



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

## FEED THE FUTURE INNOVATION LAB FOR ASSETS AND MARKET ACCESS

### 2012-2018 REPORT



**USAID**  
FROM THE AMERICAN PEOPLE

**UC DAVIS**  
UNIVERSITY OF CALIFORNIA

“Innovation is making the impossible, possible, the unsolvable, solvable. And of course, nowhere is this more true than in the area of international development, where technology and new thinking are enabling us to reinvent how we go about fulfilling our mission.”

— Mark Green, USAID Administrator

“To reduce poverty requires multi-dimensional thinking. Addressing the root causes of persistent, extreme poverty in a complex, real-world setting puts families in a position to be economically viable. That is the first step toward a future free from the need for aid.”

— Michael Carter, AMA Innovation Lab Director



**Feed the Future  
Innovation Lab  
for Assets  
and Market Access**

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# EXECUTIVE SUMMARY

In 2001, the research network that would become the AMA Innovation Lab began a series of programs in eastern and southern Africa to explore the nature of chronic and persistent poverty. The approach generated a foundational theory in two parts. First, households' levels of assets, meaning the resources that produce a livelihood, are better predictors of chronic poverty than income. Second, when those assets fall below a minimum threshold—perhaps because of a shock—people become trapped in chronic poverty with no pathway to resilience.

In 2012 the AMA Innovation Lab was established by the USAID Bureau for Food Security as a Collaborative Research Support Program (CRSP) at the University of California, Davis to conduct rigorous policy and programming research in the areas of Inclusive Market Access, Risk Management and Resilience, and Rural and Agricultural Finance. As we found new opportunities with additional funding through USAID Associate Awards and ongoing initiatives like our Index Insurance Innovation Initiative (I4), we have expanded our

efforts to respond to the broad shift in the field of development toward resilience and achieving an end to the need for development aid. Both of these are ideas that have always been at the core of our thinking.

The foundational theory and knowledge we gained from our earlier work on the dynamics of poverty and resilience has been the driving force behind our research this past six years. We have conducted basic research, program evaluations and low-cost pilots to test innovations in 32 projects across 16 countries. Our Principal Investigators from leading institutions worldwide have used established and cutting-edge research methods that include randomized controlled trials, digital innovations, satellite technology, advanced qualitative analysis and machine learning to expand our understanding and test what's possible for small-scale agricultural households globally.

Our work has yielded valuable knowledge and innovations ready right now to take from the lab to the field. We can focus these results

into three key categories of insights for sustainable development and resilience.

## **RESILIENCE DYNAMICS**

Our work on poverty dynamics has established three fundamental and complementary pathways into and out of poverty: assets, capacities and risk. Our field trials around the world have contributed significantly to our understanding of these dynamics and provided the opportunity to design and evaluate programs intended to reduce poverty and promote resilience.

In the broadest sense, ending the need for development aid will depend on our ability to continually shrink the number of poor households over time. While cash transfers sustain the very poorest households in times of dire need, we could achieve much bigger long-term impacts from a contingent transfer—such as agricultural insurance—that keeps vulnerable households from falling into poverty. This phenomenon, which we have called the “social protection paradox,” presents a real opportunity for promoting resilience when scaled

to national social protection budgets, particularly for countries in Sub-Saharan Africa and others that face a growing threat of weather-related shocks.

While the policy focus is often on assets, research shows that stress, depression or a deterioration in physical health can affect cognitive function, resulting in hardship that itself reinforces stress and depression. In the development context, this kind of self-reinforcing loop—effectively a behavioral poverty trap—means that the experience of poverty itself can influence an individual's future decisions about productivity.

The dynamics of assets, capacities and risk mean that for small-scale agricultural households to sustainably escape poverty requires a way to increase their assets and/or capacities while managing or transferring their risks. Ideally, programs will accomplish all three. Poverty graduation programs, which increase assets and capacities, provide a unique opportunity to test the dynamics of poverty and resilience when agricultural insurance is added.

### RISK AND INSURANCE

The risk of weather-related catastrophes, illness or market failures creates challenges for agricultural households in two ways. First, poverty often starts with a serious shock. However, risk itself can discourage households from investing in more productive technologies or cash crops. Agricultural insurance is a key tool for promoting resilience as both a safety net in bad years and a way to promote investments for a higher income in the good.

We must be sure index insurance works as theorized and that the impacts are high. We have contributed to a

growing base of evidence that high-quality index insurance does act as an effective safety net, keeping households from selling off assets or reducing consumption after a weather-related catastrophe. We have also established that index insurance promotes investments in more productive technologies and cash crops with a potential to increase profitability.

Low-quality contracts have the potential to leave households who purchase them worse off than having no insurance at all. The AMA Innovation Lab has developed a Minimum Quality Standard for agricultural index insurance (MQS), the world's first objective measure of index insurance quality. Right now MQS is at the center of a USAID/UC Davis initiative to launch the world's first index insurance quality certification in East Africa.

Advances in satellite technology and index insurance contract innovations are key pathways for reducing “basis risk,” meaning the likelihood that a contract will pay out accurately for losses. The AMA Innovation Lab has leveraged advances in satellite technology to improve how well an index can predict losses for individual farmers. We have developed and tested a number of contract innovations, including an audit rule and a dual-strikepoint contract, both of which are ready for broad adoption and scaling.

Bundling index insurance with existing interventions, both for microfinance and weather-related risk, are particularly promising. Village Insurance Savings Accounts (VISA) use savings groups to aggregate small insurance purchases into one larger purchase, which makes offering insurance contracts more feasible in remote, rural communities. We are also testing how bundling index insurance with drought-tolerant

seed can eliminate the risk of hybrid adoption and boost yields in years without drought.

### INCLUSIVE AGRICULTURAL GROWTH

Farmers have not adopted many of the technologies which have seen the greatest investments—like hybrid seeds and chemical fertilizers—in part because of their higher risk in an unpredictable environment. Constraints include thin markets for credit and inputs, but access to information is also a fundamental barrier to adopting more productive technologies.

AMA Innovation Lab research has established that temporary subsidies eliminate a key constraint to adoption by reducing the risk of trying a new input. They also provide a low-risk way to learn whether new inputs or farming methods are profitable. In addition to promoting technology adoption, a temporary subsidy could shift broader poverty dynamics by increasing a farmer's future planning as well as what they believe to be their economic prospects.

Our projects have also shown that significant agro-ecological variation between small-scale farms, including soil variation, microclimates and other physical conditions, can significantly affect yields and even whether improved inputs are profitable. High variation within villages can also severely hinder what households can learn from their neighbors. When farmers learn from each other's experiences, they avoid costly experimentation with new inputs.

The proliferation of information and communications technology across developing economies provides a primed opportunity for small-scale producers to get broader access to market information. Our researchers





Photo:AMA Innovation Lab

AMA Innovation Lab projects are conducted in partnership between researchers at U.S. institutions and host-country institutions in collaboration with governments, NGOs and other stakeholders for direct impact for the benefit of small-scale farmers.

have developed a printed phone directory that connects rural and remote households to enterprises, strengthening local markets and reducing the costs of finding information. We have also helped to build an online marketing platform that has shown promise in trade volumes in its second year.

### **AMA INNOVATION LAB OUTREACH IMPACT**

We have worked diligently so these kinds of research results achieve the greatest impact. Part of this is ensured by the structure of our projects. The majority of our work is conducted in partnership with governments, private-sector entities, international NGOs and other stakeholders who share in the development of the intervention, participate in the process of evaluation and receive results directly. This two-way relationship provides a context for

the research, access to data and rigorous analysis fit for publication under the scrutiny of peer review in leading academic publications.

Another important part of our work is dedicated outreach through stakeholder engagement and large-scale events both in the U.S. and in host countries, as well as a robust program of ongoing news media outreach, web publications and other content tailored for the broader development community. The result of these efforts include a wealth of accessible and adaptable knowledge, toolkits for scaling interventions and a wide network of stakeholders working to promote greater opportunities for small-scale agricultural households.

### **LOOKING TOWARD THE FUTURE**

The AMA Innovation has three

continuing projects supported by USAID Associate Awards that integrate the knowledge we have already gained. A project in Kenya pairs an effective poverty graduation program with an established livestock insurance program. A project in Tanzania and Mozambique is measuring the impacts of pairing drought-tolerant maize developed by CIMMYT with index insurance. The third is evaluating the impact of the PEPFAR program for orphans and vulnerable children in Mozambique.


Overall, the AMA Innovation Lab has helped to establish and cement lasting connections between people who are all working to build better opportunities for small-scale agricultural families. We must continue to find new ways to address the complex challenges facing the world's poorest populations today and to design, target and evaluate the most effective interventions for tomorrow.





# PROGRAM OVERVIEW





The Feed the Future Innovation Lab for Assets and Market Access at the University of California, Davis builds knowledge that can empower smallholder farmers in developing economies worldwide to create a secure, self-reliant and resilient future for their families and communities. We conduct and support research on policies and programs designed to help households to manage risk, adopt productive technologies and take an active part in economic growth. We are one of 24 Feed the Future Innovation Labs across the United States funded by the USAID Bureau for Food Security to support the U.S. Government's global hunger and food security initiative.

**32**

**PROJECTS**

**69**

**ACADEMIC PAPERS**

**16**

**COUNTRIES**

**110**

**POLICY PUBLICATIONS**

**20**

**TECHNOLOGIES FOR SCALE**

**39**

**OUTREACH EVENTS**

**68,892**

**HOUSEHOLDS INSURED**

**83**

**STAKEHOLDER MEETINGS**

**10,170**

**TRAINED**

**87**

**RESEARCH PRESENTATIONS**

**76,474**

**HOUSEHOLDS BENEFITING FROM  
U.S. GOVERNMENT INVESTMENTS**



The AMA Innovation Lab, housed in the UC Davis College of Agricultural and Environmental Sciences, studies the complex problems of persistent poverty and food insecurity that prevent poorer households from sharing in agriculture-led economic growth. This kind of research requires a theoretical foundation paired with problem-focused creativity to understand the complexity of these challenges and to provide scalable solutions.

We leverage a network of development researchers at leading institutions worldwide to conduct impact evaluations and basic research on the mechanisms that make and keep rural households poor. We innovate and pilot novel solutions on a small-scale to learn what works and build on prior knowledge to find the most effective, scalable opportunities for smallholder agricultural households.

Research in a university offers a freer rein to explore these complex problems than any other setting. This environment provides USAID and the international development community solutions they would not find otherwise. We have also found tremendous opportunity to expand beyond traditional approaches to poverty and food insecurity by finding and taking parts and pieces from other related areas of research to solve these complex problems.

Our research program is built upon a committed, long-term engagement with the hard problems of reducing poverty and food insecurity. This is the strength of academic research. Our work does not begin with clear-cut solutions. Rather, it begins with a careful and thorough understanding of what the problems really are. While we do not know what problems we will uncover in the future, we are broadening the horizon of knowledge and all that is possible for tomorrow.

