonably assert that the four segments represent natural groups in the smallholder population as a whole. Bangladesh presents a unique case, because other countries with smallholder populations, such as Tanzania and Mozambique, tend to have populations with more distinct cleavages.

By key segmentation variables only, the four clusters or segments are as follows:

- **Farming for sustenance.** This segment is the most disadvantaged and

FIGURE 101. Bangladeshi smallholder household segments



vulnerable in Bangladesh. The segment indexes low on the PPI, with over 80 percent of the population living below the extreme poverty line ($< \$1.25/\text{day}$). Its members have little education and limited access to emergency funds. Perhaps consequently, they have a fatalistic attitude, with most of the segment's population believing that "the future will take care of itself." This highly vulnerable group perhaps stands to gain the most from financial and agricultural mechanisms that can optimize their daily labor.

- **Battling the elements.** This segment has some risk mitigation advantages compared to "farming for sustenance" households. This segment is still challenged by a somewhat limited education and increased exposure to unexpected events. Despite these challenges, the smallholders in this segment are less impoverished than "farming for sustenance" smallholders. For those who are impoverished, they are not as frequently living below the extreme poverty line. Consequently, they have increased access to emergency funds. This segment is also notable for near universal mobile phone ownership, a rarity compared to smallholders in similar economic situations in countries such as Mozambique and Uganda.
- **Options for growth.** This segment is characterized by increased stability and insulation from unexpected events, relative to "farming for sustenance" and "battling the elements" smallholders. Despite increased exposure to unexpected events, a greater portion of the segment's smallholders live above the poverty line and have widespread access to emergency funds. Members of this segment are generally educated, and mobile phone ownership is universal. Notably, this group has the

least fatalistic attitude toward the future, with only 61 percent believing "the future will take care of itself."

- **Strategic agricultural entrepreneurship.** This segment is the most stable and economically well-off segment. Members of this segment have diversified income sources and are deliberate in selecting which income sources to use. Like those in the "options for growth" segment, members of this segment are frequently exposed to unexpected events, but have managed to persevere despite them. They have the highest mean income, ensuring that over two-thirds of its members live above the poverty line and no members live below the extreme poverty line. All of its members are certain they can procure emergency funds if necessary. Their success in agriculture and other professions can serve as a model or use case for carrying meaningful messages or examples of growth to other segments of the population.

Smallholder households are not overwhelmingly characterized and defined by a single segment (see Table 14). Excluding the most economically advantaged segment, "strategic agricultural entrepreneurship," the segments each hold a substantive portion of the population. No segment is an outright plurality, with both the "options for growth" and "battling the elements" groups containing 31 percent of the smallholder population (Figure 102). Twenty-seven percent of the smallholder population belongs to the "farming for sustenance" segment. On the other end of the spectrum, only 11 percent of the population belongs to the "strategic agricultural entrepreneurship" segment.

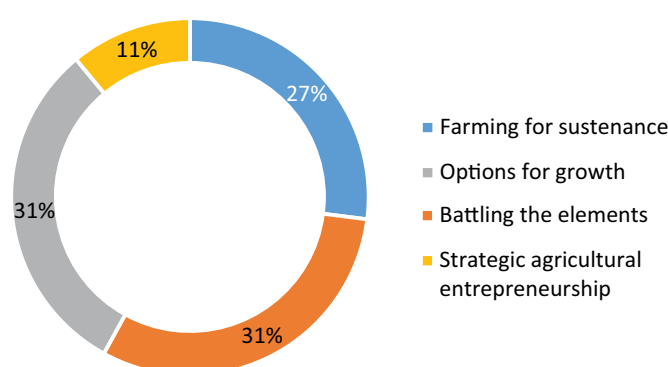
Because of the difference in the number of segments, segment distribution in Bangladesh cannot be completely and directly compared to segment distribution

TABLE 14. Bangladeshi smallholder household segments, by clustering criteria

Segments	Farming for Sustenance (%) n=810	Battling the Elements (%) n=993	Options for Growth (%) n=896	Strategic Agricultural Entrepreneurship (%) n=396
Educational attainment of household head*				
Never attended school	41	35	21	0
Preprimary	0	0	1	0
Primary	39	44	39	0
Secondary	19	17	26	65
Higher education	1	3	13	35
Socioeconomic status*				
Above the poverty line	0	19	35	69
Below the poverty line	100	81	65	31
Access to emergency funds: Can come up with 4,180TK (~\$50.00) within the next month*				
Very possible	11	16	59	100
Somewhat possible	56	66	33	0
Not possible	32	18	8	0
Don't know	0	1	1	0
Mobile phone ownership—at least one phone in the household*				
No	20	1	<1	0
Yes	80	99	>99	100
Attitude: The future will take care of itself*				
Agree	73	88	61	68
Disagree	26	12	36	31
Don't Know	2	0	3	1
In the past 12 months, experienced any unexpected events (including, but not limited to death, illness, accidents, etc.)				
No, I didn't	21	23	24	30
Yes, I did	77	74	72	68

Sample: All smallholder farmers, n=3,095.

*Pearson chi2 p-value <.05.

FIGURE 102. Bangladesh smallholder household segments

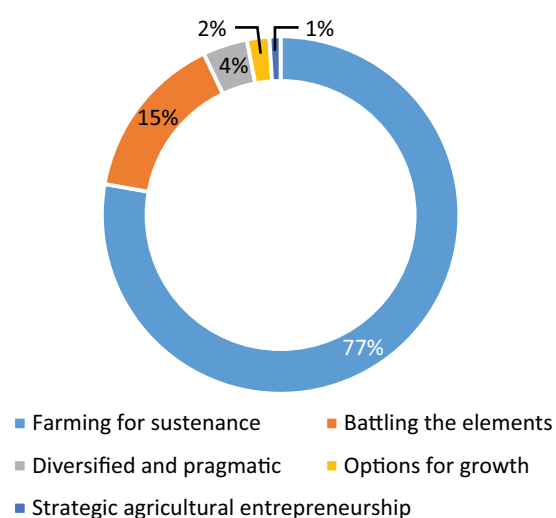
Sample: All smallholder farmers, n=3,095.

in other countries with prominent smallholder populations, such as Uganda and Mozambique (see figures 103 and 104). What is notable, though, is that, in these countries, smallholder populations are dominated by the most economically disadvantaged segment, “farming for sustenance,” where Bangladesh has a more even distribution.

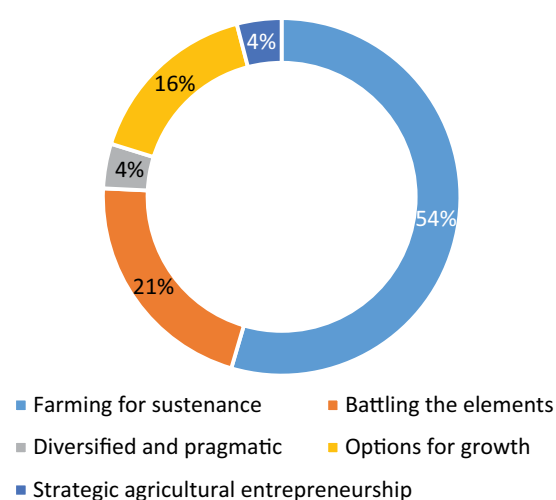
The profiles in Table 15 detail the dynamics of each segment, providing character and depth to each of them.²²

Perhaps the best illustration of the differences in the segments, however, is the linear progression of the four groups, where the “farming for sustenance” is the most impoverished and in need, and the “strategic agricultural entrepreneurship” is at the other end showing models of progress within the population.

Financial inclusion rates increase moving upward through the segments (see Figure 105). As the rate of inclusion

FIGURE 103. Mozambique smallholder household segments

Sample: All smallholder farmers, n=2,209.

FIGURE 104. Uganda smallholder household segments

Sample: All smallholder farmers, n=2,771.

²² Note: Small segment sizes for the “strategic agricultural entrepreneurship” group can limit analysis.

TABLE 15. Bangladeshi smallholder attitudes, by segment

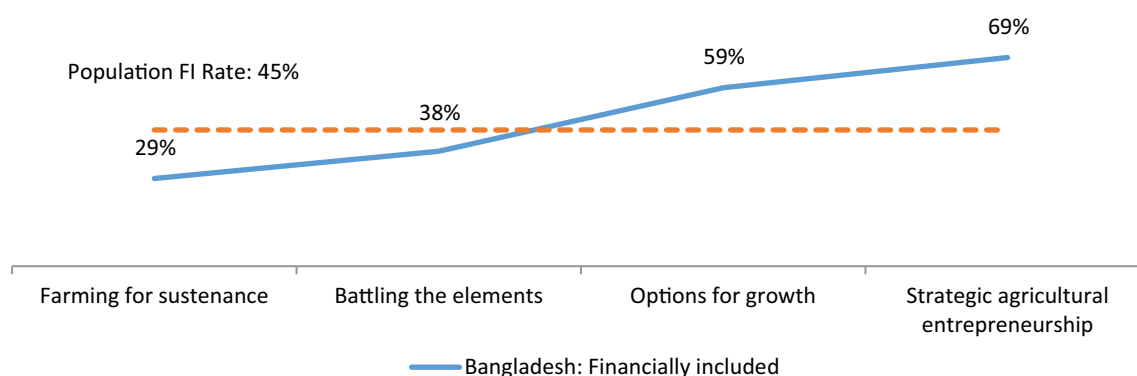
Mindsets (Agree)	Farming for Sustenance (%) n=810	Battling the Elements (%) n=993	Options for Growth (%) n=896	Strategic Agricultural Entrepreneurship (%) n=396
My life is determined by my own actions.*	69	80	72	78
I can determine what will happen in my life.	78	85	83	83
I can only focus on the short term.*	69	75	66	60
I live more for the present than tomorrow.*	70	84	69	70
What is going to happen will happen.*	82	89	77	78

Sample: All smallholder farmers, n=3,095

*Pearson chi2 p-value .05

increases, the type of service driving this inclusion shifts. In the first two segments, most notably “farming for sustenance,” inclusion is driven by NBFIs or MFIs. These segments have few members that use banks or mobile money. “Options for growth” and “strategic agricultural entrepreneurship” members do not completely abandon NBFIs or MFIs;

however, use rates of banks and mobile money increase dramatically. These segments are not only more financially included, but the nature of their inclusion is oriented toward more advanced use of services. Comparatively speaking, the range in financial inclusion is narrower for smallholders than for those in Uganda, Mozambique, or Tanzania,

FIGURE 105. Smallholder farmers in Bangladesh, financial inclusion by segment

Sample: All smallholder farmers, n=3,095.

where far fewer of the most vulnerable groups are financially included.

Segment 1. “Farming For Sustenance”: Dependent on the Farm For Day-To-Day Survival

The “farming for sustenance” segment includes 27 percent of the smallholder population. Members of this segment face social and economic vulnerabilities and are the most impoverished group of smallholders, making this large population share particularly notable.

Demographics: *All of the sampled households live below the poverty line, and they are concentrated in a few divisions*

“Farming for sustenance” households are primarily concentrated in Rangpur and Dhaka. These divisions contain 41 percent and 23 percent of the segment’s households, respectively. Few “farming for sustenance” households are located in Sylhet (3 percent) and Barisal (5 percent).

“Farming for sustenance” households are extremely economically disadvantaged. Each household lives below the poverty line (\$2.50/day). More worrying, 77 percent of “farming for

sustenance” households are below the extreme poverty line of \$1.25/day. This rate is over three times as great as the overall smallholder population extreme poverty rate of 25 percent.

The “farming for sustenance” segment skews toward middle age. Thirty percent of this segment’s heads of households are between 30 and 39 years old, and 22 percent are between 40 and 49 years old (Figure 106). Thirty-six percent are 50 years old or older. This segment, compared to the other three, has the largest share of young, under 30 years old, heads of households, at 12 percent of the segment population.

Farming: *Experienced, dependent on crops for income, but not dependent on agriculture for fulfillment*

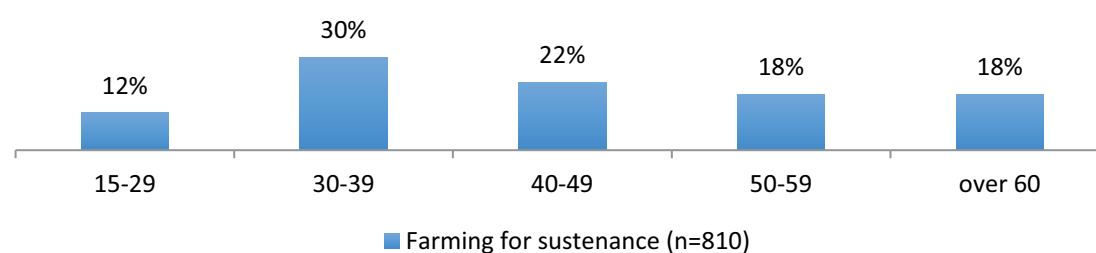
“Farming for sustenance” households are generally very tenured. Sixty-nine percent have been working in agriculture for 10 or more years, and 17 percent have been working in agriculture for six to 10 years, making this segment the second most tenured. Fourteen percent have been working in agriculture for less than five years, which is the largest proportion of less tenured farmers across the four segments. This relatively

SEGMENT SYNOPSIS

The “farming for sustenance” segment represents the most vulnerable portion of the smallholder population. Members of this segment index very low on the PPI; 77 percent live in extreme poverty, under \$1.25 per day.

Members of this segment truly rely on agricultural activities for their well-being. While agriculture is important in this regard, this segment’s smallholders do not value agriculture over alternatives. They are interested in alternative professions and very much want their children to pursue alternative paths.

This group is more excluded than those in the other segments, but demonstrates potential for inclusion because of a relative lack of readiness barriers and a demonstrated value of financial services.

FIGURE 106. Age distribution (head of household)

Sample: Smallholder head-of-household farmers by segment.

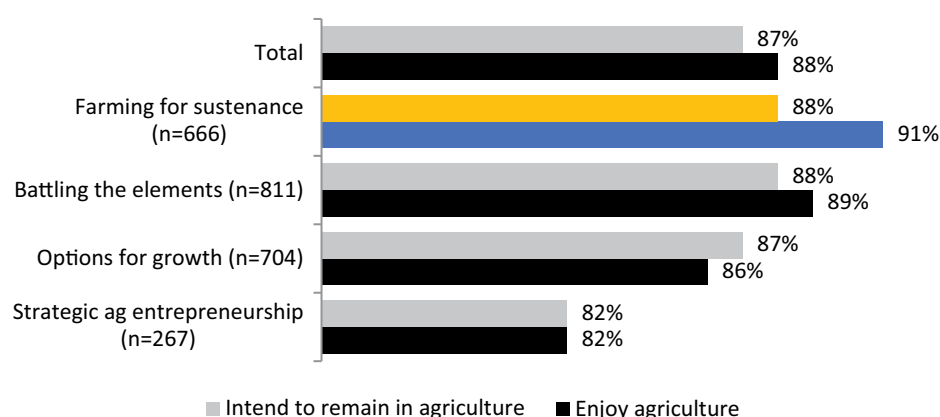
large group of less tenured farmers suggests that this segment may grow in the near future.

These households generally intend to remain working in agriculture. Eighty-eight percent of “farming for sustenance” households explicitly state this intention, and even more enjoy their agricultural pursuits (91 percent) (Figure 107).

Intention to remain in agriculture and reported general enjoyment is not equivalent to an unqualified attachment to agriculture, though. Despite the high rates of reported enjoyment and intention, these farmers, or their future generations, may be inclined to exit agriculture. Only 53 percent report they would not want to do any other kind of work; 63 percent of this segment would take full-time employment if offered.

Seventy-two percent regard their agricultural activities as their desired legacy, while only 29 percent hope their children continue in agriculture.

“Farming for sustenance” households do not diverge from the general population with regard to a general intention to remain in agriculture. Each segment, except “strategic agricultural entrepreneurship,” has a generally similar rate of intention to remain in agriculture and enjoyment of agriculture. This trend is noticeably different than smallholders in Africa, where segments perceive agriculture differently than one another. Additionally, the share of “farming for sustenance” households that would take full-time employment or would like their children to continue in agriculture is nearly identical to the mean population rate. However, “farming for

FIGURE 107. Enjoyment of agriculture and willingness to continue working in it

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

sustenance” households are significantly more disadvantaged than other segments. This can result in an inability to alter the course of their lives or act on professional desires.