# I4 | INDEX INSURANCE INNOVATION INITIATIVE

The AMA Innovation Lab's Index Insurance Innovation Initiative (I4) has advanced knowledge and action on index insurance as a tool for small-scale farmers and pastoralists to manage weather-related risks, increasing their long-term self-sufficiency and resilience. I4 efforts focus on three key areas:

- Improve the accuracy and precision of how a given index can estimate individual farmer losses, including those using cutting-edge remote sensing technologies.
- Bundle index insurance with other innovations and interventions to improve access to markets and the delivery of benefits.
- Advance the international adoption of a Minimum Quality Standard (MQS) for agricultural index insurance to ensure consumers have confidence that contracts will protect them and to promote market growth.



GAN is a collaborative initiative of the AMA Innovation Lab and the International Labour Organization's Impact Insurance Facility with support from USAID to guide political momentum towards quality index insurance and to close the gap between research and large-scale projects. GAN's primary activities are:

- Establish and coordinate a community of experts to discuss key issues around agricultural insurance.
- Build capacities in focus countries to create an enabling environment for agricultural insurance.
- Promote the responsible scaling of agricultural insurance; package and disseminate knowledge products, tools and training modules.
- Contribute to the design, implementation and evaluation of large-scale index insurance programs.



Enumerators and Ph.D.-candidate research assistants are essential to field work. This team of enumerators in Tanzania, led by Laura Paul from UC Davis, completed extensive training, presented the intervention to farmer groups and conducted detailed household surveys throughout the project's life cycle.



**DIRECTOR:** Michael Carter

Michael R. Carter is a professor of agricultural and resource economics at UC Davis where he directs the AMA Innovation Lab and the Index Insurance Innovation Initiative (I4). His research examines poverty dynamics and productive social safety nets, the

Tara Chiu provides administrative and strategic support for a wide portfolio of research projects focused on poverty, food security, improved technology adoption and risk management and resilience. This includes the Index Insurance Innovation Initiative (I4). She conducts high-impact outreach to integrate research findings for more effective, evidence-based public policy and development programming. She regularly consults on index insurance implementation and scaling for national governments and NGOs. She was a Peace Corps volunteer in The Gambia and holds a B.A. in Political Science from American University and a Master of Public Policy from Duke University.



**STRATEGIC COMMUNICATIONS MANAGER:** Alex Russell

Alex Russell develops and implements strategic communications plans and manages web and print communications. He also manages relationships with media, researchers,

# AMA STAFF

impact of violence on aspirations and hope and small-farm uptake of improved agricultural technologies. He also designs, pilots and evaluates index insurance contracts as tools to alleviate chronic poverty. Carter is a fellow of NBER, BREAD and the American Agricultural Economics Association. He has served on advisory boards for numerous academic journals and international development NGOs. He is co-editor of *The Economics of Poverty Traps* (U. of Chicago, 2018).



**ACCOUNT MANAGER:** Christine Mungo

Christine Mungo administers AMA Innovation Lab contracts and grants and provides financial analysis for all research and outreach activities. This includes managing outgoing subcontracts, modifying existing subcontracts and working with UC Davis offices on oversight. She also manages invoices and tracks subcontract spending. Mungo holds a B.S. in Business Administration with a concentration in Accounting from San Francisco State University.

news service groups and related agencies. Russell holds a B.A. in Literature from UC Santa Cruz and a M.A. in English from UC Davis.



**COMMUNICATIONS AND OUTREACH SPECIALIST:** Sophie Javers

Sophie Javers builds partnerships to better support stakeholder needs. Her outreach and events create knowledge sharing and engagement at local, national and international levels. She holds a B.A. in History from Princeton and a M.A. in International Policy Studies from Stanford.



**ASSISTANT DIRECTOR:** Tara Chiu



David Ameyaw  
President, International Centre for  
Evaluation and Development (ICED)

David Sarfo Ameyaw, a native of Ghana and a U.S. citizen, has worked in several senior international management positions in Haiti, Ghana and other parts of Africa, Europe, Asia and South

Jennifer Cissé manages the USAID Bureau for Food Security's insurance-related activities and provides technical assistance on resilience, risk management and index insurance. She has a Ph.D. in applied economics from Cornell University.



Craig McIntosh  
Professor of Economics, UC San Diego

in Somalia with the International Rescue Committee and spent a year on a Fulbright grant as a research director at FINCA/Uganda, a major microfinance lender.



Jolyne Sanjak  
Chief Program Officer, Landsea Rural  
Development Institute

# ADVISORY BOARD

America. He brings over 20 years of international development work, with a focus on work in Africa. He was formerly director of M&E for AGRA. Ameyaw holds a D.Min in Missions and Community Development and a Masters in Divinity from Andrews University.



Jennifer Cissé  
Senior Risk Advisor, USAID Bureau  
for Food Security

Craig McIntosh is co-director of the Policy Design and Evaluation Lab at UC San Diego. He is a development economist whose work focuses on program evaluation. His main research interest is the design of institutions that promote the provision of financial services to micro-entrepreneurs, and he has conducted field evaluations of innovative anti-poverty policies in Mexico, Guatemala, Malawi, Rwanda, Uganda and Tanzania. He is currently working on research projects testing how technology can be used to extend financial services and deepen agricultural markets, as well as studies seeking to understand how the impact of cash transfers relates to more conventional development assistance. Before earning his Ph.D. in agricultural and resource economics from UC Berkeley, McIntosh did aid work

Jolyne Sanjak is an agricultural economist with specialization in development economics. She has more than 25 years of technical, research and managerial experience relating to inclusive global economic development, with technical expertise in areas including rural and urban land governance, as well as with rural livelihoods and agricultural development. Currently serving as Landesa's Chief Program Officer, providing strategic leadership, oversight and technical support to Landesa's programming worldwide. She founded and was the Executive Director of the Land Alliance, and served as Deputy Vice President for the Millennium Challenge Corporation. Sanjak holds a Ph.D. in Agricultural Economics & Development Economics from the University of Wisconsin.





# INSIGHTS FOR SUSTAINABLE DEVELOPMENT AND RESILIENCE




From 2012-2018, the AMA Innovation Lab built upon a strong foundation of development economics research with randomized interventions and field trials to expand our understanding of the major challenges and opportunities for small-scale agricultural households in developing economies. Across 32 projects in 16 countries we have developed key insights in the areas of Poverty Dynamics, Risk and Insurance and Inclusive Growth. These insights are tested and ready to contribute to more effective interventions beyond our project countries to reduce poverty, promote resilience and accelerate the end to the need for aid globally.





# RESILIENCE DYNAMICS

Photo: Jonathan Malacarne / AMA Innovation Lab



The AMA Innovation Lab has built a wealth of new knowledge about the dynamics that keep some households in poverty despite generations of advances in seed technologies and farming methods. This body of research shows that the underlying processes that make and keep people poor in rural areas are inherently dynamic, highly variable and complex.

From 2012-2018 the AMA Innovation Lab focused its research on the dynamics of household assets and access to markets through what our research has determined to be three fundamental and complementary pathways into and out of poverty: assets, capacities and risk. Our field trials around the world have contributed significantly to our understanding of these dynamics and provided the opportunity to design and evaluate programs intended to reduce poverty and promote resilience.

The result is a body of evidence that provides adaptable insights for reducing or eliminating many of the fundamental barriers that keep households in rural areas from achieving resilience. These insights, based on dynamics that are present in all developing economies, will help design the next generation of more effective—and more targeted—investments.

### **TARGET THE RIGHT PEOPLE WITH THE RIGHT TOOLS**

In the broadest sense, ending the need for development aid will depend on our ability to continually shrink

the number of poor households over time. No single approach to aid will accomplish this on its own, as households at different levels of need require different types of support.

Early on we learned the potential value of an intervention targeted to levels of need. From 2008-2012 we conducted a randomized intervention that paired index insurance with the Government of Kenya's Hunger Safety Net Program (HSNP).<sup>1</sup> We wanted to learn whether the small cash transfers put households on a footing to escape poverty and whether insurance would alter the broader poverty dynamics.

The results established that while a cash transfer program like HSNP is important for the very poorest households, there could be much bigger impacts from a contingent transfer—such as agricultural insurance—that keeps vulnerable households from falling into poverty. In fact, we found that the extent and depth of overall poverty are lower in the medium term when first targeting the vulnerable non-poor.

We have since then called this



phenomenon the “social protection paradox,” and it presents a significant opportunity to promote resilience when scaled to national social protection budgets. This is particularly true across Sub-Saharan Africa and other areas that face a growing threat of weather-related shocks.

“As the frequency and intensity of climate-related shocks continue to grow, so does the risk that more households will live their lives in destitution. This raises the stakes for addressing poverty, food security and vulnerability through resilience-based social protection programs, as the alternative for many families is chronic poverty that lasts for generations.”

— Michael Carter  
AMA Innovation Lab Director

A contingent transfer that keeps fewer households from falling into poverty would reduce the total number who require emergency aid. If this transfer comes in the form of agricultural insurance, at-risk households could also at least partially pay for their own protection through premiums, which would increase the overall reach of social protection budgets.

**ASPIRATIONS AND DEPRESSION IMPACT POVERTY AND RESILIENCE**

Across many of our projects, we have incorporated components that build the growing evidence base on how the subjective experience of poverty itself can keep people trapped in destitution. Research has shown that stress, depression or a deterioration in physical health can affect cognitive

Assets	Capacities	Risk
<ul style="list-style-type: none"> <li>• cash savings</li> <li>• land</li> <li>• tools</li> <li>• livestock</li> </ul>	<ul style="list-style-type: none"> <li>• physical ability</li> <li>• skill and education</li> <li>• level of depression</li> <li>• aspirations</li> </ul>	<ul style="list-style-type: none"> <li>• weather</li> <li>• markets</li> <li>• health</li> <li>• conflict</li> </ul>

function, resulting in hardship that itself reinforces stress and depression.

This self-reinforcing loop—effectively a behavioral poverty trap—means that the experience of poverty itself can influence an individual’s future decisions about productivity. While helping households to build up their assets is a mainstay of development practice, treating only the physical conditions of poverty overlooks the human experience of poverty that can have a significant impact.

A component of our input subsidy and savings field trial in Mozambique<sup>2</sup> showed how a behavioral poverty trap is possible depending on how people manage psychological distress. The data showed that when people see few prospects for themselves, they may avoid planning for the future to reduce their distress but at the expense of actions that could change those prospects. In addition to promoting the sustainable adoption of higher-yielding fertilizer, the subsidies increased households’ future planning as well as what they believed to be

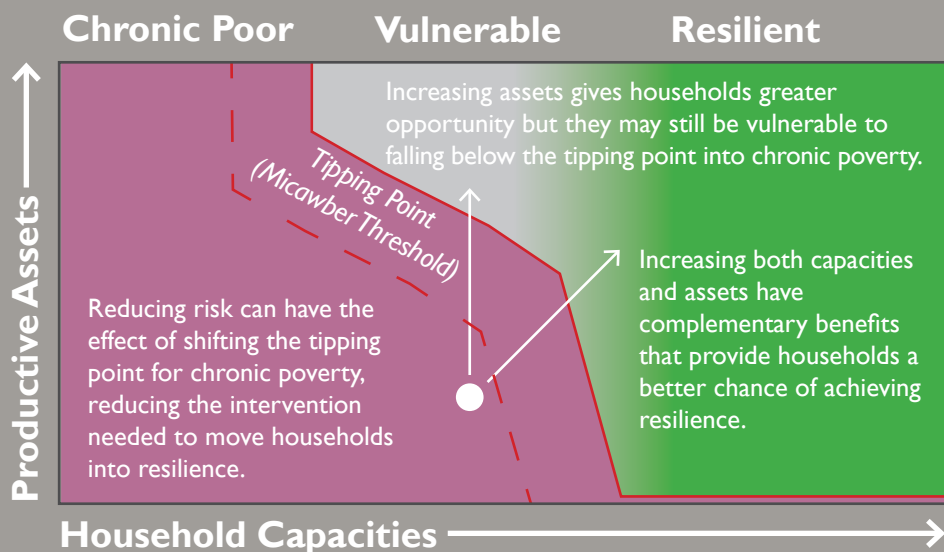
their economic prospects.

In an evaluation of a Heifer International livestock transfer program for women in Nepal<sup>3</sup> we included a component to test how women’s aspirations affect how much they save and invest in their children’s education. We learned that greater aspirations increase both but only to a point. If aspirations are too large, they may result in failure and frustration. Programs that seek to boost aspirations can be effective but not if they provide false hope.

“If internal constraints like low aspirations prevent households from making investments that may one day lift them out of poverty, then interventions might be more effective by addressing internal as well as external constraints.”

— Nicholas Magnan and Sarah Janzen  
AMA Innovation Lab Pls





This figure shows how assets, capacities and risk contribute to a household’s chances of achieving resilience. The tipping point to a poverty trap is called the “Micawber Threshold,” a term derived from a Charles Dickens fictional character who extolled the benefits of saving money to those for whom saving would make no difference.

**INTEGRATED SOCIAL PROTECTION COULD HAVE BROADEST IMPACT**

The dynamics of assets, capacities and risk mean that for small-scale agricultural households to sustainably escape poverty requires a way to increase their assets and/or capacities while managing or transferring their risks. Ideally, programs will accomplish all three, providing a pathway to resilience.

The AMA Innovation Lab recently launched a randomized controlled trial (RCT) in northern Kenya<sup>4</sup> to measure the impact of a program for women pastoralists that addresses assets, capacities and risk. The intervention pairs The BOMA Project’s Rural Entrepreneur Access Project (REAP) poverty graduation program with the International Livestock Research Institute’s Index-based Livestock Insurance program to help participating women to maintain their gains in the event of drought.

Integrating insurance seeks to solve a leading problem for the program’s beneficiaries. In northern Kenya, an arid region prone to devastating droughts, women who are able to build assets as a result of the graduation program alone are still at risk of losing those gains in the next drought. Insurance should help to safeguard those gains, keeping them on a pathway to resilience.

Notes:

- <sup>1</sup>“A Productive Safety Net for Northern Kenya’s Arid and Semi-Arid Lands: The HSNP+ Program”
- <sup>2</sup>“Savings, Subsidies and Sustainable Food Security: A Field Experiment in Mozambique”
- <sup>3</sup>“Evaluation of the Welfare Impacts of a Livestock Transfer Program in Nepal”
- <sup>4</sup>“A Randomized Evaluation of an Integrated Graduation and Contingent Social Protection Program in Kenya”



Pairing The BOMA Project’s Rural Entrepreneur Access Project (REAP) with Index-based Livestock Insurance (IBLI) could help pastoralist families in northern Kenya to achieve resilience despite a growing risk of drought.



# RISK AND INSURANCE

Photo: Jonathan Malacarne / AMA Innovation Lab



Risk is an age-old problem in agriculture. For small-scale producers, risks include drought or flood but also health risks and the risk of market failures. Risk creates challenges for agricultural households in two ways. First, poverty often starts with a serious shock. However, risk itself can discourage households from investing in more productive technologies or cash crops. Creating both a safety net in bad years and a way to promote investments for a higher income in good years is the most effective way to promote resilience.

The AMA Innovation Lab has rigorously tested existing tools to overcome these challenges while innovating tools for tomorrow. We have advanced quality index insurance through I4 and GAN. The results are a field-ready evidence base and innovations that encourage the adoption of improved technologies and safeguard pathways out of poverty.

### **INDEX INSURANCE HAS DEVELOPMENT IMPACTS**

Despite significant investments in promoting agricultural index insurance markets, the evidence for its impact on development has been limited. Considering the cost and scale of future investments, we must be sure that this tool works in the field as theorized. We must also be sure the returns and impacts are high.

We have added to a growing base of evidence that high-quality index insurance does act as a safety net for vulnerable households. In a key study we evaluated the safety-net impacts of Index-based Livestock Insurance (IBLI) in Kenya and Ethiopia.<sup>1</sup> We found that insured households were 36 percent less likely than the non-insured to sell

livestock as a way to cope. Insured households were also 25 percent less likely to reduce meals than non-insured households.

We have also shown that index insurance promotes productive investments.<sup>2</sup> In Mali, farmer groups who purchased insurance we designed increased their cotton planting by between 25-40 percent. In Burkina Faso, farmers who purchased insurance increased their cultivation of sesame, a short-season cash crop. We are working with our implementation partners in Burkina Faso to scale this insurance model nationwide.

Index insurance can also increase access to credit by reducing the risk of borrowing and lending. One of our theoretical analyses<sup>3</sup> showed that insurance interlinked with credit can reduce interest rates offered to farming households. This was especially pronounced among farmers who have little to offer for collateral.

Index insurance can particularly increase access to credit when interlinked to a loan contract. In a field trial in Ghana,<sup>4</sup> banks were 32 percent more likely to approve loans in which



insurance payouts go directly toward retiring the loan. Because these loans were for inputs and ploughing services, increases in credit were also increases in technology adoption.

### INNOVATION CAN IMPROVE INDEX INSURANCE QUALITY

These impacts are only possible with high-quality index insurance. One of the biggest challenges to the broader adoption of index insurance is the prevalence of low-quality contracts that have the potential to leave households worse off than having no insurance at all.

The AMA Innovation Lab’s Minimum Quality Standard for agricultural index insurance (MQS) is the world’s first objective measure of agricultural index insurance quality. MQS is the starting point for the USAID/UC Davis Quality Index Insurance Certification (QUIIC) initiative, which is working right now in East Africa with partners from the region’s governments and insurance sectors to establish the world’s first quality certification.

We have also leveraged advances in satellite technology to improve how well an index can predict losses for individual farmers. Higher-resolution data has made it possible to reduce “basis risk,” meaning the likelihood a contract will not pay when a farmer experiences a loss.

We developed and tested contract innovations that are ready for broad adoption. In Mali and Burkina Faso we piloted dual-strikepoint index insurance<sup>5</sup> that triggers for two levels of losses rather than for one catastrophic loss. Based on an analysis of 12 years of data from Burkina Faso, for a severe loss a single-scale index would have paid the full amount only 30 percent of the time and failed to pay at all 35 percent of the time. Our

dual strike-point contract would pay correctly 85 percent of the time and fail only 15 percent of the time.

In Tanzania we piloted an “audit rule”<sup>6</sup> that lets farmers petition their insurance company to have an agronomist measure average village yields. It functions as a failsafe so farmers can be secure that they will receive payouts when they are most needed.

### BUNDLING AND MICROFINANCE CAN SCALE RISK-MANAGEMENT

Bundling index insurance with existing interventions both for microfinance and weather-related risk have been promising. Our Village Insurance Savings Accounts (VISA) model leverages existing microfinance networks to scale insurance in underserved areas, making offering insurance contracts more feasible in remote, rural communities.

We bundled index insurance with CIMMYT drought-tolerant hybrid maize seed<sup>7</sup> to extend protection for farmers in Mozambique and Tanzania. If crops still fail, farmers with the insurance receive new seeds, eliminating the risk of purchasing

more productive seeds.

We have also tested other ways to pull risk out of small-scale agriculture. In partnership with BRAC we innovated and piloted an emergency loan product in Bangladesh<sup>8</sup> that triggered in the event of catastrophic floods. Pre-qualified households planted about 25 percent more rice than households who were not. Covered households who did not suffer floods grew 33 percent more from their crops.

Notes:

<sup>1</sup> “Index-Based Livestock Insurance in East Africa”

<sup>2</sup> “Using Index Insurance to Promote Investment in West Africa’s Cotton Industry”

<sup>3</sup> Carter, et al. 2015. “Where and How Index Insurance Can Boost the Adoption of Improved Agricultural Technologies.” *Journal of Development Economics*.