“Farming for sustenance” households have relatively diversified income sources, compared to members of this segment in Mozambique (Anderson and Leach 2016) or Uganda (Anderson, Leach, and Gardner 2016). The average “farming for sustenance” household generates income from 3.35 sources. Only 5 percent of “farming for sustenance” households report having a single income source, and 23 percent report having only two income sources. Fifty-seven percent of smallholder households in this segment consider growing crops their most important and largest source of income, followed by earning wages from an occasional job (12 percent). These sources of income equate to a self-reported segment mean monthly household income of 8,132 TK, compared to the smallholder population mean of 11,917 TK.

Smallholders in the “farming for sustenance” segment are severely constrained by available, cultivatable land. According to collective reporting from all household members active in agriculture, the average “farming for sustenance” household has access to 0.46 hectares of land, where the average smallholder has access to 0.82 hectares.²³

On average, the smallholder households in the “farming for sustenance” segment are growing 3.73 crops each year on their land. Smallholder households in this segment grow less crops to sell; the average household in this segment

grows 2.95 crops to sell. A significant segment of this population is engaged in monocropping (28 percent), the highest rate across the four segments. This represents a vulnerability that could compound this segment’s already vulnerable status. Rice is the most grown crop, without equal. Ninety-three percent of “farming for sustenance” smallholders grow rice, and 99 percent of the smallholders engaged in monocropping grow rice as their sole crop.

Vulnerable to Outside Elements

Households in the “farming for sustenance” segment are frequently exposed to unexpected events (e.g., extreme weather, death in the family) that exacerbate their already precarious position. Seventy-seven percent of smallholders in this segment have experienced an unexpected personal event in the past three years, such as a medical emergency or death in the family. This is the highest rate across the four segments. In the past three years, 93 percent of the smallholders in this segment have experienced an event that has impacted their agricultural activities (e.g., losing a harvest to pests/disease or being impacted by fluctuating input prices), and 50 percent have experienced two or more of these agriculture-impacting events. Seventy-seven percent of smallholders in this segment have had their agricultural activities impacted by a weather-related event, and 45 have suffered from harvest or crop loss due to pests or disease. These two events are the most frequently experienced, followed by experiencing unexpected market and input price fluctuations, at 17 and 16 percent, respectively.

²³ 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.

When faced with these events, “farming for sustenance” smallholders are forced to either turn outward for assistance or have no particular response. Fifteen percent of “farming for sustenance” smallholders took a loan to cope with an unexpected event and 43 percent turned to borrowing. Comparatively, only 4 percent used savings and 3 percent sold preexisting assets. Roughly a quarter of the households in this segment did nothing in particular to cope with the event.

As reflected in borrowing and accessing savings rates to cope with an unexpected event, “farming for sustenance” smallholders face limited access to emergency funds. When asked about the possibility of obtaining 4,180 TK (~\$50) in the event of an emergency, only 11 percent of the smallholders from this segment described it as “very possible.” Fifty-six percent described the situation as “somewhat possible,” and 32 percent described it as “not at all possible.”

Financial Attitudes

The segmentation model is built on predictors of digital financial inclusion, which is defined here as those having a full-service bank, mobile money, NBFIs, or MFI 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.

Access to financial services driven by NBFIs or MFI membership, otherwise limited²⁴

Overall, 45 percent of smallholders are financially included, with account ownership with NBFIs or MFIs driving inclusion (Table 16). Fifty-four percent of financially included smallholders have an account with an NBFIs or MFI. Of the four segments, the “farming for sustenance” segment has the lowest rate of financial inclusion. Only 29 percent of this segment’s members are financially included. Eighty percent of financially included “farming for sustenance” members have an account with an NBFIs or MFI.

Unlike “farming for sustenance” smallholders in other countries, smallholders in this segment do not face a general mobile money awareness barrier. Seventy-one percent of smallholders in this segment are aware of at least one specific mobile money provider (i.e., they are aware by name). bKash dominates the awareness in the market. Of the smallholders in this segment who are aware of at least one mobile money provider,

TABLE 16. Informal and formal financial mechanisms

	Financially Included (%)	Own Bank Account (%)	Own Mobile Money Account (%)	Own NBFIs/MFI Account (%)	Have Used Informal Savings (%)
Farming for sustenance n=810	29	8	5	32	13

Sample: Smallholder farmers by segment.

²⁴ The authors recognize that the Central Bank of Bangladesh does not categorize MFIs as NBFIs. These two institution types are grouped in this report to facilitate cross-country comparability with results from the five other national surveys of smallholder households in Mozambique, Uganda, Tanzania, Côte d’Ivoire, and Nigeria.

100 percent are aware of bKash, followed by 50 percent who are aware of Dutch-Bangla Bank Limited (DBBL).

Smallholders in this segment also do not face barriers related to a lack of information. Ninety-six percent of “farming for sustenance” smallholders believe that mobile money account ownership can be beneficial to the account holder. Additionally, smallholders in this segment do not face a general technology barrier; 80 percent of “farming for sustenance” smallholder households own at least one mobile phone.

While these barriers are not the only impediments to mobile money access and account ownership, they are significant nonetheless. It is perhaps surprising, then, that given the absence of these barriers in the “farming for sustenance” segment, the rate of account ownership is minimal, at 5 percent of the segment population. This rate is nearly four times less than the smallholder population rate, suggesting the absence of a use case(s) or a high perceived cost-to-value for the “farming for sustenance” smallholder.

NBFIs and MFIs drive “farming for sustenance” smallholder inclusion. They are the most commonly held accounts, at 32 percent of this segment’s members or 80 percent of the financially included smallholders in this segment. MFIs have the highest conversion rate; 78 percent of smallholders in this segment who have used an MFI have a registered account with an MFI, followed by a conversion rate of 65 percent for village-level, semi-formal savings groups.

Informal savings groups are the second most commonly used financial service provider. Thirteen percent of smallholders in this segment have used an informal group. The majority of those who have used an informal group have used only one such group.

Farming for sustenance households are more likely to be financially included in Bangladesh than they are in Tanzania, Mozambique, or Uganda, where sometimes as few as 1 percent are financially included. This underscores the reach that NBFIs and MFIs have had in bringing the most impoverished into the financial fold to date.

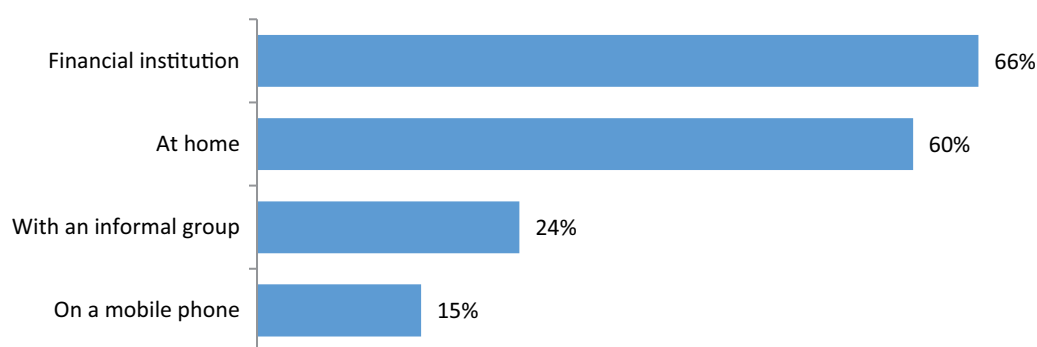
High perceived importance of financial practices

Slightly over two-thirds of smallholders in the “farming for sustenance” segment managed to save money in the past year, below the overall smallholder rate of 76 percent. For those who managed to save, saving was generally limited in the amount of mechanisms or channels used. Of those “farming for sustenance” members who managed to save money, about half did so with one savings channel. The mean number of channels used by this segment in the past year was 1.18, compared to the overall smallholder mean of 1.58.

Even though most members of this segment do not use financial services or savings mechanisms, they do place great importance in saving, particularly with formal financial institutions. Sixty-six percent of “farming for sustenance” smallholders believe that saving money at a formal financial institution is “very important,” and 52 percent believe it is the most important savings channel (figures 108 and 109).

Segment 2. “Battling the Elements”: Challenged, with Limited Resources, but Persevere

The “**battling the elements**” segment comprises 31 percent of smallholder farming households, making it one of the two largest segments, along with the “options for growth” segment, which also comprises 31 percent of smallholder

FIGURE 108. View saving money through different mediums as “very important”

Sample: “Farming for sustenance” households, n=810.

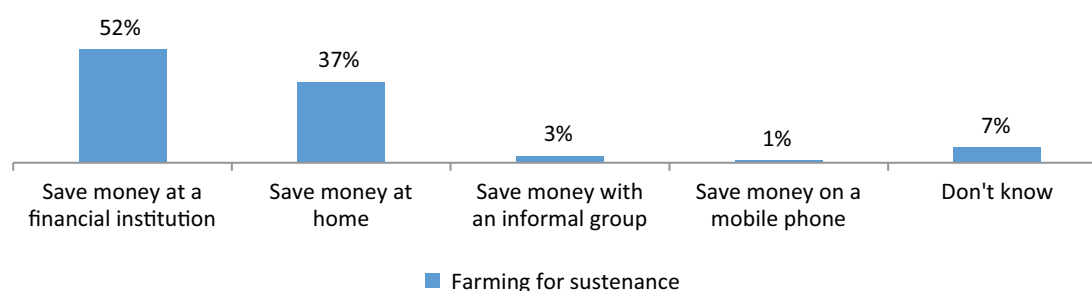
households. It is an important group because its members are eager farmers. These households may face many of the same limiting circumstances as those in the “farming for sustenance” group (i.e., low education, high poverty, limited resources), but they are optimistic and committed to farming, and they take better financial steps.

Demographics: *A majority of households live below the poverty line and are relatively evenly distributed across the country’s divisions.*

“Battling the elements” households are relatively evenly dispersed across the divisions. Twenty-five percent of this segment’s households are located in Rangpur, followed by 20 percent in both Dhaka and Khulna, 15 percent in Chittagong, and 13 percent in Rajshahi.

Eighty-one percent of “battling the elements” households live below the poverty line (\$2.50/day). Unlike “farming for sustenance” households, though, relatively few “battling the elements” households live below the extreme poverty line (\$1.25/day). Only 3 percent of smallholder households in this segment live below the extreme poverty line, compared to 77 percent of smallholder households belonging to the “farming for sustenance” segment.

“Battling the elements” heads of households are older than their “farming for sustenance” counterparts. Nearly half of the heads of households in this segment are 50 years old or older (Figure 110). Conversely, only 8 percent are under 30 years old. This skew toward maturity suggests that nonhead of household individuals who were raised in a “battling

FIGURE 109. Most important savings channel

Sample: “Farming for sustenance” households, n=810.

SEGMENT SYNOPSIS

The “battling the elements” segment is also vulnerable, but as a group does not face the same severity of limitations as the “farming for sustenance” segment. A greater portion of this segment 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 unexpected life or farm-related events.

This group of smallholders is older and more tenured than the “farming for sustenance” smallholders, and they value their agricultural activities to a greater degree. However, these smallholders similarly wish to see their children pursue other professions.

The smallholders in this segment have greater access to financial services, particularly mobile money, compared to “farming for sustenance” smallholders. Additionally, they exhibit greater diversity in savings channels used.

the elements” household may not be continuing with agriculture.

Farming: *Highly experienced farmers that remain committed to agriculture*

“Battling the elements” smallholders are the most tenured farmers of the four segments. Seventy-seven percent of smallholders in this segment have been practicing agriculture for 10 or more years, and 15 percent have been farming for six to 10 years. Only 2 percent are new smallholders who have less than two years of experience.

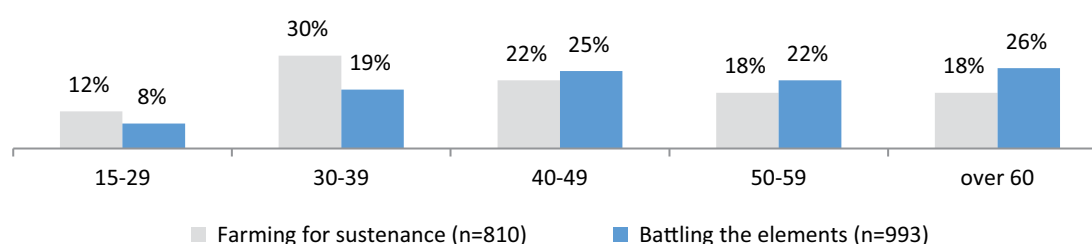
Enjoyment of Farming

Smallholders in the “battling the elements” segment enjoy agriculture and

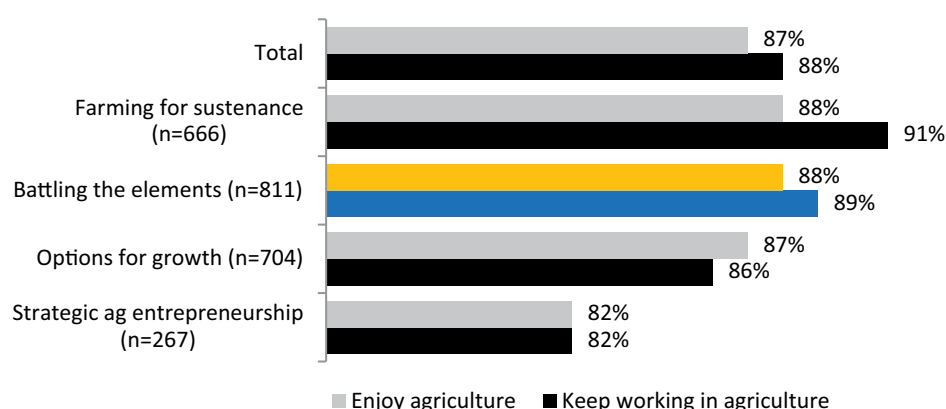
intend to remain in agriculture at a rate generally seen across the other segments. Eighty-eight percent enjoy agriculture, and 89 percent intend to keep working in agriculture (Figure 111). Smallholders in this segment give the slightest indication of a potential exit from agriculture, compared to the other segments. The majority (58 percent) of “battling the elements” smallholders report they would not want to do any other work. This is the highest rate across the segments. Similarly, 61 percent report that they would consider full-time employment if offered, the second lowest rate.

Smallholders in the “battling the elements” segment are proud of their agricultural activities. Seventy-nine percent

FIGURE 110. Age distribution



Sample: Smallholder heads of household by segment.

FIGURE 111. Enjoyment of agriculture and willingness to continue working in it

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

report that agriculture is the legacy they want to leave for their families, and 81 percent are proud of what their agricultural activities have achieved. The level of pride found in this segment is second only to the most economically well-off segment, “strategic agricultural entrepreneurship.” “Battling the elements” heads of households wish to see their children continue in agriculture more than heads of households in the other segments, but only by a small margin, at 31 percent to the smallholder population mean of 29 percent.

Most “battling the elements” households generate income from agriculture, either selling crops (78 percent) and/or rearing livestock (59 percent). Agriculture is this segment’s greatest (i.e., most revenue-generating) reported income source (62 percent), followed by rearing and selling livestock (10 percent). While agriculture is the most valuable income source to these households, it is not the only reported household income source. “Battling the elements” households are diversified,

with 3.40 income sources on average. Only 6 percent of the smallholders in this segment have a single income source. These additional income sources include the following:

- Running own business in retail or manufacturing (20 percent)
- Earning wages from an occasional job (13 percent)
- Earning wages from a regular job (10 percent)

On average, smallholder households in the “battling the elements” segment have access to 0.77 hectares of land.²⁵ On this land, these smallholders grow 4.50 crops on average, with 3.24 crops grown for sale. Slightly over a quarter of the “battling the elements” households are engaged in monocropping. The most commonly grown crops include the following:

- Rice (95 percent)
- Jute (36 percent)

²⁵ 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.