<sup>4</sup> “Promoting Adoption of Improved Production Technologies via Coupled Credit and Insurance Contracts among Smallholders in Ghana”

<sup>5</sup> “Using Index Insurance to Promote Investment in West Africa’s Cotton Industry”

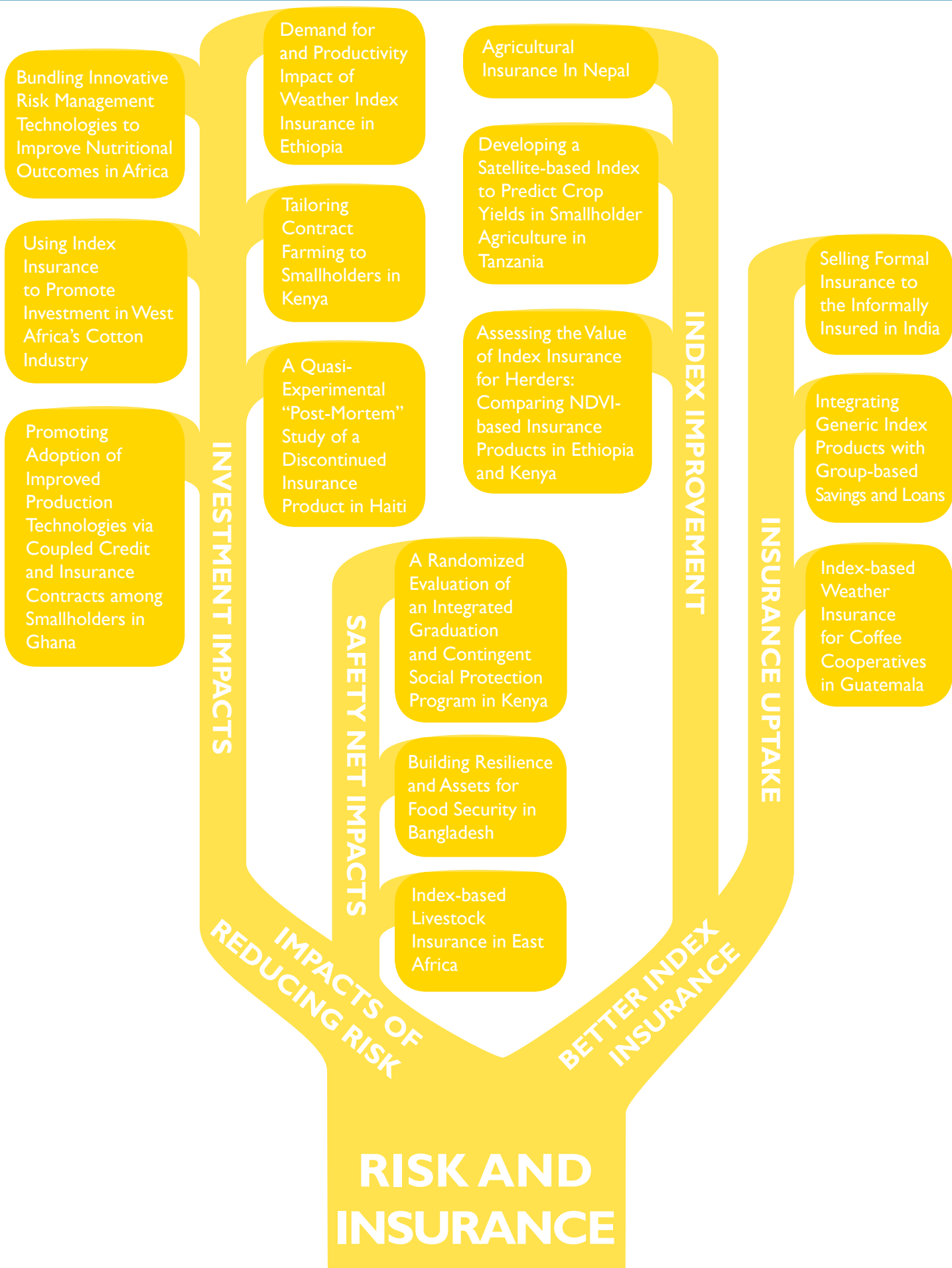
<sup>6</sup> “Developing a Satellite-based Index to Predict Crop Yields in Smallholder Agriculture in Tanzania”

<sup>7</sup> “Bundling Innovative Risk Management Technologies to Improve Nutritional Outcomes of Vulnerable Agricultural Households”

<sup>8</sup> “Building Resilience and Assets for Food Security in Bangladesh”



The AMA Innovation Lab was an early collaborator with the International Livestock Research Institute (ILRI) in their development of the Index-based Livestock Insurance (IBLI) program. The IBLI model was adopted by the Government of Kenya in 2015 to establish the national Kenya Livestock Insurance Program (KLIP).








# INCLUSIVE GROWTH

Photo: Jonathan Malacarne / AMA Innovation Lab





One of the biggest challenges is promoting inclusive agricultural growth with the tools we already have. Farmers have not adopted many of the technologies which have seen the greatest investments—like hybrid seeds and improved fertilizers—in part because of the higher risk of adopting them in an unpredictable environment. However, risk is only one of the constraints that keep farmers from shrinking the yield gap between what they currently achieve and what’s possible.

The AMA Innovation Lab has studied key challenges that keep households from adopting existing technologies as well as what keeps potentially transformative knowledge and information from reaching them despite the proliferation of mobile phones and information and communications technology (ICT). Some of the constraints are market-related. Others have to do with how households make decisions and, equally, the decisions available.

### **TAILORED AGRICULTURE SUPPORTS GAINS FOR SMALL-SCALE FARMERS**

Our research has added to growing evidence that significant agro-ecological variation between small-scale farms—including soil variation, microclimates and other physical conditions—can significantly affect yields and even whether improved inputs are profitable. High variation within localities also means that government or extension worker recommendations are not likely to work well for every farmer.

In Tanzania, we piloted SoilDoc,<sup>1</sup> a portable, on-farm soil testing kit

developed at the Earth Institute at Columbia University that provides cost-effective, farmer-specific soil and crop management recommendations. Across our pilot district, if the average farmer followed the government recommendation, he or she would pay more for fertilizer than necessary for a lower potential impact on yields.

High variation within villages can also severely hinder what households can learn from their neighbors. In a social network-focused component of a randomized hybrid seed intervention in Kenya,<sup>2</sup> we found that in villages where soils were similar farmers were able to apply lessons from their neighbors. This was not true in villages where soils varied widely.

On a national scale, some small-scale farmers may be historically underserved by input producers. In the same intervention in Kenya we found that hybrid seeds fine tuned to a local agro-ecology can impact poverty and food security. Maize farmers who had opportunities to purchase the tailored hybrid seed increased their productivity by 41 percent compared to farmers who did not. However, the biggest impacts



came for farmers who were better resourced and who already used hybrid seeds. This suggests that for the poorest populations, the impacts of even an appropriate seed technology are limited by financial constraints.

### INVESTING IN TIME-LIMITED SUPPORT CAN BUILD SUSTAINABLE GAINS

A straight-forward way to eliminate financial constraints is through subsidies, and we have learned that subsidies to adopt inputs that do increase yields and profitability can be temporary. Households need low-risk ways to learn for themselves whether these inputs and farming methods are worth both the money and effort. Temporary subsidies reduce the risk of trying a new input.

In Mozambique a temporary fertilizer subsidy<sup>3</sup> had big impacts for at least two years after it ended. On average, maize yields remained 48 percent higher among those who used their subsidy voucher increasing the overall value of their agricultural production by 41 percent. The temporary subsidy put farmers on a transformational path, shifting them from near-subsistence farming to selling more of their output on the market.

Programs that provide an initial transfer and support to start a business also have shown promise under rigorous evaluation. In Nepal we evaluated a Heifer International program<sup>4</sup> that transfers goats and conducts business training and community building among women. The financial impacts are still forthcoming but short-run impacts include increased empowerment and financial inclusion.

In Uganda we evaluated a BRAC program<sup>5</sup> that established community-based distribution networks for

hybrid maize seeds and model farmers to train their neighbors with basic farming techniques. The program only lasted four years but the adoption of both hybrid seeds and farming practices have sustained. Also, the basic farming techniques which cost almost nothing to adopt significantly increased food security across villages eligible for the program.

### INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) CAN PROMOTE GROWTH

The proliferation in mobile phone technology across developing countries provides a primed opportunity for small-scale producers to get broader access to market information. The AMA Innovation Lab has piloted two projects that use ICT to connect farmers to broader markets.

We have helped to pilot Kudu,<sup>6</sup> a digital food trading platform developed by computer scientists at Makerere University in Uganda, which acts as a virtual match-maker allowing farmers to contract directly with major buyers. The Kudu platform began to see meaningful volumes of trade in its second year.

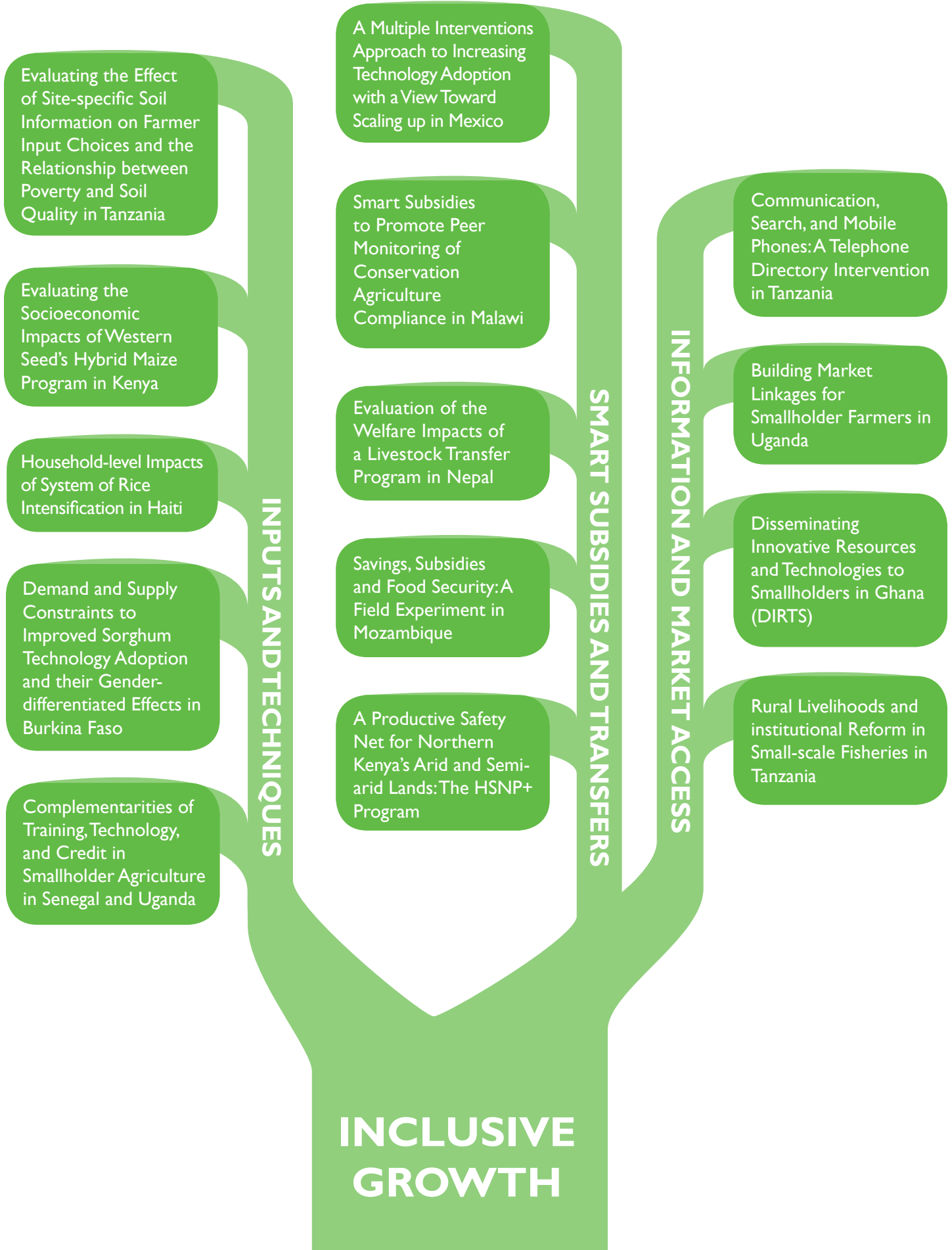
Mobile phones also provide an opportunity to connect farmers to local markets. In Tanzania we connected farming households with agriculture-related enterprises through a printed mobile phone directory.<sup>7</sup> The directory increased how much farmers used their mobile phones to source inputs and their use of mobile money, with some evidence of improved farming outcomes. Enterprises saw large increases in the volume of calls and the use of mobile money. Given that we also found a significant willingness-to-pay among both farmers and enterprises, this kind of directory could have important implications for promoting agricultural growth.

#### Notes:

- <sup>1</sup> "Evaluating the Effect of Site-Specific Soil Information on Farmer Input Choices and the Relationship Between Poverty and Soil Quality in Tanzania"
- <sup>2</sup> "Evaluating the Socio-economic Impacts of Western Seed's Hybrid Maize Program in Kenya"
- <sup>3</sup> "Savings, Subsidies and Sustainable Food Security: A Field Experiment in Mozambique"
- <sup>4</sup> "Evaluation of the Welfare Impacts of a Livestock Transfer Program in Nepal"
- <sup>5</sup> "Complementarities of Training, Technology, and Credit in Smallholder Agriculture in Senegal and Uganda"
- <sup>6</sup> "Building Market Linkages for Smallholder Farmers in Uganda"
- <sup>7</sup> "Communication, Search, and Mobile Phones: A Telephone Directory Intervention in Tanzania"



In Mozambique we found sustained increases in the adoption of fertilizer two years after the end of a temporary subsidy.







# OUTREACH IMPACT





The AMA Innovation Lab conducts a range of outreach activities to ensure that the knowledge we generate can have the greatest benefit for rural households and communities. These activities include dedicated stakeholder engagement and large-scale events both in the U.S. and in host countries, as well as a robust program of ongoing news media outreach, web publications and other content tailored for the broader development community. The result of these efforts include a wealth of accessible and adaptable knowledge, toolkits for scaling interventions and a wide network of stakeholders working to promote greater opportunities for small-scale agricultural households.



The AMA Innovation Lab's engagement activities ensure lasting policy and programming impacts through a long-term commitment to fostering durable relationships and effective partnerships with agents of change across our areas of research. Our dedicated engagement has been key to growing our understanding our stakeholders' needs, making us a valued resource for policy-relevant evidence. Impacts from this approach include:

- The Government of Kenya modeled its Kenya Livestock Insurance Program (KLIP), an innovative national social safety net program for pastoralists on the successful and AMA

- Two AMA Innovation Lab impact evaluations on index insurance in Ghana has led to a Ghana Agricultural Insurance Program (GAIP) request for our assistance in designing new, higher-quality index-insurance products for scaling nationwide.

### **BUILDING LASTING IMPACTS**

The AMA Innovation Lab has developed a dynamic approach to sharing key insights from our broad portfolio of research with stakeholders in policy and program design. Our successful practices include:

- **Responsive outreach to international stakeholders**

in Haiti, Ethiopia, Mozambique, Tanzania, Malawi and many other countries.

- **Building on established institutional partnerships**  
Our GAN partnership with the International Labour Organization's Impact Insurance Facility has allowed us to more effectively engage with a wider range of national policymakers from around the world. Also, a deep collaborative relationship with the International Centre of Evaluation and Development (ICED) in Nairobi has drawn us into large regional and continent-wide dissemination events that extend the scope of our

# QUALITY ENGAGEMENT

Innovation Lab-supported Index-based Livestock Insurance program.

- AMA Innovation Lab work to develop a Minimum Quality Standard for agricultural index insurance (MQS) led to the USAID/UC Davis partnership to establish the Quality Index Insurance Certification (QUIIC) in East Africa, the world's first index insurance quality certification.
- The AMA Innovation Lab's success with a temporary subsidy in Mozambique that built sustained demand for improved inputs inspired the Government of Uganda to pursue a similar policy with our guidance.

We create opportunities to present our research to governments and other policy makers in developing countries. This has included peer-learning workshops in Tanzania, Ghana, Kenya, Nigeria and Nepal.

- **Project-specific dissemination events**  
Project-specific dissemination workshops are an integral part of knowledge-sharing. Our researchers develop strong relationships with partners who participate in their research projects. This includes host country research partners and local universities and institutions. These events have occurred

knowledge sharing well beyond what we could achieve in isolation.

- **Individual, face-to-face policymaker engagement**  
Our management team and network of principal investigators have developed relationships with change agents across many of the contexts in which we work. Consistently engaging these stakeholders as research progresses shapes the kinds of information we produce and makes it accessible for policy and program development. It also makes us a resource for unique expertise and support.
- **Large-scale dissemination**



Photo: Alex Russell / AMA Innovation Lab

This outreach event in Kenya in 2017 in partnership with Tegemeo Institute to present research findings included representatives of the Government of Kenya, the national seed sector, international NGOs and USAID.

**events**

We have worked closely with USAID to identify policy priorities to develop targeted large-scale knowledge-sharing events, such as “Mind the Gap” in 2016 and “Resilience in the Face of Poverty Traps” in 2018. We also host USAID Brown Bag lunches and informational meetings. Each of these efforts have fostered a responsive and connected relationship between the AMA Innovation Lab and leaders within USAID.

Through international USAID-hosted events such as the Global Learning and Evidence Exchanges (GLEEs) as well as regular individual in-country Mission meetings, we have developed an effective way of transmitting and updating our research results to Missions while also seeking opportunities to understand and incorporate Mission priorities into our work. This dedicated outreach has resulted in mission-requested technical assistance.

is a key resource that provides access to up-to-date information and results from each of our research projects. Our regular online communications through Twitter, LinkedIn, webinars, and the e-newsletter *AMA Update* have helped us to maintain direct connections with a growing audience across the international development community. We have also regularly produced exclusive content for the USAID web platforms *AgriLinks*, *MarketLinks* and other development websites such as *Devex*, *The Next Billion* and others.

- **USAID Mission engagement**

- **Digital engagement**  
The AMA Innovation Lab website



**Index Insurance Innovation Initiative** *I<sub>4</sub> Update*

**Interlinking Weather Index Insurance with Credit in Rural Ethiopia**

**PARTNERS**  
  
**Key Project Features**

**Innovation:** Interlinking weather index insurance with credit in rural Ethiopia

**Pilot Area Market Size:** 100,000 households (100,000 tropical livestock units)

**Insurance Linked To:** Livestock (goats, sheep, camels, cattle)

**Index Used:** Predicted livestock mortality based on Normalized Difference Vegetation Index (NDVI)

**Sales Rollout Date:** January 2010

**Pastoralist Education:** Games, Village Insurance People (VIPs), comic books, radio public service announcements

**Impacts:** 2011 payouts cut hunger and costly coping strategies

**AFRICA RE**

**Index Insurance Innovation Initiative** *I<sub>4</sub> Update*

**Index Based Livestock Insurance for Pastoralists in Ethiopia**

**PARTNERS**  
  
**Key Project Features**

**Innovation:** Index-based livestock insurance for pastoralists in Ethiopia

**Pilot Area Market Size:** 100,000 households (100,000 tropical livestock units)

**Insurance Linked To:** Livestock (goats, sheep, camels, cattle)

**Index Used:** Predicted livestock mortality based on Normalized Difference Vegetation Index (NDVI)

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**AFRICA RE**

**Index Insurance Innovation Initiative** *I<sub>4</sub> Update*

**Dual Strike Point Index Insurance: Innovations for Cotton Farmers in West Africa**

**PARTNERS**  
  
**Key Project Features**

**Innovation:** Dual strike point index insurance for cotton farmers in West Africa

**Pilot Area Market Size:** 100,000 households (100,000 tropical livestock units)

**Insurance Linked To:** Cotton production

**Index Used:** Predicted cotton yield based on Normalized Difference Vegetation Index (NDVI)

**Sales Rollout Date:** January 2010

**Pastoralist Education:** Games, Village Insurance People (VIPs), comic books, radio public service announcements

**Impacts:** 2011 payouts cut hunger and costly coping strategies

**AFRICA RE**

**Index Insurance Innovation Initiative** *I<sub>4</sub> Update*

**Insuring Against the Weather: Addressing the Challenges of Basis Risk in Index Insurance using Gap Insurance in Ethiopia**

**PARTNERS**  
  
**Key Project Features**

**Innovation:** Index insurance with gap insurance to address basis risk in Ethiopia

**Pilot Area Market Size:** 100,000 households (100,000 tropical livestock units)

**Insurance Linked To:** Crop production

**Index Used:** Predicted crop yield based on Normalized Difference Vegetation Index (NDVI)

**Sales Rollout Date:** January 2010

**Pastoralist Education:** Games, Village Insurance People (VIPs), comic books, radio public service announcements

**Impacts:** 2011 payouts cut hunger and costly coping strategies

**AFRICA RE**

**Index Insurance Innovation Initiative** *I<sub>4</sub> Update*

**Index Based Livestock Insurance for Livestock Herders in Northern Kenya**

**PARTNERS**  
  
**Key Project Features**

**Innovation:** Insurance based on satellite spectrometer data

**Pilot Area Market Size:** 27,000 households (340,000 tropical livestock units)

**Insurance Linked To:** Livestock (goats, sheep, camels, cattle)

**Index Used:** Predicted livestock mortality based on Normalized Difference Vegetation Index (NDVI)

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**Impacts:** 2011 payouts cut hunger and costly coping strategies

**AFRICA RE**

**Index Insurance Innovation Initiative** *I<sub>4</sub> Update*

**Sharing the Risk and the Uncertainty: Public-Private Reinsurance Partnerships for Viable Agricultural Insurance Markets**

**PARTNERS**  
  
**Key Project Features**

**Innovation:** Public-private reinsurance partnerships for viable agricultural insurance markets

**Pilot Area Market Size:** 100,000 households (100,000 tropical livestock units)

**Insurance Linked To:** Various agricultural products

**Index Used:** Various indices for different products

**Sales Rollout Date:** January 2010

**Pastoralist Education:** Games, Village Insurance People (VIPs), comic books, radio public service announcements

**Impacts:** 2011 payouts cut hunger and costly coping strategies

**AFRICA RE**

**Index Insurance Innovation Initiative** *I<sub>4</sub> Update*

**Index Insurance Contracts that Increase Farmer Investments in Cotton in Burkina Faso**

**PARTNERS**  
  
**Key Project Features**

**Innovation:** Index insurance contracts that increase farmer investments in cotton in Burkina Faso

**Pilot Area Market Size:** 100,000 households (100,000 tropical livestock units)

**Insurance Linked To:** Cotton production

**Index Used:** Predicted cotton yield based on Normalized Difference Vegetation Index (NDVI)

**Sales Rollout Date:** January 2010

**Pastoralist Education:** Games, Village Insurance People (VIPs), comic books, radio public service announcements

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# OUTREACH PUBLICATIONS



### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### DISSEMINATING INNOVATIVE RESOURCES AND TECHNOLOGIES TO SMALLHOLDERS IN GHANA

**KEY POINTS**

Smallholder farmers in Ghana face significant challenges in accessing agricultural inputs, services, and markets. This research explores innovative approaches to disseminate resources and technologies to these farmers, focusing on the role of extension services and digital tools. The study identifies key barriers to access and proposes strategies to improve the reach and effectiveness of extension services, including the use of mobile phones and community-based extension workers.