- Wheat (35 percent)
- Chilies (29 percent)
- Potatoes (27 percent)

Vulnerable to Outside Elements

“Battling the elements” smallholders have a high incidence of experiencing unexpected personal events or events that disrupt their agricultural activities. Seventy-four percent of smallholders in this segment have experienced an unexpected life event in the past three years, such as a death in the family. Ninety-five percent have had their agricultural activities impacted by an unexpected event within the past three years, with 57 percent of the smallholders in this segment having had their agricultural activities impacted by more than one event.

These households experienced an unexpected extreme weather event most frequently, followed by crop loss from pests (79 percent) and disease (53 percent). A sizable portion of this segment has been negatively impacted by market price fluctuations (23 percent) and inputs (16 percent) within the past three years. Notably, only 5 percent have been impacted by a market downturn, indicating a general resiliency despite other external events.

When faced with these unexpected events, “battling the elements” smallholders have either limited recourse or are forced to look outward for assistance. Thirty percent took no particular action to cope with the difficulties caused by external events. Only 6 percent used savings, and only 4 percent sold assets. Thirty-nine percent had to borrow, and 18 percent took a loan. “Battling the elements” smallholders are more likely to have access to emergency funds than are “farming for sustenance” households. Only 16 percent of smallholders in this segment believe that coming up

with 4,180 TK (~\$50) is “very possible,” and 66 percent believe it is “somewhat possible.”

Financial Attitudes

Compared to the other four segments, the “battling the elements” segment and its members have the second lowest rate of financial inclusion. Thirty-eight percent of the smallholders in this segment are financially included, compared to the overall population rate of 45 percent. This segment shows signs of adopting more advanced financial services.

Increased Ownership of Formal Financial Accounts, But NBFIs and MFIs Still Dominate Landscape

“Battling the elements” smallholders exhibit more diverse account ownership than smallholders who belong to the “farming for sustenance” segment. NBFIs and MFIs are similarly prominent, with 62 percent of the financially included in this segment having an NBFI or MFI account. “Battling the elements” smallholders use bank and mobile money accounts at a much greater rate, though. Nearly twice as many smallholders in this segment have a bank account, and over twice as many have a mobile money account, compared to smallholders in the “farming for sustenance” segment.

Seventy-four percent of the smallholders in this segment are aware of at least one mobile money provider. “Battling the elements” smallholders also have a broader awareness of mobile money providers than the “farming for sustenance” households, with greater or equal rates of recognition for most providers. Thirty-seven percent of the members of this segment have used mobile money. Additionally, smallholder households in this segment do not face a technology access barrier, as 99 percent of the households own at least one mobile phone.

The awareness-to-account-ownership conversion rate for members of the “battling the elements” segments is ~16 percent; 33 percent of those with access to mobile money hold an account. These rates indicate that use cases do exist, but there is still much room for improvement. Specifically, this suggests a need for building awareness that goes beyond conceptual awareness. Smallholders in this segment recognize an undefined “value” of mobile money, but lack specificity in their perception of value.

NBFIs and MFIs are the most used financial service providers for smallholders in this segment. The majority of financially included “battling the elements” smallholders have an NBFI or MFI account (62 percent), and primarily with an MFI. Eighty-six percent of “battling the elements” smallholders who have used an MFI hold an account with an MFI.²⁶ MFIs not only have a high conversion rate, but they also have a high active use rate. Seventy-six percent of smallholders in this segment with an MFI account are active users (i.e., have used their account in the past 90 days).

Informal savings services are relatively infrequently used, compared to formal banks and NBFIs or MFIs. Seventeen percent of the segment population has used

an informal group in the previous year, with the majority of informal group users having used one informal group (Table 17).

High Perceived Importance of Financial Practices

Smallholder households in the “battling the elements” segment generally have been successful in saving money. Seventy-three percent have saved in the past year. “Battling the elements” smallholders do not necessarily use diverse savings channels; the average number of channels used is 1.46. Only 18 percent of the smallholders in this segment save with three or more channels.

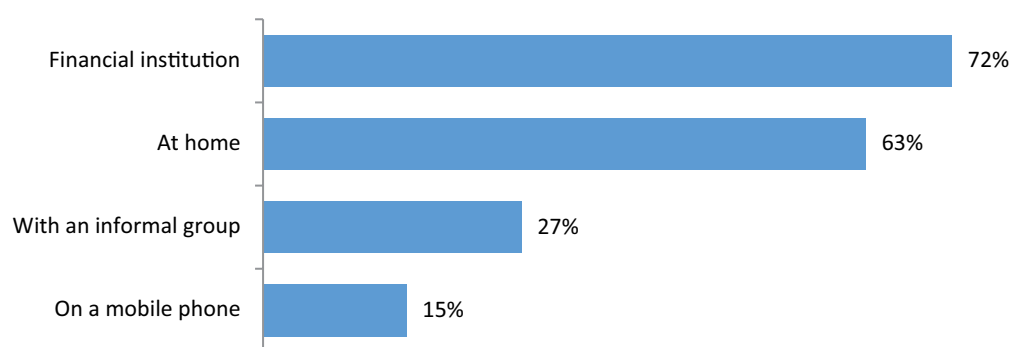
Smallholders in this segment show a movement toward valuing formal financial institutions, compared to “farming for sustenance” smallholders. Most smallholders in this segment believe that it is very important to save money at a financial institution (72 percent) and that a financial institution is the most important savings medium, at 61 percent compared to 52 percent of “farming for sustenance” smallholders (figures 112 and 113). Despite nearly a third of the population having used mobile money in the past and over one-tenth owning a mobile money account, mobile money is not regarded as the most important savings medium.

TABLE 17. Informal and formal financial mechanisms

	Financially Included (%)	Own Bank Account (%)	Own Mobile Money Account (%)	Own NBFI/MFI Account (%)	Have Used Informal Savings (%)
Farming for sustenance n=810	29	8	5	32	13
Battling the elements n=993	38	15	12	31	17

Sample: Smallholder farmers by segment.

²⁶ Refers solely to MFIs and does not include NBFIs as defined by the Bangladesh regulatory context.

FIGURE 112. View saving money through different mediums as very important

Sample: “Battling the elements” households, n=393.

Segment 3. “Options For Growth”: Increasingly Stable, Optimistic, and Building Various Paths for the Future

Smallholder households in the **options for growth** segment comprise 31 percent of the smallholder population, one of the two largest segments. Compared to the “farming for sustenance” and “battling the elements” segments, this segment is characterized by increased levels of education, economic well-being, and financial inclusion. Members of this segment have transitioned or are nearing the cusp of transitioning from vulnerable to stable.

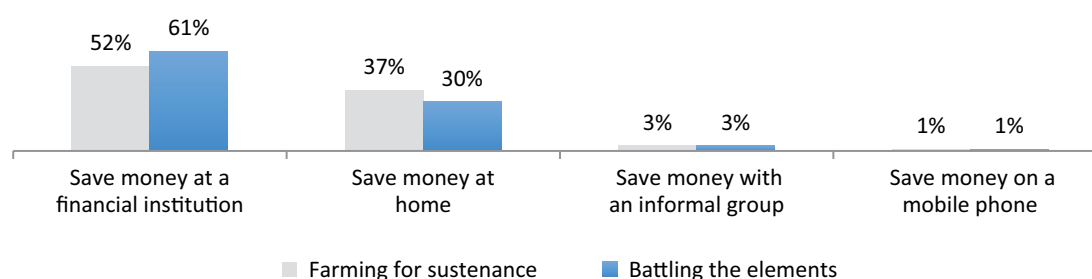
Demographics: Middle age and located in few divisions, with a substantial portion of well-off members

“Options for growth” smallholder households are concentrated in three divisions,

with 25 percent of the households located in Chittagong, 22 percent in Rangpur, and 20 percent in Dhaka. The households located in these divisions are almost exclusively located in rural areas; 99.9 percent of the households in this segment in Dhaka are in rural areas.

Of all the households in Chittagong, 44 percent belong to the “options for growth” segment (Figure 114). No division has such a large percentage of households from a single segment.

Over one-third of the “options for growth” smallholders live above the poverty line (\$2.50/day), representing a substantial portion of the segment population. Less than 10 percent of the segment population lives below the extreme poverty line (\$1.25). Compared to the “battling the elements” segment, this segment exhibits a greater degree

FIGURE 113. Perceived most important savings medium

Sample: Smallholder farmers by segment.

SEGMENT SYNOPSIS

The “options for growth” segment is made up of smallholders with greater access to financial tools and external support. Its members are more educated and feel less at the mercy of powerful figures and forces; they are decidedly in control of their destiny.

The segment relies heavily on agricultural income. At the same time, smallholder farmers in the “options for growth” segment are highly engaged in more stable income-generating pursuits outside of or tangential to agriculture, such as running a business, wage labor, or agricultural product processing.

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

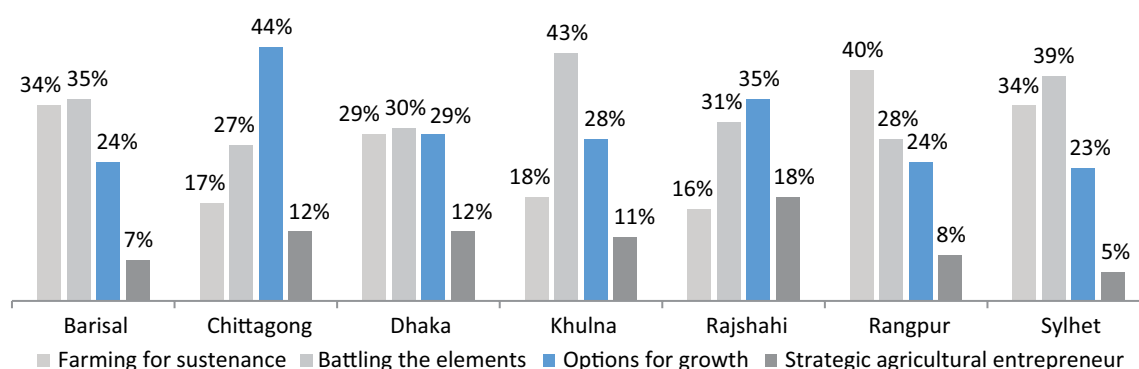
of income disparity. The “battling the elements” segment contains a greater portion of smallholders below the poverty line; however, compared to the “options for growth” segment, this portion is not as concentrated under the extreme poverty line. The portion of “options for growth” members living below the extreme poverty line is nearly three times as great as that of the “battling the elements” segment.

“Options for growth” heads of households tend to be middle age. Forty-six percent of the segment population’s heads of households are between 30 and 49 years old. This segment has the second highest proportion of farmers younger than 30, at 10 percent.

Farming: Increased land availability and crop diversity, but decreased importance due to diverse sources

The “options for growth” segment has the smallest proportion of highly tenured (i.e., greater than 10 years of experience) agricultural participants, with 66 percent of this segment’s smallholders. Twenty-three percent of this segment’s smallholders have between six and 10 years of experience. The “options for growth” segment has the largest proportion of mid-tenured farmers. This leaves the “options for growth” group potentially poised for the most immediate segment growth, compared to “farming for sustenance,” which is poised for longer-term growth due to its large

FIGURE 114. Division population makeup, by segment



Sample: All smallholder households, n=3,095.

share of farmers with zero to five years of experience.

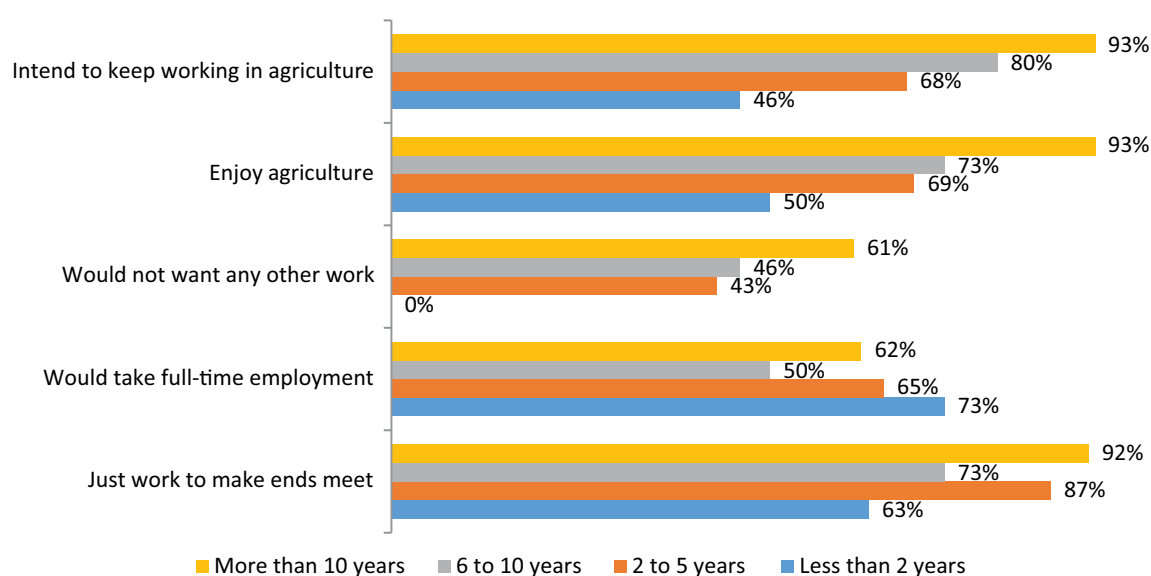
The smallholders in this segment generally enjoy agriculture and intend to remain in it. Their level of enthusiasm, though, is less than that of the previous two segments. Eighty-seven percent intend to keep working in agriculture, and 86 percent report that they enjoy agriculture. Only 67 percent regard agriculture as the legacy they want to leave their families, markedly the lowest rate across the four segments.

The potential for segment growth because of a relatively younger and less experienced population may be tempered by a lack of enthusiasm across the less experienced smallholders. Smallholders with less tenure are not as committed to agriculture and, true to their segment's name, are potentially willing to consider alternatives to agriculture. Almost uniformly within the segments, rates of enthusiasm decline with fewer years of farming experience (i.e., the longer a smallholder is engaged in agriculture, the more enthusiastic he or she is about

the sector). Only 50 percent of smallholders with less than two years of experience report enjoying agriculture, compared to 93 percent of smallholders with more than 10 years of experience (Figure 115). No smallholders with less than two years of experience, and 43 percent of smallholders with two to five years of experience, would not want to take any other work, compared to 61 percent of the most tenured smallholders in this segment. Finally, the less tenured smallholders appear to be seeking a profession that they earnestly enjoy. Sixty-three percent of smallholders with less than two years of experience work just to make ends meet, compared to 92 percent of smallholders with more than 10 years of experience.

Smallholders in the "options for growth" segment rely the most on agriculture, compared to smallholders belonging to the other three segments. Seventy-nine percent of the segment report generating income from growing and selling crops. Fifty-six percent rear livestock, which is the smallest proportion seen among the segments. These smallholders ex-

FIGURE 115. Enthusiasm toward agriculture by tenure



Sample: Smallholders in "options for growth."

hibit a larger degree of income-source diversity compared to the “farming for sustenance” and “battling the elements” segments, with 3.65 income sources on average. These additional income sources include the following:

- Running own business in retail, manufacturing, or other—30 percent, which was the highest rate across segments
- Earning wages or salary from a regular job—16 percent
- Buying agricultural products from farmers and processing them (e.g., paddy to rice)—15 percent, which was the highest rate across segments
- Receiving remittances—11 percent
- Providing a service to farmers or processors of farming products (e.g., renting equipment)—6 percent, which was the highest rate across segments

Twice as many “options for growth” smallholders receive remittances compared to the previous two segments. There is not sufficient evidence to establish a causal link, but these data call for further investigation into the relationship between receiving remittances and owning a business. That is, do remittances facilitate establishing and/or running one’s own business? Of the “options for growth” smallholders who receive remittances, 38 percent own a business in retail or manufacturing. Of the smallholders in this segment who do not receive remittances, only 24 percent own a business. No other income source

has a higher percentage of overlap with owning a business.