**KEY POINTS**

- Smallholder farmers in Ghana face significant challenges in accessing agricultural inputs, services, and markets.
- This research explores innovative approaches to disseminate resources and technologies to these farmers, focusing on the role of extension services and digital tools.
- The study identifies key barriers to access and proposes strategies to improve the reach and effectiveness of extension services, including the use of mobile phones and community-based extension workers.

### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### THE INTERACTIONS BETWEEN FORMAL INSURANCE MARKETS AND INFORMAL RISK SHARING IN INDIA

**KEY POINTS**

Formal insurance markets and informal risk-sharing mechanisms in India interact in complex ways. This research examines the interactions between formal insurance products and informal risk-sharing practices, such as community-based insurance schemes and mutual aid groups. The study explores how these interactions affect the risk management strategies of smallholder farmers and the overall resilience of rural communities.

**KEY POINTS**

- Formal insurance markets and informal risk-sharing mechanisms in India interact in complex ways.
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### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### TWO TRIGGERS ARE BETTER THAN ONE: INNOVATIVE INSURANCE DESIGN FOR COTTON FARMERS IN MALI

**KEY POINTS**

Innovative insurance designs for cotton farmers in Mali are being tested to improve risk management. This research evaluates the effectiveness of two triggers (weather and yield) compared to a single trigger (weather) in determining insurance payouts. The study finds that two triggers significantly reduce the number of false claims and improve the accuracy of payouts, leading to higher farmer satisfaction and better risk management outcomes.

**KEY POINTS**

- Innovative insurance designs for cotton farmers in Mali are being tested to improve risk management.
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### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### SPREADING TECHNOLOGICAL INNOVATION AND POSITIVE OUTCOMES: THE IMPACT OF A NEW SEED MARKET IN ETHIOPIA

**KEY POINTS**

A new seed market in Ethiopia is spreading technological innovation and positive outcomes. This research examines the impact of a new seed market on the adoption of improved seed varieties and the resulting increases in crop yields and farmer income. The study highlights the role of the seed market in providing farmers with access to high-quality seeds and technical support, leading to significant improvements in agricultural productivity and livelihoods.

**KEY POINTS**

- A new seed market in Ethiopia is spreading technological innovation and positive outcomes.
- This research examines the impact of a new seed market on the adoption of improved seed varieties and the resulting increases in crop yields and farmer income.
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### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### TAILORING RISK-GRANULAR CONTRACT FARMING TO SMALLHOLDERS IN KENYA

**KEY POINTS**

Risk-granular contract farming in Kenya is being tailored to meet the needs of smallholders. This research explores how contract farming arrangements can be designed to reduce the risks faced by smallholders while providing them with access to inputs, services, and markets. The study identifies key factors that influence the success of risk-granular contract farming and proposes strategies to improve its effectiveness.

**KEY POINTS**

- Risk-granular contract farming in Kenya is being tailored to meet the needs of smallholders.
- This research explores how contract farming arrangements can be designed to reduce the risks faced by smallholders while providing them with access to inputs, services, and markets.
- The study identifies key factors that influence the success of risk-granular contract farming and proposes strategies to improve its effectiveness.

### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### USING INDEX INSURANCE TO ENHANCE THE AGRICULTURAL CREDIT SYSTEM IN GHANA

**KEY POINTS**

Index insurance is being used to enhance the agricultural credit system in Ghana. This research examines how index insurance can be used to reduce the risk faced by lenders and increase the willingness of lenders to provide loans to smallholder farmers. The study explores the impact of index insurance on the availability and terms of agricultural credit and the resulting improvements in farmer access to financial services.

**KEY POINTS**

- Index insurance is being used to enhance the agricultural credit system in Ghana.
- This research examines how index insurance can be used to reduce the risk faced by lenders and increase the willingness of lenders to provide loans to smallholder farmers.
- The study explores the impact of index insurance on the availability and terms of agricultural credit and the resulting improvements in farmer access to financial services.

### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### INCREASING SOREGRUM TECHNOLOGY ADOPTION IN BURUNDI

**KEY POINTS**

Soregrum technology adoption in Burundi is being promoted to improve crop yields. This research examines the factors that influence the adoption of soregrum technology by smallholder farmers, including access to inputs, services, and markets. The study identifies key barriers to adoption and proposes strategies to improve the reach and effectiveness of extension services and other support mechanisms.

**KEY POINTS**

- Soregrum technology adoption in Burundi is being promoted to improve crop yields.
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- The study identifies key barriers to adoption and proposes strategies to improve the reach and effectiveness of extension services and other support mechanisms.

### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### TRAINING, TECHNOLOGY, AND CREDIT IN SENEGAL AND UGANDA

**KEY POINTS**

Training, technology, and credit interventions in Senegal and Uganda are being evaluated for their impact on farmer productivity. This research examines the effectiveness of training, technology, and credit interventions in improving the productivity and income of smallholder farmers. The study identifies key factors that influence the success of these interventions and proposes strategies to improve their effectiveness.

**KEY POINTS**

- Training, technology, and credit interventions in Senegal and Uganda are being evaluated for their impact on farmer productivity.
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## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

# EYES WIDE OPEN OR SHUT: CHANGING DECISION HORIZONS AMONGST POOR FARMERS

by Rachid Laajaj (rachid.laajaj@parisschoolofeconomics.edu)

**CLOSING THE EYES ON A GLOOMY FUTURE**

For the poor, the contradiction between gloomy prospects and daily consideration of and concern for their future welfare is a source of cognitive dissonance. Why plan for the future if there is no hope for improvement? In 2000, Narayan and Ebary conducted a study that reported "Mental health problems—stress, anxiety, depression, lack of self-esteem and suicide—are among the more commonly identified effects of poverty and ill-being... People cope by focusing on one day at a time, becoming indifferent, apathetic or hovering near losing their mind." By closing their eyes on the future, the poor can reduce their psychological distress and increase their day to day happiness. Under these conditions, people rarely consider saving money, as they prefer to leave behind this day to day worry. Without a deeper understanding of what causes the poor to be reluctant to plan and save for their financial future, interventions may only address the symptom rather than the source of the issue, thus limiting lasting change.

**THE CONNECTION BETWEEN PATIENCE AND POVERTY**

Can an individual's time horizon, or patience level, change? Are time horizons determined by poverty, a condition difficult to change in the short term? Numerous studies have confirmed the positive correlation between patience (time discounting) and income. This research provides the first empirical evidence of the endogenous determination of time discounting. Amongst a relatively poor population, an increase in either the initial or the expected wealth of an individual increases his patience and lengthens his time horizon. Below a certain level of wealth, the time horizon of an individual, or the extent to which an individual identifies with his future selves at any given point in time, is decreasing in poverty, resulting in a behavioral poverty trap. Thus, the poorer you are the less able you are to look further into the future and the more likely you are to remain poor.

The theoretical framework for this research describes how an individual relates to her future self by decomposing time discounting into

**KEY POINTS**

- The value of a subsidy equivalent to USD 65 increased to USD 65 equivalent to USD 34 in matched savings increased the time horizon 29 percent.
- Interventions which improve the economic prospects of the poor led to a substantial increase in his time horizon.
- This research shows the positive side-effect of policies that encourage asset accumulation: the behavioral change that goes with it enhances the long term benefits.

BASIS Brief 2013-02 December 2013

### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### IDENTIFYING THE ROOT CAUSES OF LOW TECHNOLOGY ADOPTION AMONGST MAIZE GROWERS IN MEXICO

**KEY POINTS**

Identifying the root causes of low technology adoption amongst maize growers in Mexico is a key challenge. This research examines the factors that influence the adoption of improved maize varieties and other technologies by smallholder farmers. The study identifies key barriers to adoption, including lack of access to inputs, services, and markets, and proposes strategies to improve the reach and effectiveness of extension services and other support mechanisms.

**KEY POINTS**

- Identifying the root causes of low technology adoption amongst maize growers in Mexico is a key challenge.
- This research examines the factors that influence the adoption of improved maize varieties and other technologies by smallholder farmers.
- The study identifies key barriers to adoption, including lack of access to inputs, services, and markets, and proposes strategies to improve the reach and effectiveness of extension services and other support mechanisms.

### USAID BASIS

## BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

### IDENTIFYING THE ROOT CAUSES OF LOW TECHNOLOGY ADOPTION AMONGST MAIZE GROWERS IN MEXICO

**KEY POINTS**

Identifying the root causes of low technology adoption amongst maize growers in Mexico is a key challenge. This research examines the factors that influence the adoption of improved maize varieties and other technologies by smallholder farmers. The study identifies key barriers to adoption, including lack of access to inputs, services, and markets, and proposes strategies to improve the reach and effectiveness of extension services and other support mechanisms.

**KEY POINTS**

- Identifying the root causes of low technology adoption amongst maize growers in Mexico is a key challenge.
- This research examines the factors that influence the adoption of improved maize varieties and other technologies by smallholder farmers.
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### USAID BASIS

## BASIS Update

### Identifying the Root Causes of Low Technology Adoption Amongst Maize Growers in Mexico

**PARTNERS**

USAID, BASIS, CIMMYT, and other partners are working together to identify the root causes of low technology adoption amongst maize growers in Mexico. This research is part of a larger effort to improve the productivity and income of smallholder farmers through the adoption of improved technologies and practices.

**Key Findings:**

- Smallholder farmers in Mexico face significant challenges in accessing agricultural inputs, services, and markets.
- This research identifies key barriers to adoption, including lack of access to inputs, services, and markets.
- The study proposes strategies to improve the reach and effectiveness of extension services and other support mechanisms.

**Next Steps:**

- Implementing strategies to improve the reach and effectiveness of extension services and other support mechanisms.
- Monitoring and evaluating the impact of these strategies on farmer productivity and income.

### USAID BASIS

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### BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

#### PUTTING THE SYSTEM OF RICE INTENSIFICATION TO THE TEST AMONG HAITIAN FARMERS

**KEY POINTS**

- 1) Smallholder farmers in Haiti are interested in the system of rice intensification (SRI) but need more information on how to implement it.
- 2) SRI requires a change in farmer mindset and practices, particularly in terms of seedling selection and spacing.
- 3) Training and extension services are crucial for successful SRI adoption.

### BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

#### IMPACTS OF LAND REDISTRIBUTION IN POVERTY EVIDENCE FROM A LAND TRANSFER PROGRAM IN SOUTH AFRICA

**KEY POINTS**

- 1) Land redistribution in South Africa has led to increased food security and income for smallholder farmers.
- 2) Access to land is a critical factor in poverty reduction.
- 3) Supportive policies and services are needed to maximize the benefits of land redistribution.

### BASIS ASSETS AND MARKET ACCESS INNOVATION LAB

#### LEARNING BY DOING VS. LEARNING FROM OTHERS: METACOGNITIVE MEASURES

**KEY POINTS**

- 1) Learning by doing (LBD) leads to higher metacognitive skills compared to learning from others (LFO).
- 2) LBD promotes deeper understanding and problem-solving abilities.
- 3) Metacognitive measures are essential for assessing learning outcomes.

### 14 IMPROVING RISK & SOCIAL PROTECTION EFFECTIVENESS

#### MEASURING INDEX INSURANCE QUALITY

**KEY POINTS**

- 1) Index insurance quality is measured by the accuracy of payouts and the timeliness of claims.
- 2) High-quality index insurance is essential for risk management.
- 3) Standardized metrics are needed to compare different insurance products.

## FEED THE FUTURE

### an AMA Innovation Lab Spotlight

# BEFORE & AFTER THE DROUGHT

## Evidence on the Impact of Index Insurance on Small Farm Investment and Social Protection

**Why Insurance for Development?**

- 1) makes people poor by reducing incomes and destroying assets, and
- 2) keeps people poor by discouraging investment and distorting patterns of asset accumulation

Households in developing rural economies face a multitude of risks. When financial alternatives are limited, in the face of disaster, households typically turn to two coping strategies: reduction of assets to smooth consumption, or reduction of consumption to protect assets. Both of these strategies can have costly long-term economic consequences. In addition, before a shock even occurs, households may try to further protect themselves by avoiding risky - but potentially profitable - opportunities for growth.

Because of this, the development impacts of risk reduction through insurance should be significant. By protecting households against the worst consequences of adverse climatic shocks, index insurance should not only prevent consumption to protect assets, but in principle should also allow households to prudentially invest more in risky, but high returning agricultural activities.

### Costly Coping Mechanisms for Uninsured Risk

#### Asset Smoothing

In the wake of a shock, to protect their remaining assets, households may reduce consumption, most notably reducing the number of meals the household consumes.

This painful strategy can lead to long-term negative consequences, in particular stunting of children (especially those under 5) and - as a result - the intergenerational transfer of poverty.

#### Consumption Smoothing

Another strategy employed by households hit by a shock is to smooth their consumption levels by selling some of their remaining assets.


This strategy can have long-term consequences if productive assets are sold. In that case, when the next season comes, the household may not have the minimum needed to maintain their livelihoods, compounding the negative impacts of the shock.

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# "3-D" Client Value Assessment

## Assessing Client Value for Agricultural Index Insurance

### A Technical Guide



**USAID** **IMPACT INSURANCE** **IFAD** **14 IMPROVING RISK & SOCIAL PROTECTION EFFECTIVENESS**

### 14 IMPROVING RISK & SOCIAL PROTECTION EFFECTIVENESS

#### THE FAVORABLE IMPACTS OF INDEX-BASED LIVESTOCK INSURANCE: EVALUATION RESULTS FROM ETHIOPIA & KENYA

**KEY POINTS**

- 1) Index-based livestock insurance in Ethiopia and Kenya has led to increased adoption and improved risk management.
- 2) Farmers are more willing to invest in their herds when they have insurance.
- 3) The insurance products are cost-effective and easy to use.

### 14 IMPROVING RISK & SOCIAL PROTECTION EFFECTIVENESS

#### GENDER & THE SUCCESS OF RISK MANAGEMENT PRODUCTS FOR PASTORALISTS IN EAST AFRICA

**KEY POINTS**

- 1) Gender equality is essential for the success of risk management products for pastoralists.
- 2) Women's participation in decision-making leads to better risk management outcomes.
- 3) Tailored products that consider gender roles are more effective.

### USAID USA GAN

#### HELPING FARMERS UNDERSTAND INDEX INSURANCE (LIVESTOCK) FOR CATTLE AND SHEEP

**KEY POINTS**

- 1) Farmers need to understand how index insurance works before they can benefit from it.
- 2) Training and extension services are crucial for understanding the product.
- 3) Clear communication is key to successful adoption.

### USAID USA GAN

#### FOUNDING TO MAKE AGRICULTURE INSURANCE WORK

**KEY POINTS**

- 1) Foundational work is needed to create an environment where insurance can thrive.
- 2) Building trust and capacity among farmers and service providers is essential.
- 3) Long-term commitment is required for sustainable success.



### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## USING SECOND-GENERATION SATELLITE IMAGERY TO IMPROVE DESIGN OF RISK MANAGEMENT TOOLS FOR SMALLHOLDER FARMERS

**SUCCESS STORY**

Index insurance is an emerging market in which farmers are able to hedge their risk against crop loss. However, the design of index insurance is often based on satellite imagery that is not accurate enough to reflect the actual crop loss. This is because the satellite imagery is often based on a single point in time, and does not account for the variability in crop growth and yield over the season. This variability is often caused by factors such as weather, soil conditions, and farm management practices. This variability can lead to inaccurate estimates of crop loss, which can result in farmers not receiving the full amount of insurance they are entitled to. This can lead to a loss of trust in the insurance program, and ultimately, a loss of income for the farmer.

Feed the Future is working with the International Food Policy Research Institute (IFPRI) to develop a second-generation satellite imagery-based index insurance program. This program will use a combination of satellite imagery and ground-based data to provide a more accurate estimate of crop loss. This will result in a more reliable insurance program that can help farmers manage their risk and increase their income.

**Key Takeaways:**

- Second-generation satellite imagery provides a more accurate estimate of crop loss.
- A combination of satellite imagery and ground-based data improves the reliability of the insurance program.
- This results in a more reliable insurance program that can help farmers manage their risk and increase their income.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## USING INNOVATIVE MOBILE TECHNOLOGY TO BRIDGE MARKET GAPS

**Background:**

Smallholder farmers in East Africa often face significant challenges when it comes to accessing markets. This is often due to a lack of infrastructure, such as roads and transport services. This can result in farmers being unable to get their products to market in a timely and efficient manner. This can lead to a loss of income for the farmer, and ultimately, a loss of livelihood.

Feed the Future is working with the International Food Policy Research Institute (IFPRI) to develop a mobile technology-based market bridge program. This program will use a combination of mobile phones and internet access to provide farmers with a more efficient way to access markets. This will result in a more reliable market bridge program that can help farmers increase their income and improve their livelihoods.

**Key Takeaways:**

- Mobile technology-based market bridge programs provide a more efficient way to access markets.
- A combination of mobile phones and internet access improves the reliability of the market bridge program.
- This results in a more reliable market bridge program that can help farmers increase their income and improve their livelihoods.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## WHERE WINNING ISN'T EVERYTHING: PLAYING GAMES TO LEARN COOPERATION

**Key Takeaways and Description:**

Cooperation is a key factor in the success of many agricultural programs. However, it is often difficult for farmers to learn the value of cooperation. This is often due to a lack of opportunities for farmers to interact and learn from each other. This can result in farmers not being able to take full advantage of the benefits of cooperation.

Feed the Future is working with the International Food Policy Research Institute (IFPRI) to develop a game-based learning program. This program will use a combination of games and role-playing to help farmers learn the value of cooperation. This will result in a more effective learning program that can help farmers improve their cooperation skills and increase their income.

**Key Takeaways:**

- Game-based learning programs help farmers learn the value of cooperation.
- A combination of games and role-playing improves the effectiveness of the learning program.
- This results in a more effective learning program that can help farmers improve their cooperation skills and increase their income.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## EMERGENCY LOANS: Building on Microfinance Success to Enhance Resilience

**Ready for the Unexpected?**

Emergency loans are a critical component of a risk management strategy for smallholder farmers. However, it is often difficult for farmers to access these loans when they are needed. This is often due to a lack of collateral and a lack of credit history. This can result in farmers not being able to get the loans they need when they need them.

Feed the Future is working with the International Food Policy Research Institute (IFPRI) to develop a microfinance-based emergency loan program. This program will use a combination of microfinance services and emergency loans to provide farmers with a more reliable way to access loans. This will result in a more reliable emergency loan program that can help farmers improve their resilience and increase their income.

**Key Takeaways:**

- Microfinance-based emergency loan programs provide a more reliable way to access loans.
- A combination of microfinance services and emergency loans improves the reliability of the loan program.
- This results in a more reliable emergency loan program that can help farmers improve their resilience and increase their income.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## INDEX-BASED LIVESTOCK INSURANCE FROM ASSET REPLACEMENT TO ASSET PROTECTION IN EAST AFRICA

**Index-Based Livestock Insurance**

Index-based livestock insurance is a type of insurance that provides farmers with a way to hedge their risk against crop loss. This is often based on satellite imagery that is not accurate enough to reflect the actual crop loss. This can result in farmers not receiving the full amount of insurance they are entitled to. This can lead to a loss of trust in the insurance program, and ultimately, a loss of income for the farmer.

Feed the Future is working with the International Food Policy Research Institute (IFPRI) to develop an index-based livestock insurance program. This program will use a combination of satellite imagery and ground-based data to provide a more accurate estimate of crop loss. This will result in a more reliable insurance program that can help farmers manage their risk and increase their income.

**Key Takeaways:**

- Index-based livestock insurance provides a way to hedge risk against crop loss.
- A combination of satellite imagery and ground-based data improves the reliability of the insurance program.
- This results in a more reliable insurance program that can help farmers manage their risk and increase their income.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## RESILIENCE IN THE WAKE OF DISASTER: Studying the Impact of post-disaster recovery on Resilience in Nepal

**The 2015 Earthquake**

The 2015 earthquake in Nepal was a major disaster that caused significant damage to the country's infrastructure and economy. This resulted in a loss of income for many farmers, and ultimately, a loss of livelihood. This led to a loss of resilience for many farmers, and they were unable to recover from the disaster.

Feed the Future is working with the International Food Policy Research Institute (IFPRI) to study the impact of post-disaster recovery on resilience in Nepal. This study will use a combination of surveys and interviews to gather data on the impact of the disaster and the recovery process. This will result in a more comprehensive understanding of the impact of the disaster and the recovery process, and will help inform the development of more effective disaster recovery programs.