Given the comparatively high rates of income sources other than growing and selling crops, perhaps it is not surprising that “options for growth” smallholders do not have a dominant income source, compared to “farming for sustenance” and “battling the elements” smallholders. Fifty-five percent of smallholders in this segment report growing and selling crops as their most important income source, compared to 62 percent of the smallholders belonging to the “battling the elements” segment. Receiving remittances is the only income source that this segment’s members report as their largest source of income more frequently than the other three segments.

On average, smallholder households in the “options for growth” segment have access to 0.91 hectares of land.²⁷ On this land, this segment’s smallholders grow 4.66 crops on average, with 3.38 being grown for sale. Twenty percent of the “options for growth” smallholders are engaged in monocropping, the smallest proportion of the four segments. As with the “farming for sustenance” and “battling the elements” groups, rice is the most frequently grown crop in this segment.

Vulnerable to outside Elements

Similar to the previous segments, “options for growth” smallholders tend to face unexpected personal events or events that disrupt their agricultural activities. Seventy-two percent of the smallholders in this segment have

²⁷ 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.

experienced an unexpected life event in the past three years, such as the loss of a job. Ninety-three percent have had their agricultural activities impacted by an unexpected event, with 60 percent of the smallholders in this segment having had their agricultural activities impacted by more than one event.

“Options for growth” smallholders experienced an unexpected extreme weather event most frequently (75 percent), followed by crop loss due to pests/disease (55 percent) within the past three years. Over a quarter have been negatively impacted by price fluctuations at the market. Fifteen percent have experienced price fluctuations with inputs. Three percent have had their agricultural activities disrupted by political unrest and 1 percent by contracts that were not honored. These otherwise unsubstantial portions are notable because, in the case of political unrest, the incidence rate for each other segment was below 1.5 percent. In the case of contracts not being honored, the incidence rate for each other segment was below a half of a percent.

When faced with these events, smallholders belonging to this segment most frequently did nothing in particular, not unlike the previous two segments. Thirty-one percent reported taking no particular action to cope with the difficulties caused by external events. Similar to those in the “farming for sustenance” and “battling the elements” groups, borrowing (32 percent) and taking a loan (18 percent) were the most frequent actions taken. Nine percent sold assets, 15 percent sold livestock, and 13 percent used savings. This continued, albeit to a lesser extent, reliance on debt over preexisting assets and savings suggests that, while this group is more economically advantaged than previous segments, it still is not fully insulated against disruptive events.

This segment does have better access to emergency funds. Fifty-nine percent report that obtaining 4,180 TK (~\$50) is “very possible,” compared to only 16 percent of “battling the elements” members who felt such a task was “very possible.”

Financial Attitudes

The majority of this segment’s members are financially included (59 percent). While a substantial portion of this segment lives below the poverty line, this does not appear to impact inclusion rates. “Options for growth” members who live above the poverty line have an inclusion rate of 62 percent; their impoverished counterparts have an inclusion rate of 58 percent.

Diversity in account-type ownership with no dominant provider

Relative to “farming for sustenance” and “battling the elements” smallholders, “options for growth” smallholders are characterized as truly diversified in their account ownership (Table 18). NBFIs and MFIs accounts are the most commonly held, but only to a small extent, at 33 percent of the segment population. Unlike the previous two segments, NBFIs and MFIs are not solely or overwhelmingly driving financial inclusion for smallholders who belong to the “options for growth” segment. Fifty percent of the segment members who are financially included hold a bank account, and 49 percent hold an account with an NBFI or MFI.

Mobile money awareness as a concept, as well as awareness of providers and of “value” in the service, is nearly universal among members of this segment. Consequently, this segment has a mobile money account ownership rate at 29 percent, nearly six times the rate of the “farming for sustenance” segment.

TABLE 18. Informal and formal financial mechanisms

	Financially Included (%)	Own Bank Account (%)	Own Mobile Money Account (%)	Own NBFI/MFI Account (%)	Have Used Informal Savings (%)
Farming for sustenance n=810	29	8	5	32	13
Battling the elements n=993	38	15	12	31	17
Options for growth n=896	59	30	29	33	14

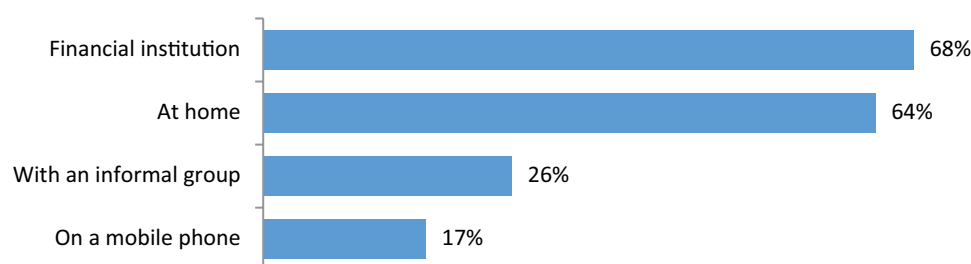
Sample: Smallholder farmers by segment.

Mobile money use may be driven by this segment's relatively high participation in business ownership. Forty-three percent of "options for growth" smallholders who generate income from owning a business possess a mobile money account. Only 23 percent of this segment's members who do not own a business possess a mobile money account. This disparity between mobile money account ownership for business owners compared to nonbusiness owners is not seen in either account ownership rates for banks/NBFIs or mobile-money account ownership for the fourth segment, suggesting that this may be a unique case.

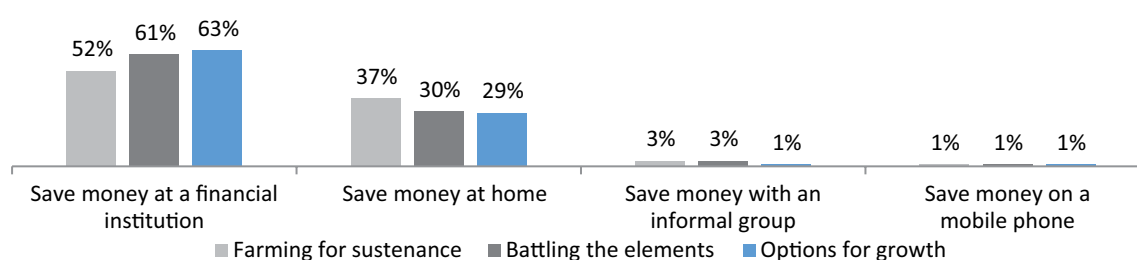
Smallholders in the "options for growth" segment are largely savers.

Eighty percent of the segment's members have saved money in the past 12 months. This segment exhibits a degree of diversity in savings channels, with the average member using 1.84 savings mechanisms. Twenty-seven percent of the segment population is saving with three or more mechanisms, exceeding the rate of those saving with only one savings mechanism (23 percent).

"Options for growth" smallholders highly value formal financial institutions, particularly when asked to select the most important savings channel for the household. Sixty-three percent of this segment's smallholders believe a household's most important savings channel is a financial institution (Figure 117). Despite an

FIGURE 116. View saving money through different mediums as very important

Sample: "Options for growth" households, n=896.

FIGURE 117. Perceived most important savings medium

Sample: Smallholder farmers by segment.

increased use of mobile money by this segment's members, relative to the previous two segments, the perceived value of mobile money as a savings channel remained more or less static (Figure 117). This provides further testament to the possibility that mobile money providers have established only limited use cases in Bangladesh that do not fully leverage the products' capabilities.

Segment 4: "Strategic Agricultural Entrepreneurship": Actively Engaged and Empowered

The **strategic agricultural entrepreneurship** segment includes 11 percent of Bangladesh's smallholder households.

They have emerged from life's events empowered, enabled, and economically well-off to a greater degree than the general smallholder population in Bangladesh.

Demographics: *Older, economically well-off and dispersed evenly across the country*

"Strategic agricultural entrepreneurship" households are relatively evenly distributed across five of the divisions, with few located in Barisal and Sylhet. The largest portion of this segment's households is located in Dhaka (22 percent), followed by Rajshahi (21 percent), and Rangpur (21 percent). This segment's largest share of a division's population is

SEGMENT SYNOPSIS

The "strategic agricultural entrepreneurship" segment includes households that are not only engaged in highly diverse and successful agricultural activities, but also are deeply engaged in alternative forms of employment, particularly regular salary or wage labor. This segment is more enabled than the others, has a substantially higher mean income, 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 cope with tough times.

The smallholders in this segment are sophisticated and successful farmers. They have access to the most land and use this land to grow the widest array of crops, both for sale and consumption. Despite this success, enthusiasm toward agriculture remains low; it is regarded by some members of the segment solely as a means to an end.

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 with regard to agricultural practices and leveraging financial tools.

in Rajshahi, where “strategic agricultural entrepreneurship” households make up 18 percent of the division’s population.

The “strategic agricultural entrepreneurship” segment is the most economically successful segment. Sixty-nine percent of the smallholders in this segment live above the poverty line (\$2.50/day). None of the smallholders in this segment live below the extreme poverty line (\$1.25), raising the possibility that the impoverished members of this segment may be at the cusp of escaping poverty.

“Strategic agricultural entrepreneurship” heads of households are the oldest of the four segments. Fifty-seven percent of all heads of households in this segment are older than 50 years old, and 30 percent are over 60 years old (Figure 118). Only 25 percent of the heads of households in this segment are younger than 40 years old, which, paired with the segment’s low enthusiasm toward agriculture (discussed below), suggests that this segment will shrink without new entrants from other segment members, through “graduation.”

Farming: *Decreased enthusiasm toward and reliance on agriculture, despite its high income generation*

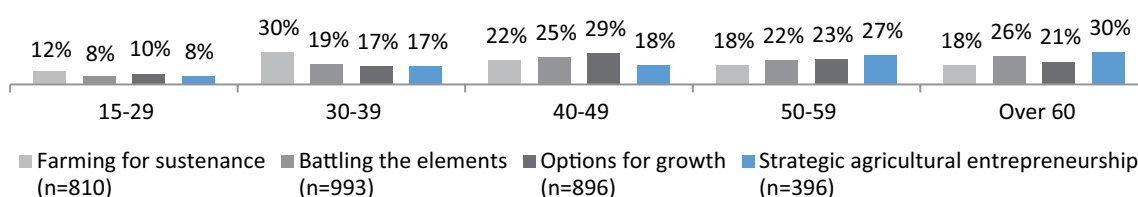
Most “strategic agricultural entrepreneurship” smallholders are highly tenured. Sixty-seven percent have been participating in agricultural activities for more than 10 years, and 19 percent

have been participating in agriculture for six to 10 years. Fourteen percent have been farming for five years or less, which is the second greatest proportion of less-tenured farmers across the four segments.

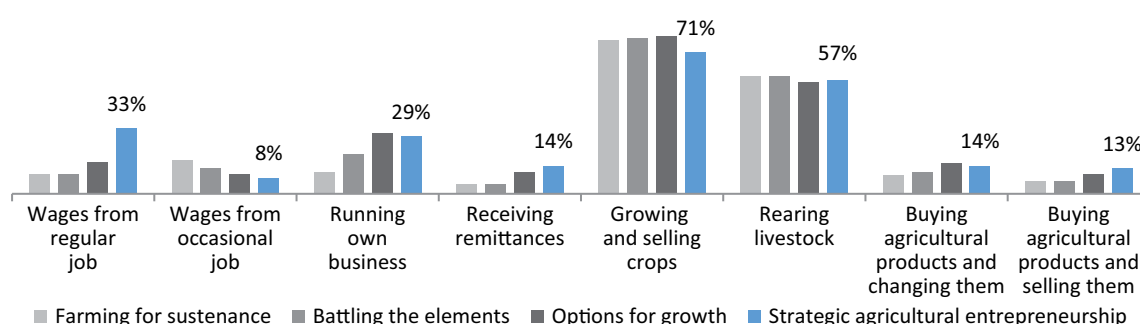
Despite their recognized success in agriculture—83 percent are satisfied with their agricultural achievements—members of the “strategic agricultural entrepreneurship” segment are the relatively least enthusiastic toward continuing in agriculture. Eighty-two percent intend to remain in agriculture, compared to the population mean of 87 percent. Eighty-two percent also report enjoying agriculture, compared to the population mean of 88 percent. Sixty-eight percent would take full-time employment if offered. Similar to other segments, despite a positive view of agriculture as a legacy (74 percent), only 25 percent of this segment’s smallholders want to see their children continue in agriculture, the lowest rate of the four segments. These low rates of enthusiasm suggest that smallholders in this segment view agriculture as a means to an end. The members of this segment choose to participate in agriculture when beneficial, but have few reservations with not participating if alternative income sources are more productive.

The “strategic agricultural entrepreneurship” households also have the lowest rate of reliance on agriculture.

FIGURE 118. Age distribution (head of household)



Sample: Smallholder farmers by segment.

FIGURE 119. Income sources by segment

Sample: Smallholder farmers by segment.

Seventy-one percent of this segment's smallholders generate income from growing and selling crops, and only 36 percent report that growing and selling crops is their household's largest source of income. Fifty-seven percent of the segment population rears livestock, with 14 percent reporting that rearing livestock is their largest income source.

The "strategic agricultural entrepreneurship" households are characterized by both their diversity of income sources and their participation in professions outside of growing crops and rearing livestock. The average household generates income from 3.82 different sources. Thirty-three percent of the smallholders in this segment generate income from a regular salary/wage job, which is over twice the rate of the general smallholder population (Figure 119). They also generate income from occasional jobs the least, indicating stability in their income sources. Twenty-nine percent of this segment's members own their own businesses, the second highest rate across the segments, falling short of "options for growth" by 1 percent. The income

sources allow the segment's members to have a self-reported mean monthly income of 18,958 TK.

Those "strategic agricultural entrepreneurship" smallholders who do grow and sell crops have access to the largest amount of land, compared to the other three segments. The average smallholder in this segment has access to 1.42 hectares of land, over three times that of the "farming for sustenance" smallholders who rely most on agriculture.²⁸ On this land, "strategic agricultural entrepreneurship" smallholders grow 5.36 crops overall and 3.84 for sale. Twenty-two percent of the segment's members are engaged in monocropping.

The "strategic agricultural entrepreneurship" smallholders are the least exposed to unexpected personal events. Sixty-eight percent have experienced an unexpected personal event in the past three years. This rate is perhaps tempered by the segment's high income and use of financial services. The segment is, though, the most exposed to unexpected events that impact agricultural activities. Ninety-six percent

²⁸ 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.

of the segment's members who participate in agriculture have had their agricultural activities impacted by an unexpected event in the past three years, with 71 percent having been impacted by more than one event. Both of these rates are the highest of all four segments. These smallholders were most impacted by weather events (81 percent) and pests/disease (67 percent). This segment also had the highest rates of exposure to price fluctuations in the market (30 percent) and price fluctuations with inputs (22 percent).

Smallholders in this segment coped with these events most frequently by taking no specific action (35 percent). When taking action, these smallholders relied on loans (12 percent) and/or borrowing (19 percent) less frequently than the other three segments. Alternatively, these smallholders rely on their savings (22 percent) more frequently than the other three segments. Owing to their prosperity, this segment's smallholders are likely to be able to come up with 4,180 TK (~\$50.00) in emergency funds. All of the segment's members reported

that coming up with this amount would be "very possible."

Financial Attitudes

"Strategic agricultural entrepreneurship" smallholders are very much included in formal financial services. Sixty-nine percent of this segment's members have a full-service financial account with a bank, mobile money provider, NBFI, or MFI. In addition to a high inclusion rate, this segment is notable for its rates of owning non-NBFI and MFI accounts, relative to the other three segments.

Most are financially included, primarily through banks

"Strategic agricultural entrepreneurship" smallholders are deeply engaged with advanced financial services providers. The smallholders in this segment have the highest rates of bank account and mobile money account ownership, relative to the other three segments, as well as the lowest rate of NBFI or MFI account ownership (Table 19).

Table 19. Informal and formal financial mechanisms

	Financially Included (%)	Own Bank Account (%)	Own Mobile Money Account (%)	Own NBFI/MFI Account (%)	Have Used Informal Savings (%)
Farming for sustenance n=810	29	8	5	32	13
Battling the elements n=993	38	15	12	31	17
Options for growth n=896	59	30	29	33	14
Strategic agricultural entrepreneurship n=396	69	55	41	24	14

Sample: Smallholder farmers by segment.

Similar to “options for growth,” this segment’s financial inclusion rate is driven by bank account ownership. Eighty percent of the financially included “strategic agricultural entrepreneurship” smallholders hold a bank account. Sixty percent of the segment’s financially included hold a mobile money account. Comparatively, NBFIs and MFIs are used less often. Only 31 percent of the segment’s financially included own an NBFI or MFI account. Comparatively, 80 percent of the included “farming for sustenance” smallholders own an NBFI or MFI account.

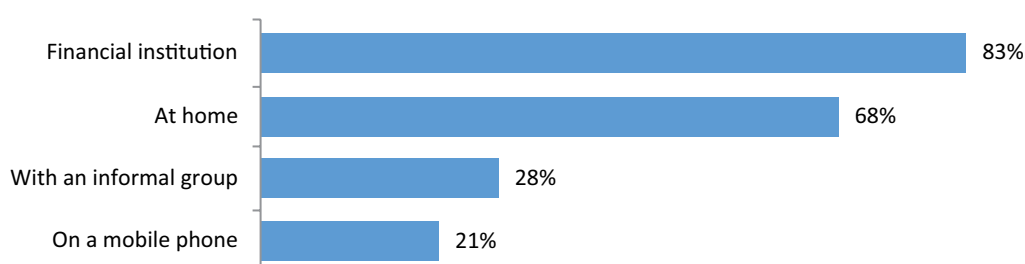
While bank account ownership is prevalent, bank account use is not. Only 4 percent of this segment’s bank account holders are active account users (i.e., have used their account within the past 90 days). Mobile money account holders, on the other hand, are significantly more engaged. Ninety-three percent of this segment’s mobile money account holders are active users, the highest rate across the four segments. Active use of NBFI or MFI accounts reflects the segment’s relative disinterest in the account type, although not to the disparate degree found among bank account holders. Sixty percent of the segment’s NBFI or MFI account holders are active users, compared to 80 percent of the “options for growth” NBFI or MFI account holders.

High perceived importance of financial practices

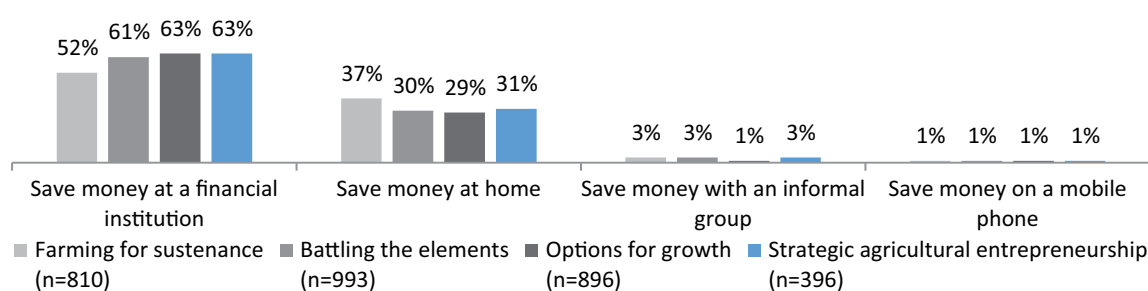
Smallholders in the “strategic agricultural entrepreneurship” segment highly value saving, with 89 percent of the segment saving through at least one channel. This segment is the only segment using more than one channel on average, with a mean of 2.16 channels used. Thirty-six percent of the smallholders in this segment are saving with three or more mechanisms. The most frequently used external savings channel is a bank or formal financial institution, which 46 percent of the segment’s smallholders have used. Smallholders in this segment predominately use nonformal savings channels; 69 percent report saving at home.

The value “strategic agricultural entrepreneurship” smallholders place in saving is evident through their evaluations of various savings channels. This segment’s smallholders view saving through each savings medium as “very important” at a rate greater than the other three segments. Financial institutions are particularly valued, with 83 percent reporting that saving through a financial institution is very important and 63 percent reporting that a financial institution is the most important savings medium (figures 120 and 121). As with “options for growth,” this segment

FIGURE 120. View saving money through different mediums as very important



Sample: “Strategic agricultural entrepreneurship” households, n=396.

FIGURE 121. Perceived most important savings medium

Sample: Smallholder farmers by segment.

does not highly value mobile money as a savings medium despite a relatively high account ownership rate.

Market Implications of the Segmentation of Smallholder Households

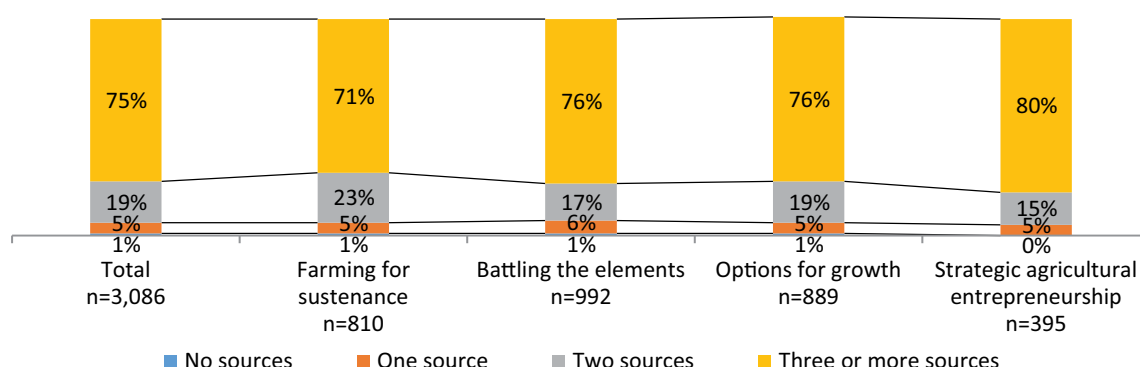
A collection of attitudinal, behavioral, and circumstantial factors defines smallholder farming households. This segmentation model offers a dynamically nuanced perspective to capture the unique points within each segment and leverage them for positive market interventions.

Smallholder farmers are not a monolithic group. Instead, there are four segments that characterize the landscape. These four segments do share some commonalities—they have access to mobile technology, a foundation of financial services access, and productive financial behaviors (e.g., widespread saving), and they desire financial products. However, their differences across certain determinative metrics are much starker:

- The “farming for sustenance” segment includes the most vulnerable smallholders. Seventy-seven percent of the members of this segment, which comprises 27 percent of the smallholder population, live in extreme poverty—living on under \$1.25 per day. This segment’s members exhibit the lowest rate of financial inclusion, but demonstrate many key components of readiness.

- The “battling the elements” segment contains many vulnerable members, albeit to a lesser extent than the “farming for sustenance” segment. Eighty-one percent live below the poverty line (\$2.50 per day), but only 3 percent in this segment lives below the extreme poverty line. This group, compared to the previous segment, has more diversified income sources and more funds allocated to savings. They exhibit a greater use of financial services.
- The “options for growth” segment continues the trend of moving toward greater economic well-being, with over a third living above the poverty line. This segment marks the first notable transition from NBFIs or MFIs as the path to financial inclusion to banks and mobile money driving inclusion.
- The “strategic agricultural entrepreneurship” group is the smallest group, comprising just 11 percent of the population. Over two-thirds of this segment’s members live above the poverty line, and none lives below the extreme poverty line. Sixty-nine percent are financially included, with 41 percent of the segment’s members possessing a mobile money account.

Fostering greater financial inclusion, agricultural stability, and growth, as well as overall economic well-being, requires

FIGURE 122. Number of income sources for the smallholder household

Sample: Smallholder farming households by segment, n=3,095.

a specific approach for each segment. This segmentation highlights several agricultural and digital financial implications for the field.

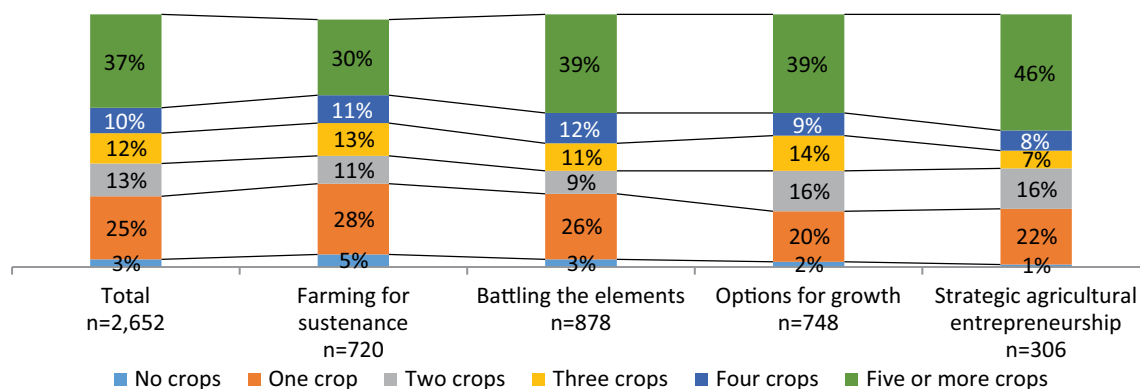
Agricultural Finance Implications

Implication 1: More stable households can rely more exclusively on a broad range of crops

The less vulnerable segments, “options for growth” and “strategic agricultural entrepreneurship,” exhibit more income-source diversity than the more vulnerable segments, “farming for sustenance” and “battling the elements” (Figure 122). That said, less well-off segments do exhibit large degrees of

income source diversity, with each segment having over three income sources on average. This suggests that each individual income-source option is not sufficient on the lower end of the spectrum; members of the less well-off segments need to scrape together multiple income sources to survive.

The differences across the segments in the number of crops grown, for either consumption or sale, further illustrate the instability in income seen in the less well-off segment households. Households on the lower end that grow crops rely on one or two crops (Figure 123). As a consequence, they are less insulated against disruptive agricultural events, such as pests,

FIGURE 123. Number of crops grown for the smallholder household

Sample: Smallholder farming households growing crops by segment, n=2,652.

FIGURE 124. Perceptual map of crops grown, income and land size

Sample: Smallholder farming households by segment.

Note: A radar graph shows multiple dimensions on one plane to spatially depict the relationship between the different dimensions. This radar graph plots the following four dimensions: number of crops grown, number of crops grown for selling, number of income sources and maximum self-reported land size in hectares. Specific values for each variable are shown in Table 20.

natural weather events, or price fluctuations. On the other end of the spectrum are well-off segments that grow crops that exhibit high rates of crop diversity, insulating them from disruptive events.

These inverse disparities between income-source diversity and crop diversity across the segments highlight areas that can be addressed by agricultural finance providers and development agencies. The lower end segments face income instability, forcing members away from focusing on improving any single income source. Perhaps consequently, members do not increase crop diversity, which could facilitate income source stability. Each segment experiences unexpected disruptive events at a relatively similar rate, but better-off segment members exhibit

income-generating behaviors that are more conducive to insulating themselves against these events.

Crop-diversity expansion moving up the segments is possibly facilitated by drastic disparities in land availability. The maximum available land size reported by the “strategic agricultural entrepreneurship” households is nearly four times that of the maximum available land size reported by the “farming for sustenance” households. These disparities are best illustrated on a perceptual map (Figure 124).

This set of disparities highlights the need for agricultural products, services, or training that foster efficient land use (see Table 20). Efficiency leading to larger yield-to-land ratios is particularly important for households that are less

TABLE 20. Individual measures for crops, land size and income sources sample: Smallholder households by segment

Segment	# Crops Grown (total)	# Crops Grown/Sold	Max Mean Reported Land Size	Number of Income Sources
Farming for sustenance	3.73 n=720	2.95 n=690	0.46ha n=720	3.35 n=810
Battling the elements	4.50 n=878	3.24 n=856	0.77ha n=878	3.40 n=992
Options for growth	4.66 n=748	3.38 n=731	0.91ha n=748	3.68 n=889
Strategic agricultural entrepreneurship	5.36 n=306	3.84 n=301	1.64ha n=306	3.82 n=395

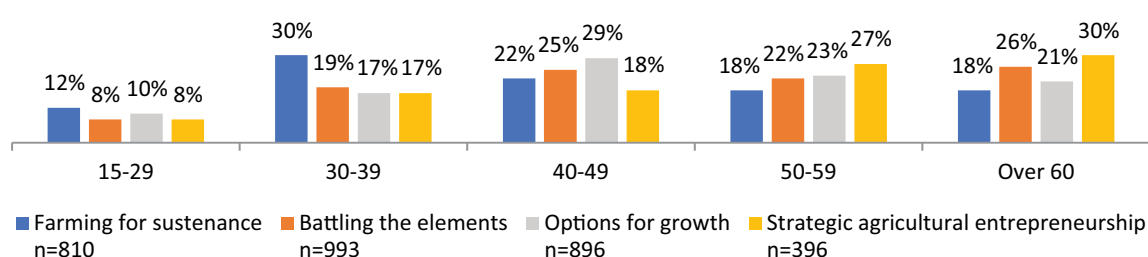
well-off or unable to dedicate all of their efforts to agriculture.

Implication 2: Youth-targeted initiatives must be adaptable across segments

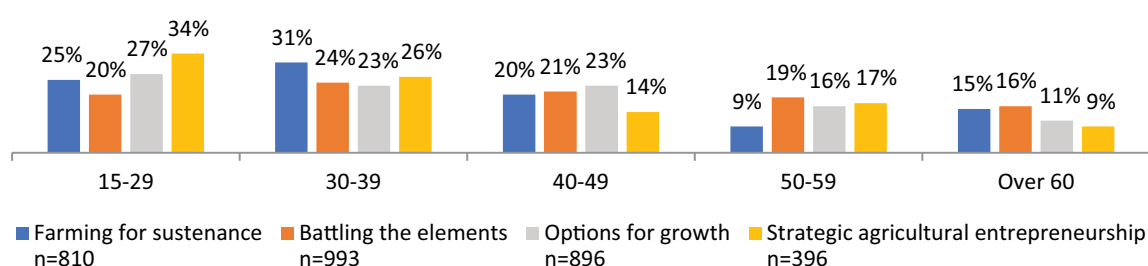
Compared to other countries with large smallholder populations, Bangladesh proves a unique case with regard to age distribution. Among smallholders, youth heads of households are not overly concentrated in any specific segment relative to the other segments. The larger segments will naturally have a greater number of younger members, but a given segment isn't more youthful than the other. Between 8 and 12 percent of each segment's heads of households are between the ages of 15 and 29 (Figure 125).

With regard to all household members, this lack of concentration and relatively even distribution is not consistent across segments. For three segments, "farming for sustenance," "options for growth," and "strategic agricultural entrepreneurship," youth make up the greatest share of the segments' membership (Figure 126). "Strategic agricultural entrepreneurship" is most characterized by a youth-heavy membership, with 34 percent of the segment's members between the ages of 15 and 29. For each segment, except for "battling the elements," over half of the segments' members are in the two youngest age categories.

With a lack of youth concentration across segments among the heads of smallholder households and a skew

FIGURE 125. Age distribution (head of household)

Sample: Smallholder farmers by segment.

FIGURE 126. Age distribution (all members)

Sample: Smallholder farmers by segment.

toward youth membership for each segment's total members, interventions must be adaptable across the demographics that determine segment membership. Simply targeting youth smallholders alone will by extension target smallholders with a range of financial services access, income stream composition, and other factors.

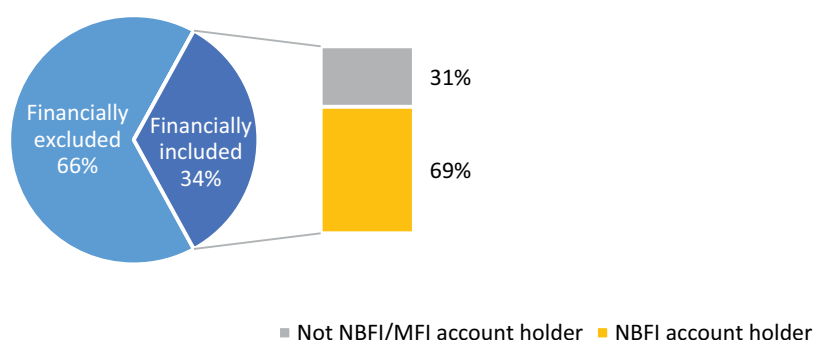
Digital Finance Implications

Implication 1: Facilitating smallholder strength must include inroads into vulnerable segments, which are primed for further financial service adoption

Bangladesh is the birthplace of the MFI. MFIs and NBFIs were conceived as vehicles for providing financial services access to a population's most vulnerable

or marginalized members. To that end, NBFI and MFI account ownership drive financial inclusion for the most vulnerable smallholders, those belonging to the "farming for sustenance" and "battling the elements" segments. Thirty-four percent of the smallholders in these two segments are financially included (Figure 127). Of those included smallholders, 69 percent have an account at an NBFI or MFI. Comparatively, these two segments have a bank account and mobile money account ownership rate of 33 percent and 26 percent, respectively.

This high rate of use of NBFIs and MFIs compared to other formal financial institutions stresses the importance of agricultural and/or financial service providers developing products that can be integrated with NBFI or MFI

FIGURE 127. NBFI/MFI account ownership for financially included vulnerable segment members

Sample: Smallholder farmers belonging to segments 1 and 2, n=1,803.

accounts. Products that are targeted at these segments' demographics, but not compatible with the financial institution (i.e., NBFIs and MFIs) they use will fail to reach their full potential.

While NBFIs and MFIs have made inroads into vulnerable populations, there is much work to be done. Sixty-six percent of the vulnerable smallholder segment members are financially excluded. Stakeholders seeking to improve the economic situation of vulnerable smallholders or providers seeking to capture new markets cannot ignore this segment of the smallholder population. Population-level metrics will not be significantly impacted without a concerted effort directed at bringing these smallholders online. The excluded members of these segments are not unreachable; they possess high degrees of readiness factors. Fifty-two percent of the financially excluded members of the two vulnerable segments own a mobile phone, and 16 percent have used a mobile phone, but do not own one. Forty percent of the financially excluded members have used financial services in the past. Of those excluded members who own their own phones, 48 percent have previously used financial services. A substantial portion of these two segments, and thus the smallholder

population, has financial experience and owns a channel to use financial services.

Implication 2: Advanced, integrated products could appeal to a substantial portion of the population

The less vulnerable segments, "options for growth" and "strategic agricultural entrepreneurship," are characterized both by a greater rate of financial inclusion and a different nature of inclusion, compared to the "farming for sustenance" and "battling the elements" segments. Sixty-two percent of the less vulnerable segments are financially included. For these segments, there is no dominant driver of inclusion. Forty-three percent of the members of these two segments have an account at an NBFI or MFI compared to 69 percent of those in the vulnerable segment. Fifty-nine percent of these two segments' members have a bank account, and 52 percent have a mobile money account. Additionally, a substantial portion of the population have accounts at multiple institution types. Over a quarter of the less vulnerable segment members have both a bank account and a mobile money account (Table 21).

A substantial portion of the less vulnerable segment members use their accounts to conduct advanced business-

TABLE 21. Multiple institution account ownership by segment type (each cell is the proportion of the segment grouping population)

Segment	Bank + MM (%)	Bank + NBFI/MFI (%)	MM + NBFI/MFI (%)
Vulnerable - Farming for Sustenance - Battling the Elements	6	16	10
Less vulnerable - Options for Growth - Strategic Agricultural Entrepreneurship	27	18	19

related transactions. Eighty-three percent of less vulnerable mobile money account holders paid employees, bought inputs, received payments, etc., for their agricultural pursuits with their mobile money accounts.

These high rates of bundled account use, paired with a not insignificant portion of the segments' population engaging in digital financial service-based business transactions, highlights room for financial services and product providers to target an economically empowered, technically savvy, and financially equipped market share. The segment members as a whole are financially equipped and digital-financial-service ready, and they have a desire to use advanced products and services. If not already using advanced products, they may be part of a peer network with experience that can be referenced.

Not only can these segments' members serve as a new market, but they also provide a vehicle for building an ecosystem. With over 80 percent of the less vulnerable population using their mobile money account for advanced business transactions, the foundation for an expanded advanced, digital-financial-services-based product infrastructure exists. Targeting the members of this segment can provide immediate returns while allowing for leveraging more downstream markets.

Implication 3: While some groups may be ready for advanced products, others are not. Products must be relevant for varying income streams

When products and services are designed and targeted toward a given

segment's members, the products and services must be relevant. Most smallholders do not have accounts with financial institutions that facilitate using advanced financial services or financial products. Even those that may have access to these institutions do not necessarily have income streams that complement certain products. Additionally, applying or addressing a use case is not the sole component of relevance. The manner or terms of use must also be considered. Take, for example, a loan repayment structure that either does not correspond to the growing and harvesting season or does not allow for variations in the season. A farmer could take out a loan to purchase inputs, but be delayed in planting due to weather and thus have a harvest time that misses the loan repayment deadline. To address this, the farmer takes a second loan, potentially initiating a cycle of debt. Alternatively, products could be designed to encourage positive financial behavior. For example, goal-based savings products that are compatible with informal savings behaviors could prove beneficial.

That is not to say, though, that these smallholders should be written off. They make up a substantial share of the population and are ready for adoption, if use cases are presented. Smallholders are a diverse group spread across different stages of digital financial service adoption and readiness. Consequently, there are innumerable potential niche markets that can serve the smallholder population's ranging needs. Stakeholders and product providers should not feel limited or constrained to targeting specific subpopulations.

7. DESIRES AND ASPIRATIONS

The national survey of smallholder households in Bangladesh includes a series of questions on what financial and agricultural tools farmers consider relevant in their agricultural and financial lives, the related financial solutions they want and need, and how that differs from what they have now. This section analyzes these financial desires and aspirations, identifying where financial and agricultural mechanisms can be most relevant to smallholders.

Smallholder Households Know the Importance of Financial Institutions, Particularly with Regard to Saving

Financial products, particularly accounts and savings mechanisms, are highly relevant to smallholder households. Smallholders recognize the importance of these products not only to their households, but also to their agricultural activities. This perceived importance and necessity is often strong, with the majority of smallholders reporting that certain products are “very important,” rather than “somewhat important” or of unknown importance.

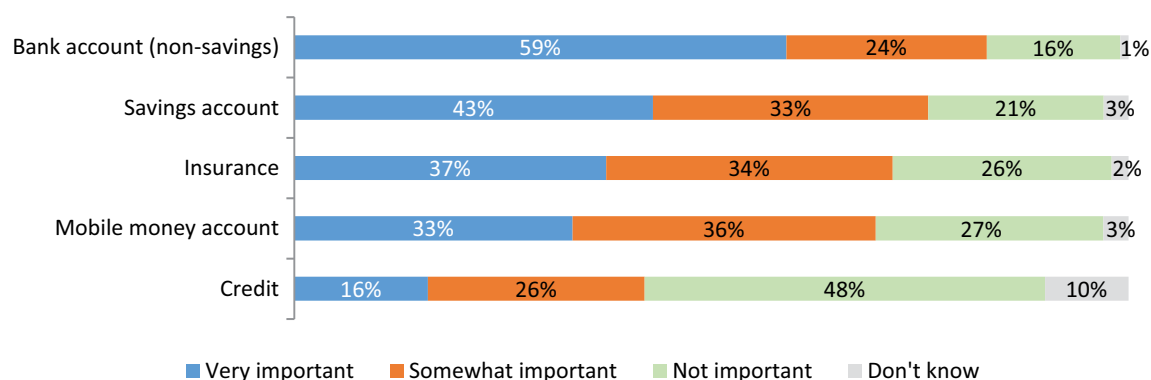
Smallholders value accounts most. Fifty-nine percent of smallholders believe that a bank account (nonsavings) is “very important” to the household, and

43 percent believe a savings account is “very important” to the household (Figure 128). Mobile money accounts are well received, albeit less enthusiastically, with nearly 70 percent of the smallholder population believing they are at least “somewhat important.” Smallholders are largely ambivalent toward credit, with nearly half of the smallholder population perceiving it as “not important.” However, ambivalence could be a function of recognized unavailability.

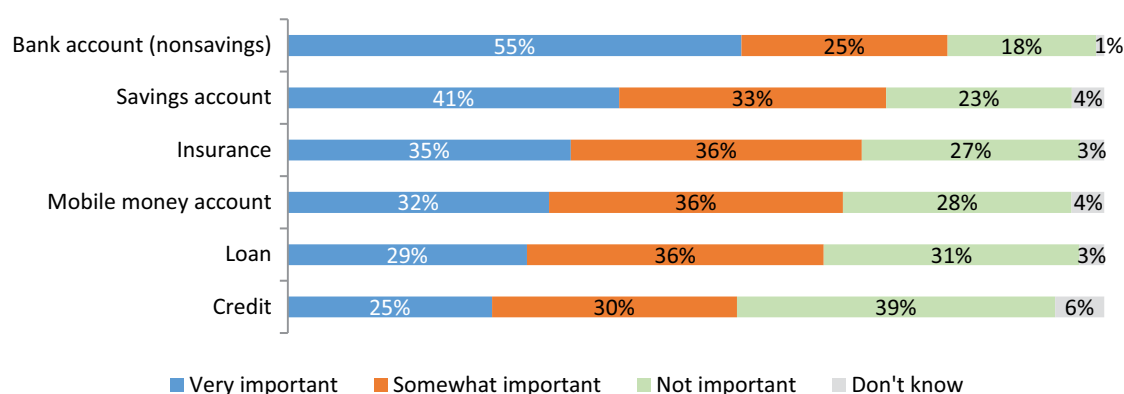
Smallholders exhibit relatively similar perceptions when evaluating the importance of financial products to their household and agricultural activities. Owning a bank account is seen as very important to the household by 59 percent of smallholders. Fifty-five percent see bank accounts as very important to their agricultural activities (figures 128 and 129). Eighty percent perceive a bank account as at least “somewhat important” to agricultural activities (Figure 129). Perception of importance for the other products wanes slightly, both in intensity of perception (i.e., very important compared to somewhat important) and overall perceived importance.

This perceived importance of formal financial institutions and savings accounts

FIGURE 128. Regardless of what you have, how important is it to your household to have the following?



Sample: Smallholder households, n=3,154.

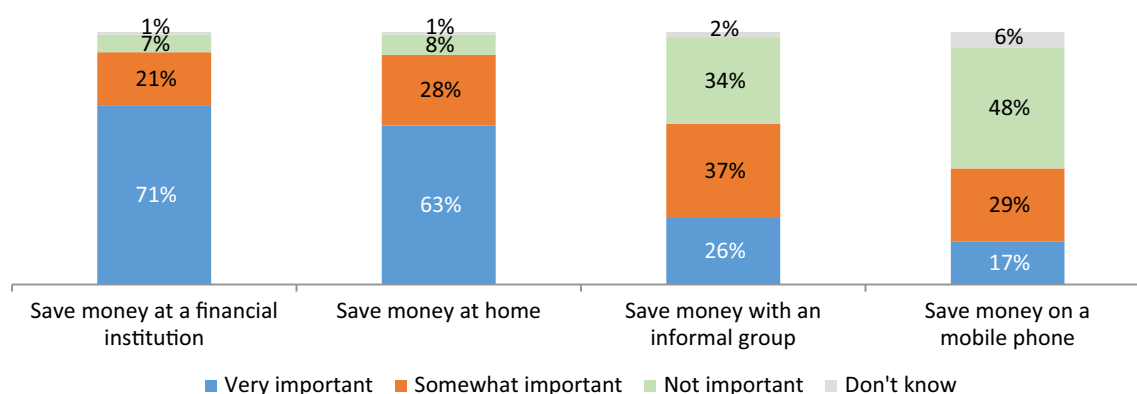
FIGURE 129. How important is it to your agricultural activities to have the following?

Sample: Smallholder farmers, n=3,095.

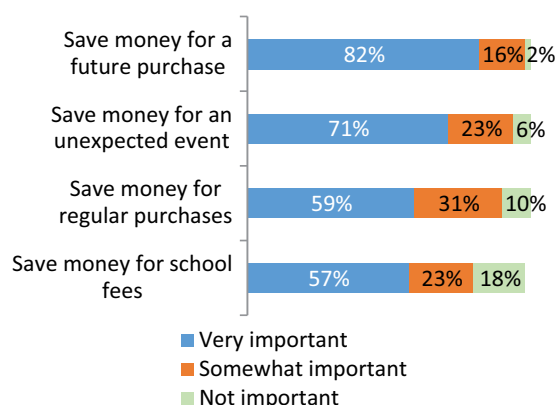
is reflected in smallholders' evaluations of the importance of various savings channels. Overall, smallholders regard saving money as important to the household. Specifically, 92 percent of the smallholder population believes it is at least somewhat important that a household saves money at a formal financial institution (Figure 130). Informal savings channels, including saving money at home, are perceived as important, as well, but to a lesser degree. Despite widespread mobile phone access and ownership, and moderate rates of mobile money account access and ownership, few smallholders believe that mobile money is an important savings channel. This suggests that providers and stakeholders have yet to establish a use case for mobile money as a savings channel for smallholder farmers.

Savings Priorities: Future Expenses, Expected and Unexpected

Smallholders prioritize saving for future expenses, rather than immediate, regularly occurring expenses. This is a sound financial practice and recognizes the importance of a safety net. Eighty-two percent of smallholders believe that saving money for a future purchase is "very important" for the household, and 16 percent believe it is "somewhat important" (Figure 131). Similarly, 93 percent believe that saving money for an unexpected event is at least "somewhat important." This recognized importance is notable, given smallholders' frequent exposure to unexpected events, both personal and related to agricultural activities.

FIGURE 130. How important is it for your household to save at each of the following?

Sample: Smallholder farmers, n=3,095.

FIGURE 131. How important is it for your household to save for each of the following?

Sample: Smallholder farmers, n=3,095.

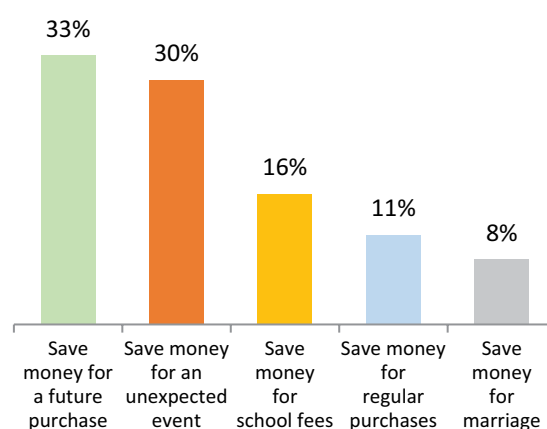
When asked to evaluate the most important savings priority, smallholders largely favor saving for future expenses, with 33 percent reporting that saving money for a future purchase is the most important saving priority for a household, and 30 percent reporting saving for an unexpected event as the most important (Figure 132).

This forward thinking and deliberation in savings priorities is solidified when considering smallholders' evaluations of savings behaviors. Smallholders most frequently agree with the saving priority, "I like to save my money in case of an emergency," with 89 percent of the

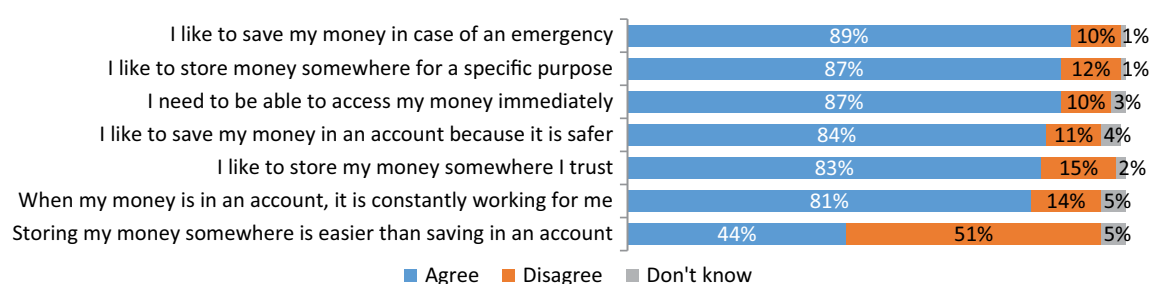
smallholder population reporting agreement (Figure 133). Eighty-seven percent also report they agree with the notion of storing money for a specific purpose. Smallholder farmers also highly prioritize trust, security, and access regarding savings behaviors and priorities. These high rates of agreement, contrasted with low support for the notion that storing money somewhere other than an account is easier than storing with an account, indicate a strong inclination toward sound financial practices. Furthermore, providers and stakeholders must be mindful of this general mindset when building relevant financial mechanisms.

Investing Priorities: Education and the Farm

Smallholders' investment priorities differ than their savings priorities, particularly with regard to education. Where education was regarded as one of the least important savings priorities, the smallholder population regards education as the most important investment priority. Fifty-nine percent of smallholders believe that investing in a future educational opportunity is "very important," and 25 percent regard it as "somewhat important" (Figure 134). Education is followed by investment in

FIGURE 132. Which of the following do you feel your household needs to save for the most?

Sample: Smallholder farmers, n=3,095.

FIGURE 133. Do you agree or disagree with the following statements?

Sample: Smallholder farmers, n=3,095.

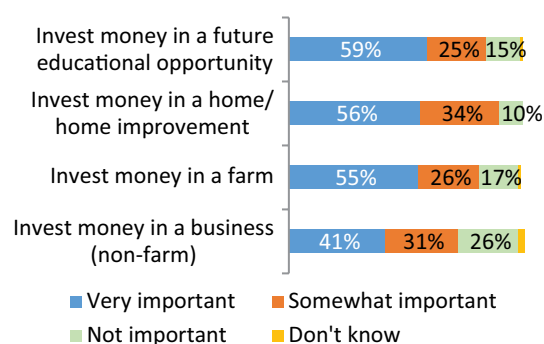
home improvement (56 percent) and investment in a farm (55 percent) as being “very important.” Education is similarly regarded as the single most important investment priority for a household (33 percent), followed by the farm (30 percent) (Figure 135).

Desires and Aspirations: Smallholder Households Prefer to Borrow from Banks Even Though They Ultimately Turn to Other Sources for Loans

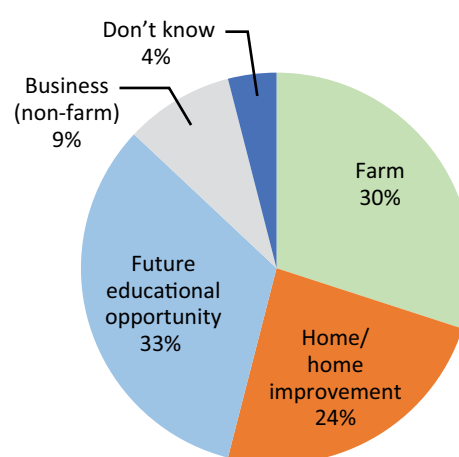
Smallholder farmers recognize the importance of borrowing from formal financial institutions such as banks for their agricultural activities. More than half of the smallholder population believes banks are “very important” as a borrowing channel for their agricultural activities, the highest rate (Figure 136). Seventy-two percent believe MFIs are

at least “somewhat important.” While these formal institutions are highly regarded and banks are the most highly regarded (i.e., highest rate of “very important”), the personal borrowing network of family and friends is the most highly regarded overall, with 86 percent of the population believing this channel is at least “somewhat important.”

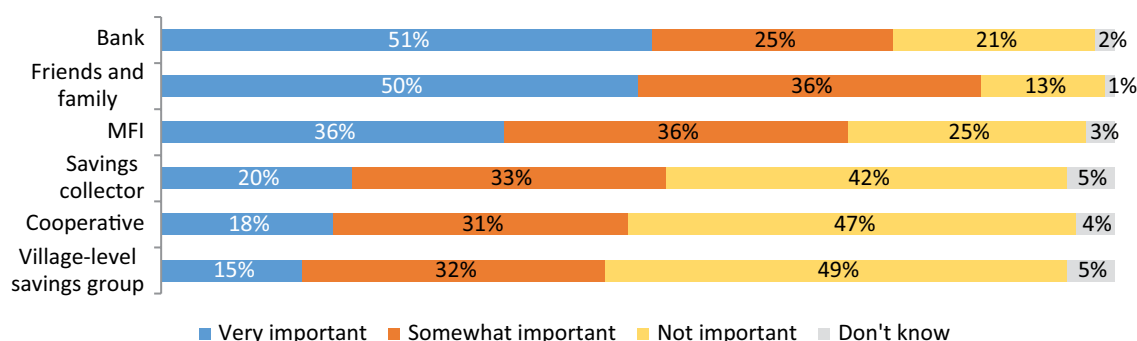
Despite the perceived importance of banks, they largely are not accessed for borrowing. Only 8 percent of the smallholder population attempted to borrow from a bank in the previous year, compared with 48 percent that attempted to borrow from friends and family, and 24 percent that attempted to borrow from an MFI (Figure 137). Furthermore, if smallholders needed to borrow, they would not turn to a bank.

FIGURE 134. How important is it for your household to invest in each of the following?

Sample: Smallholder farmers, n=3,095.

FIGURE 135. Which of the following do you feel your household needs to do the most?

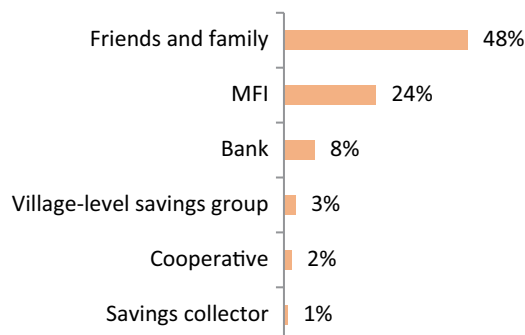
Sample: Smallholder farmers, n=3,095.

FIGURE 136. For your agricultural activities, how important to you is it to borrow from each of the following?

Sample: Smallholder farmers, n=3,095.

Seventeen percent report they would attempt to borrow from a bank if borrowing were necessary, compared with 64 percent who would attempt to borrow from family and friends, and 26 percent who would attempt to borrow from an MFI (Figure 138). These low rates of attempted access or hypothetical attempted access suggest that barriers exist prohibiting farmers from using banks' loan services.

Smallholders report that they would consider a wide range of factors if they were considering borrowing money. Convenience was cited most frequently, with 82 percent reporting they would consider quickest access and 60 percent reporting that they would consider a convenient location (Figure 139).

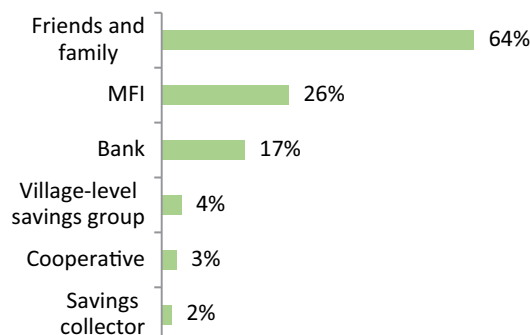
FIGURE 137. In the past 12 months, have you attempted to borrow from any of the following?

"Yes" answers.

Sample: Smallholder farmers, n=3,095.

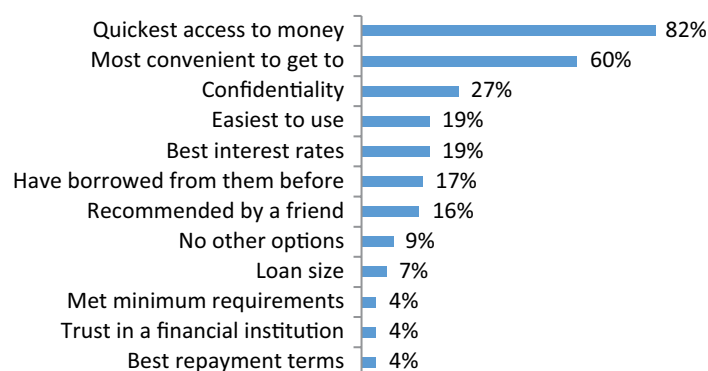
Loan specifications are not frequently considered, with 19 percent citing a concern for interest rates and 4 percent citing a concern for comparative repayment terms.

Smallholders would be driven to borrow by a variety of factors, the most common of which are necessity in the event of an emergency and investment in their agricultural activities (e.g., buy inputs). Fifty-eight percent report they would take a loan for emergency expenses (Figure 140), indicating the ability to save does not match the recognized necessity of saving as seen in Figure 131. Forty-three percent report they would take a loan to purchase inputs, and 16 percent report they would take a loan to start or expand a business. Only 16 percent report they would

FIGURE 138. If the need arose, would you attempt to borrow from any of the following?

"Yes" answers.

Sample: Smallholder farmers, n=3,095.

FIGURE 139. What factors would you consider when you want to borrow money?

Sample: Smallholder farmers, n=3,095.

Multiple responses allowed.

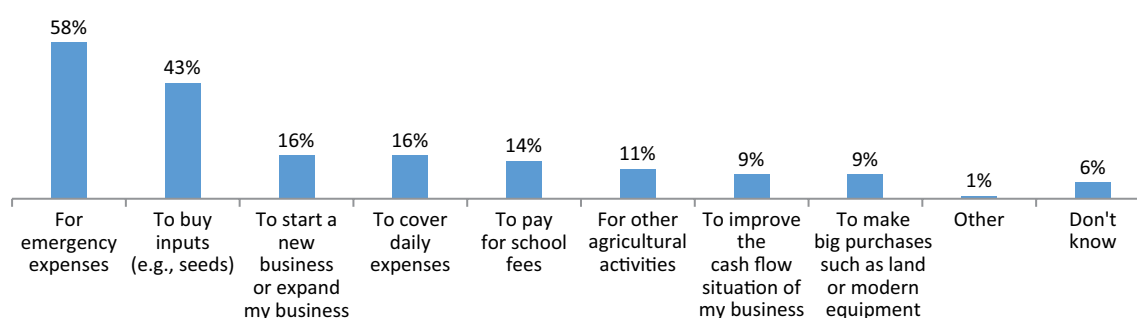
take a loan for daily expenses, which is positive given the poverty rate among smallholders. These motivations for seeking a loan, if necessary, are frequently acted on. Forty-two percent of the smallholder population currently has some form of a loan (Figure 141).

Desires and Aspirations: There Is High Interest in Plans for Input-Related Expenses and School Fees

Smallholders emphasize the importance of financial products related to income expenses. Specifically, 34 percent consider a payment plan for inputs to be important to agriculture activities, and 33 percent consider a savings plan for inputs to be “very important” to agricultural activities (Figure 142). These two products are the only nonloan products with a perception of at least “somewhat important” at, or over, 60 percent.

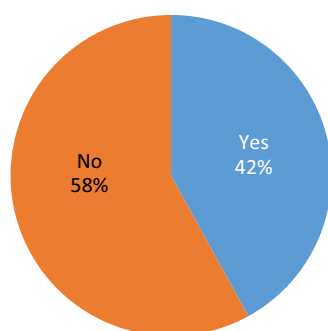
A product addressing school fees is also highly regarded, with 45 percent of the smallholder population believing it to be at least “somewhat important.” Smallholders’ borrowing motivations paired with this perceived importance suggest the necessity of available products addressing inputs and school fees.

Very few Bangladeshi smallholders own these products. Nine percent have a payment plan for inputs, the highest product ownership rate (Figure 143). Virtually no smallholders have a credit plan for school fees. For those who do not currently have these products, demand is substantive, but tempered. Forty-three percent of smallholders would like to own a savings plan for inputs and 41 percent without a payment plan for inputs would like to own one. These products must be tailored, because only a specific subset of the population wants them. Alternatively, these low

FIGURE 140. What would be the main reasons for borrowing money?

Sample: Smallholder farmers, n=3,095.

Multiple responses allowed.

FIGURE 141. Do you currently have any loans?

Sample: Smallholder farmers, n=3,095.

rates could also indicate a lack of awareness regarding the products' benefits.

Smallholders generally do not consider loan products to be important for their agricultural activities. Reflecting smallholders' prioritization of formal financial institutions, the most well-regarded loan products are those that are connected to a bank. Specifically, loan products connected to a bank are the only loan products that a majority of smallholders regard as at least "somewhat important" to their agricultural activities (Figure 144). Following this, a loan that comes with a bank account is the only loan product that a majority of smallholders would like, if they do not already have an account (Figure 145). The perceived importance of loan products bundled with bank accounts, in various formats, presents an opportunity for

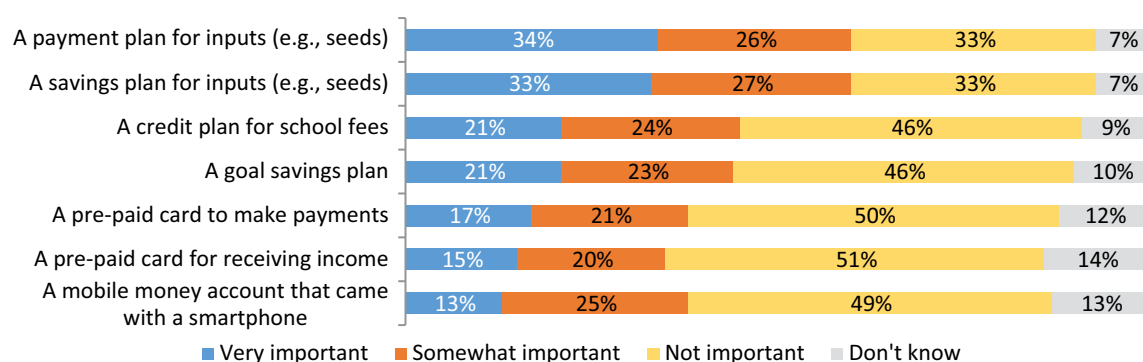
providers and stakeholders to develop products that address needs.

Desires and Aspirations: Mobile Products Spark Moderate Interest

Despite widespread mobile phone access and ownership, interest in mobile products remains rather moderate, compared to that among smallholders in other countries. No more than 49 percent of smallholders find the ability to access agricultural information to be "very important" to their household's agricultural activities. Accessing market pricing gains has the most perceived importance at 49 percent, while far fewer find it important to be able to track inputs via phone, access financial services, or buy and sell goods (Figure 146).

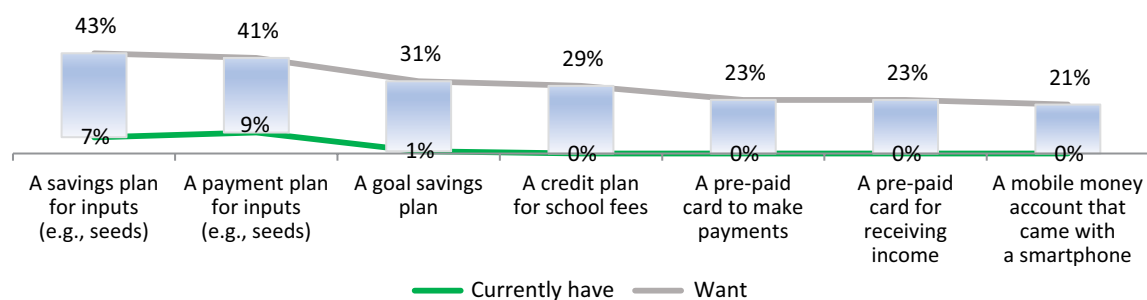
In fact, up to a third of smallholders explicitly find these mobile phone uses to be "unimportant." Thirty-three percent of smallholders believe the "ability to track the transportation of inputs and crops on a mobile phone" is not important to a household's agricultural activities, and one in four finds it unimportant to track weather on a phone (Figure 146).

Lack of enthusiasm is real; however, it does not hamper interest in using a mobile product for agricultural activities. Around half of smallholders would like

FIGURE 142. How important is each of the following products to your agricultural activities?

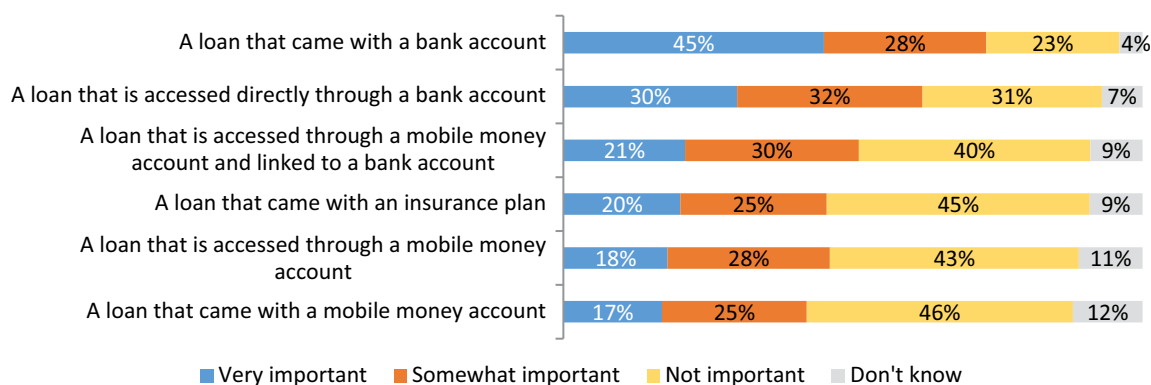
Sample: Smallholder farmers, n=3,095.

FIGURE 143. 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?



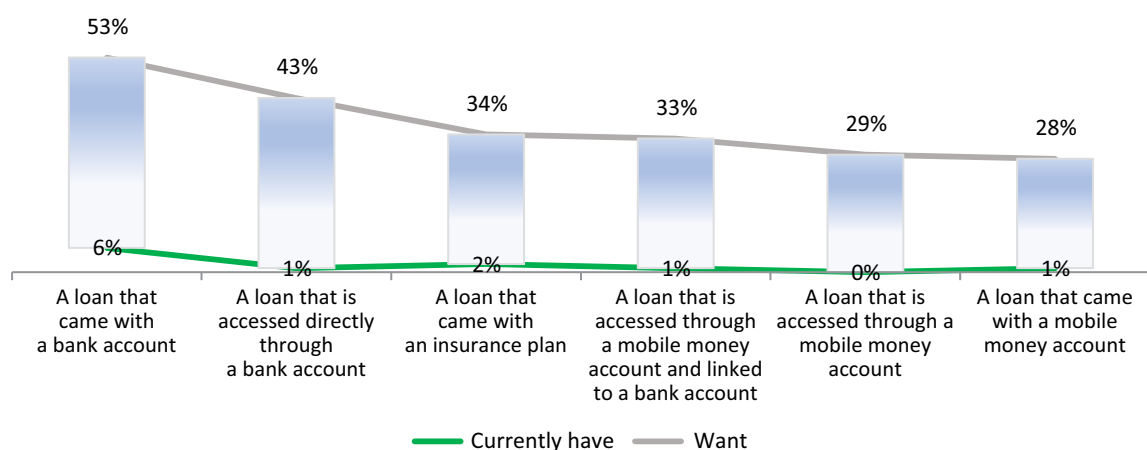
Sample: Smallholder farmers, n=3,095.

FIGURE 144. How important is each of the following products to your agricultural activities?

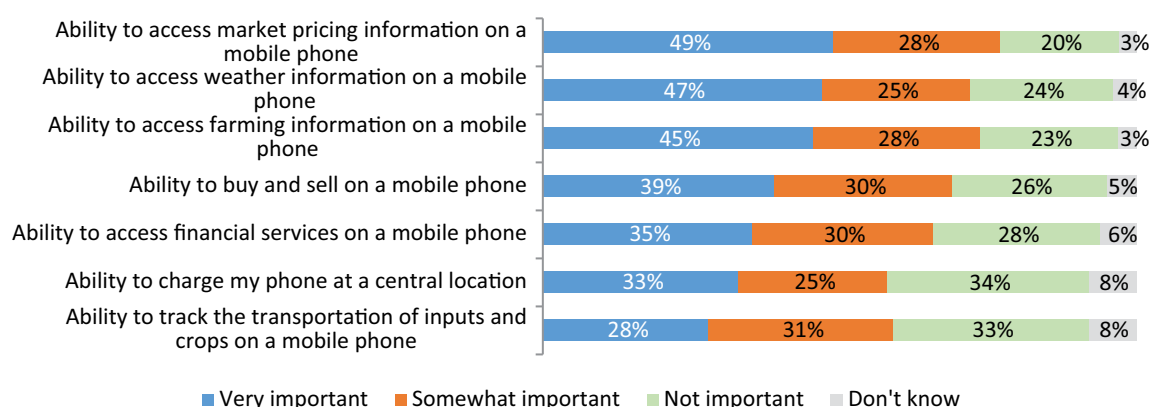


Sample: Smallholder farmers, n=3,095.

FIGURE 145. 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?



Sample: Smallholder farmers, n=3,095.

FIGURE 146. How important is each of the following abilities to your household's agricultural activities?

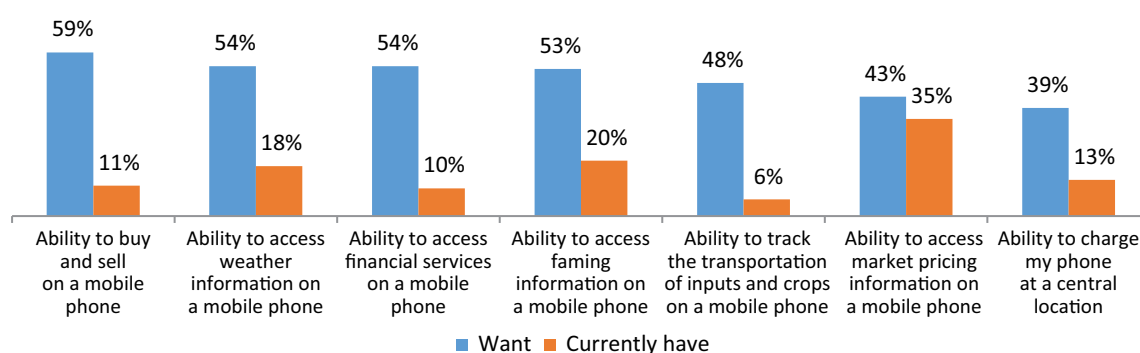
Sample: Smallholder farmers, n=3,095.

to own a product, if they do not already, that allows them to buy and/or sell on their phone and access farming, input, or weather information (Figure 147).

Ownership of these products, while not widespread, is not uncommon. Over one-third of smallholders have the ability to access market pricing information on their mobile phones. Twenty percent can access general farming information, and 18 percent can access weather information. This group of early adopters has the potential to act as a catalyst, promoting the value of these products to the remaining group of smallholders

who are interested but who do not yet have access.

This disconnect between perceived importance and desire for agriculture-related mobile products may indicate that either the products are only marginally beneficial (i.e., they are helpful but aren't a silver bullet) or that smallholders lack concrete information regarding the products' benefits (i.e., smallholders are aware that the products can be helpful, but are not aware of the degree to which they can be helpful). The products may also be considered too expensive for the value gained.

FIGURE 147. 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?

Sample: Smallholder farmers, n=3,095.

ANNEX 1: METHODOLOGY AND DESIGN

The smallholder household survey in Bangladesh 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. The universe for the survey consists of smallholder households defined as households with the following criteria: households with up to 5 hectares or farmers who have fewer than either 50 heads of cattle, 100 goats, or 1,000 chickens *and* in which agriculture provides a meaningful contribution to the household livelihood, income, or consumption.

Sampling Frame

Bangladesh is divided into seven administrative divisions. Each is divided into districts, subdistricts, wards (for urban areas), and unions (for rural areas). Each ward is further divided into mahallas, while each union consists of mauzas. For the 2008 agricultural census, mahallas and mauzas were further divided into 153,945 EAs.

The Bangladesh Bureau of Statistics maintains a list of 64,314 mahallas and mauzas. Among these, 750 mahallas and mauzas (i.e., ~1.2 percent) have missing information on the number of agricultural households they had in 2008. In addition, 18,377 mahallas and

mauzas had less than 80 agricultural households. These mahallas and mauzas had ~4.8 percent of the total number of agricultural households.

The sampling frame for the smallholder survey consisted of the list of EAs for mahallas and mauzas that had at least 80 agricultural households in 2008. While at the mahalla and mauza level the number of agricultural households was available, at the EA level only the estimated number of (general) households was available along with the urban-rural classification.

Sample Allocation and Selection

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 divisions based on the number of agricultural households in the sampling frame. Within each division, the resulting sample was then distributed to urban and rural areas in proportion to the number of agricultural households.

Given that EAs were the primary sampling units and 15 households were selected in each EA, a total of 211 EAs were selected.

TABLE A1-1. Distribution of agricultural households

Division	Rural	Urban	Total
Barisal	1,123,216	53,627	1,176,843
Chittagong	2,333,268	181,937	2,515,205
Dhaka	3,881,120	272,200	4,153,320
Khulna	1,992,369	112,561	2,104,930
Rajshahi	2,174,392	161,070	2,335,462
Rangpur	1,988,681	75,484	2,064,165
Sylhet	801,033	27,993	829,026
Bangladesh	14,294,079	884,872	15,178,951

TABLE A1-2. Proportional allocation of the sample

Division	Rural	Urban	Total
Barisal	325	15	340
Chittagong	464	36	500
Dhaka	598	42	640
Khulna	426	24	450
Rajshahi	447	33	480
Rangpur	434	16	450
Sylhet	290	10	300
Bangladesh	2,984	176	3,160

The sample for the smallholder survey is a stratified multistage sample. Stratification was achieved by separating each division into urban and rural areas. The urban/rural classification is based on the 2008 agricultural census. Therefore, 14 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 (i.e., number of households in the EAs). In each stratum, before the selection, the list of EAs was sorted by district, subdistrict, wards and unions, and mahallas and mauzas. A household listing operation was conducted in all selected EAs to identify smallholder households and to provide a framework for selecting 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, the household questionnaire was administered to the head of the household, the spouse, or any knowledgeable adult household member to collect information about household characteristics. The 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.

TABLE A1-3. Distribution of PSUs (rounded)

Division	Rural	Urban	Total
Barisal	21	2	23
Chittagong	31	2	33
Dhaka	40	3	43
Khulna	28	2	30
Rajshahi	30	2	32
Rangpur	28	2	30
Sylhet	18	2	20
Bangladesh	196	15	211

Household Listing

The household listing operation was conducted in all selected EAs between 14 February and 13 March 2016. For this purpose, InterMedia developed a manual describing the listing and mapping procedures. The manual included listing forms, along with questions used to identify smallholder households according to the agreed definition for the survey. This manual was used to train listing teams in Dhaka. Each listing team comprised one supervisor, one lister, and one mapper recruited from the field partner's (MRB Global) pool of enumerators. The training involved classroom sessions and field practice.

The household listing was done on tablets, which required MRB to develop a script 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 were produced using either the SPSS Complex Sample module or STATA's module 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 (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 age 15 and over to collect 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. The 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 and poverty status of the households.

TABLE A1-4. Smallholder Household Survey in Bangladesh: Questionnaire sections, respondents, and content

Questionnaire Section	Household Respondent(s)	Achieved Sample Size	Content
Household Survey	Head of the household, their spouse or a knowledgeable adult	n = 3,154	<ul style="list-style-type: none"> • Basic information on all household members (e.g., age, gender, education) • Information about household assets and dwelling characteristics to derive poverty status
Multiple-Respondent Survey	All household members over 15 years old who contributed to the household income or participated in its agricultural activities	n = 5,214	<ul style="list-style-type: none"> • Demographics (e.g., land size, decision-making, financial behaviors) • Agricultural activities (e.g., selling, trading, livestock, suppliers) • Household economics (e.g., employment, income sources, shocks)
Single-Respondent Survey	One randomly selected adult in the household	n = 3,095	<ul style="list-style-type: none"> • Agricultural activities (e.g., market relationships, storage, risk mitigation) • Household economics (e.g., expense prioritization, insurance, outlook) • Mobile phones (e.g., use, access, ownership) • Formal and informal financial tools (e.g., ownership, use, access, importance)

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 into Bangla and then pretested on 9 February 2016. After the pretest,

debriefing sessions were held with pretest field staff and the questionnaires were modified based on the observations from the pretest. Next the questionnaires were finalized and a script was developed to support data collection on tablets. The script was tested and validated before it was used in the field.

Main Training, Fieldwork, and Data Processing

MRB Bangladesh, InterMedia's local field partner, recruited interviewers and

TABLE A1-5. Response rate for the Household Questionnaire

	Barisal	Chittagong	Dhaka	Khulna	Rajshahi	Rangpur	Sylhet	Rural	Urban	Total
Households selected	374	483	639	494	515	510	340	3,176	179	3,355
Households occupied	348	453	605	461	479	503	314	2,997	166	3,163
Households interviewed	346	452	599	461	479	503	314	2,291	163	3,154
Household response rate (%)	99.4	99.8	99.0	100.0	100.0	100.0	100.0	99.8	98.2	99.7

TABLE A1-6. Response rate for the Multiple-Respondent Questionnaire

	Barisal	Chittagong	Dhaka	Khulna	Rajshahi	Rangpur	Sylhet	Rural	Urban	Total
Eligible household members	573	887	937	609	863	1,060	481	5,147	263	5,410
Eligible household members interviewed	572	717	925	608	859	1,052	481	4,967	247	5,214
Response rate (%)	99.8	80.8	98.7	99.8	99.5	99.2	100.0	96.5	93.9	96.4

TABLE A1-7. Response rate for the Single Respondent Questionnaire

	Barisal	Chittagong	Dhaka	Khulna	Rajshahi	Rangpur	Sylhet	Rural	Urban	Total
Eligible household members	346	452	599	461	479	503	314	2,991	163	3,154
Eligible household members interviewed	345	403	595	458	479	501	314	2,933	162	3,095
Response rate (%)	99.7	89.2	99.3	99.3	100.0	99.6	100.0	98.1	99.4	98.1

supervisors for the main fieldwork, taking into account their language skills. Following the recruitment of field staff, a centralized training session was conducted on 13–16 March 2016. The training covered interview techniques and field procedures, a detailed review of the survey questionnaires, mock interviews between participants in the classroom, and field practice with actual respondents in the areas outside of the sampled EAs. Independent field quality control (QC) staff, hired directly by InterMedia, also attended the training.

Thirty interviewing teams carried out data collection for the survey on tablets. Each team consisted of one supervisor and five interviewers. Two staff members from MRB Bangladesh coordinated and supervised fieldwork activities along with the independent QC team hired by InterMedia to oversee the overall quality function of data collection. The QC team stayed with the survey teams during fieldwork to closely supervise and monitor them. Data collection took place between 17 March and 21 April 2016.

The final data file was checked for inconsistencies and errors by InterMedia, and corrections were made as necessary and where possible.

Deviations in Sample Design

The smallholder survey in Bangladesh is the fourth survey in the series, which also includes Mozambique, Uganda,

Tanzania, Côte d' Ivoire, and Nigeria. Other countries experienced many 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 Bangladesh, the number of households selected in each EA was increased from 15 to 17 following the household listing operation in all sampled EAs.

Response Rates

The tables below show household and household member response rates for the Bangladesh smallholder household survey. A total of 3,355 households was selected for the survey, of which 3,163 were found to be occupied during data collection. Of these, 3,154 were successfully interviewed, yielding a household response rate of 99.7 percent.

In the households interviewed, 5,410 eligible household members were identified for the Multiple Respondent questionnaire. Interviews were completed with 5,214 eligible household members, yielding a response rate of 96.4 percent for the Multiple Respondent questionnaire.

Among the 3,154 eligible household members selected for the Single Respondent questionnaire, 3,095 were successfully interviewed, yielding a response rate of 98.1 percent.

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.³⁰ 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 votes 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 dataset. The optimal size of the subset of predictor values 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 the following:

$$\text{mean error} = (\text{observed-tree response})^2$$

The predictions of the Random Forest are taken to be the average of the predictions of the trees:

$$\text{Random Forest Predictions} = \frac{1}{K} \sum_{k=1}^K K^{\text{th}} \text{ tree response}$$

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. 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.

³⁰ See documentation on Random Forest Algorithm at www.statsoft.com/Textbook/Random-Forest

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