**Key Takeaways:**

- Post-disaster recovery programs can help farmers improve their resilience.
- A combination of surveys and interviews provides a more comprehensive understanding of the impact of the disaster and the recovery process.
- This results in a more comprehensive understanding of the impact of the disaster and the recovery process, and will help inform the development of more effective disaster recovery programs.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## SUBSIDIZING LEARNING SMART SUBSIDIES PLACE INDONESIAN FARMERS ON A TRANSFORMATIONAL PATH

**Temporary Subsidies Promote Lasting Change**

Subsidizing learning smart subsidies is a way to help farmers improve their skills and knowledge. This is often done through the provision of financial support for training and education. This can result in farmers being able to take full advantage of the benefits of learning smart subsidies.

Feed the Future is working with the International Food Policy Research Institute (IFPRI) to subsidize learning smart subsidies for Indonesian farmers. This program will provide financial support for farmers to attend training and education programs. This will result in a more effective learning smart subsidy program that can help farmers improve their skills and knowledge and increase their income.

**Key Takeaways:**

- Subsidizing learning smart subsidies helps farmers improve their skills and knowledge.
- Financial support for training and education improves the effectiveness of the learning smart subsidy program.
- This results in a more effective learning smart subsidy program that can help farmers improve their skills and knowledge and increase their income.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## Integrating a VISA Model into Microfinance Success to Enhance Resilience

**Integrating a VISA Model into Microfinance Success**

The VISA Model is a way to help farmers improve their resilience and increase their income. This is often done through the provision of financial support for training and education. This can result in farmers being able to take full advantage of the benefits of the VISA Model.

Feed the Future is working with the International Food Policy Research Institute (IFPRI) to integrate the VISA Model into microfinance success. This program will provide financial support for farmers to attend training and education programs. This will result in a more effective VISA Model program that can help farmers improve their resilience and increase their income.

**Key Takeaways:**

- Integrating the VISA Model into microfinance success helps farmers improve their resilience and increase their income.
- Financial support for training and education improves the effectiveness of the VISA Model program.
- This results in a more effective VISA Model program that can help farmers improve their resilience and increase their income.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## BUILDING INNOVATIVE RISK MANAGEMENT TECHNOLOGIES TO IMPROVE NUTRITIONAL OUTCOMES OF VULNERABLE AGRICULTURAL HOUSEHOLDS

**Key Takeaways:**

- Building innovative risk management technologies helps improve nutritional outcomes.
- A combination of surveys and interviews provides a more comprehensive understanding of the impact of the technologies.
- This results in a more comprehensive understanding of the impact of the technologies, and will help inform the development of more effective risk management technologies.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## 5 STEPS TO ENSURING AGRICULTURAL RISK MANAGEMENT TOOLS HAVE DEVELOPMENT IMPACT

**Needs Assessment**

Needs assessment is a key step in the development of agricultural risk management tools. This involves gathering information on the needs and preferences of farmers. This can result in the development of more effective risk management tools that meet the needs of farmers.

**Resources**

Resources are a key factor in the success of agricultural risk management tools. This involves providing farmers with the resources they need to use the tools effectively. This can result in farmers being able to take full advantage of the benefits of the tools.

**Data**

Data is a key factor in the success of agricultural risk management tools. This involves gathering information on the use of the tools and the impact of the tools. This can result in a more comprehensive understanding of the impact of the tools, and will help inform the development of more effective tools.

**Quality**

Quality is a key factor in the success of agricultural risk management tools. This involves ensuring that the tools are of high quality and are easy to use. This can result in farmers being able to use the tools effectively and take full advantage of the benefits of the tools.

**Evaluation**

Evaluation is a key step in the development of agricultural risk management tools. This involves gathering information on the impact of the tools and the effectiveness of the tools. This can result in a more comprehensive understanding of the impact of the tools, and will help inform the development of more effective tools.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## AN AUDIT RULE TO PROTECT FARMERS IN CASE AN INSURANCE INDEX FAILS

November 2017

Index insurance has shown great promise in helping poor and vulnerable farmers to manage the risks associated with climatic disasters like drought and flood. Index insurance works for development because it avoids the high costs and logistical challenges of offering conventional insurance in developing agricultural economies.

However, even the highest quality index insurance products carry the risk of failing to pay when farmers experience losses. This is because index insurance links payouts to remote factors, such as levels of rainfall, vegetation growth or an area's average crop yields rather than verified individual claims. An index of these factors produces average losses in an area, not individual losses.

For this reason, index insurance will always carry some risk, meaning a chance that the predicted losses do not match up with real losses on the ground. To minimize the risk that an index insurance contract will fail to pay out at the time of an unexpected but widespread losses, AMA Innovation Lab researchers are testing an audit rule so farmers can be sure their index insurance product has functioned as it should.

**HOW AN AUDIT RULE ENSURES THAT INDEX INSURANCE CONTRACTS PAY OUT WHEN THEY SHOULD**

With an audit rule, if enough farmers register complaints, their insurance company is required to conduct an area-yield audit to verify the index is working.

A satellite-based index for insurance is used to estimate average crop losses in an area.

There is always the risk these estimates will not trigger payments when they should.

If the audit shows that the index failed to recognize insurable losses, farmers receive the payments they are due.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## LOCAL SEED COMPANY FILLS A NICHE TO INCREASE MAIZE PRODUCTIVITY IN KENYA

**Key Takeaways:**

- Local seed companies provide a more reliable way to access seeds.
- A combination of surveys and interviews provides a more comprehensive understanding of the impact of the seed company.
- This results in a more comprehensive understanding of the impact of the seed company, and will help inform the development of more effective seed companies.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## HAIZE TECHNOLOGY BUNDLES AND FOOD SECURITY IN KENYA

**Key Takeaways:**

- Haize technology bundles provide a more reliable way to access technology.
- A combination of surveys and interviews provides a more comprehensive understanding of the impact of the technology bundles.
- This results in a more comprehensive understanding of the impact of the technology bundles, and will help inform the development of more effective technology bundles.

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### FEED/FUTURE

#### an AMA Innovation Lab Spotlight

## HOW AN AUDIT RULE ENSURES THAT INDEX INSURANCE CONTRACTS PAY OUT WHEN THEY SHOULD

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**Innovation Lab for Assets and Market Access Policy Brief**

**DISPERSE SOILS AND INPUTS CHALLENGE RECOMMENDATIONS TO PAIZE FARMERS IN RWANDA**  
By Michael Carter, Sarah Janzen, and Sarah Janzen



**KEY FACTS**

- In Rwanda, soil fertility is a major challenge for smallholder farmers. Soil fertility is low due to soil erosion and nutrient depletion. This is exacerbated by the use of synthetic fertilizers, which are expensive and often misapplied.
- The use of synthetic fertilizers is often based on blanket recommendations, rather than soil-specific needs. This leads to inefficient use of inputs and increased costs for farmers.
- Dispersed soils and inputs make it difficult for farmers to access and use fertilizers effectively. This is particularly true for smallholder farmers who lack the resources to transport and store large quantities of fertilizer.

**RECOMMENDATIONS FOR PAIZE**

- Promote soil conservation practices to reduce soil erosion and improve soil fertility.
- Encourage the use of organic fertilizers and other soil management practices that are more sustainable and cost-effective.
- Improve access to and use of fertilizers through targeted distribution and extension services.

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**Innovation Lab for Assets and Market Access Policy Brief**

**INSURED LOANS INCREASE CREDIT ACCESS AND TRAINING TECHNOLOGY ADOPTION IN GHANA**  
By Michael Carter, Sarah Janzen, and Sarah Janzen



**KEY FACTS**

- In Ghana, access to credit is a major challenge for smallholder farmers. This is particularly true for women, who often face additional barriers to credit access.
- The use of insurance as a collateral requirement for loans can increase credit access for farmers, particularly for women.
- Training in agricultural technologies and other skills can improve farmers' productivity and income, which in turn increases their ability to access credit.

**RECOMMENDATIONS FOR GHANA**

- Promote the use of insurance as a collateral requirement for loans to increase credit access.
- Provide training in agricultural technologies and other skills to improve farmers' productivity and income.

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**Innovation Lab for Assets and Market Access Policy Brief**

**A LIVESTOCK TRANSFER AND TRAINING PROGRAM INCREASES WOMEN'S EMPLOYMENT AND FINANCIAL INCLUSION IN RWANDA**  
By Michael Carter, Sarah Janzen, and Sarah Janzen



**KEY FACTS**

- In Rwanda, women's employment and financial inclusion are major challenges. This is particularly true for women who are engaged in livestock production.
- A livestock transfer and training program can increase women's employment and financial inclusion by providing them with the skills and resources they need to succeed in the market.
- The program also provides women with access to credit and other financial services, which can further improve their economic situation.

**RECOMMENDATIONS FOR RWANDA**

- Promote livestock transfer and training programs to increase women's employment and financial inclusion.
- Provide women with access to credit and other financial services to support their economic activities.

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**Innovation Lab for Assets and Market Access Policy Brief**

**HOW CONSIDERING ASPIRATIONS CAN SHAPE BETTER DEVELOPMENT INTERVENTIONS AND POLICE**  
By Michael Carter, Sarah Janzen, and Sarah Janzen



**KEY FACTS**

- Understanding people's aspirations is a key to designing effective development interventions. This is because aspirations shape people's behavior and their willingness to engage in development activities.
- Development interventions should be designed to address people's aspirations and provide them with the resources and skills they need to achieve them.
- This approach can lead to more sustainable and impactful development outcomes.

**RECOMMENDATIONS FOR DEVELOPMENT INTERVENTIONS**

- Conduct assessments to understand people's aspirations and how they shape their behavior.
- Design interventions that address people's aspirations and provide them with the resources and skills they need to achieve them.

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**Innovation Lab for Assets and Market Access Policy Brief**

**Brief 2017-05  
April 2017**

**IMPROVING INDEX INSURANCE FOR SMALL-SCALE FARMERS IN DEVELOPING ECONOMIES**  
By Michael Carter, Alain de Janvry, Elisabeth Sadoulet, and Alexandros Sarris



**KEY STEPS TO IMPROVE INDEX INSURANCE FOR DEVELOPMENT IMPACT**

1. Invest in the development of higher-quality index insurance products
2. Develop and enforce Safe Minimum Standards
3. Target subsidy investments to farmers with catastrophic losses and share risk with insurance providers
4. Bundle with drought-tolerant agricultural technologies
5. Apply lessons from the microcredit revolution with Village Insurance Savings Accounts (VISAs)
6. Create flexible structures for savings and credit

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**Innovation Lab for Assets and Market Access Policy Brief**

**Brief 2018-01  
January 2018**

**RESILIENCE-BASED PROTECTION BLUNTS CLIMATE CHANGE'S IMPACT ON POVERTY**  
By Michael Carter and Sarah A. Janzen



**KEY FACTS**

- Catastrophic weather shocks, such as severe drought or flood, are an important cause of poverty among rural households in developing economies. As the risk of these shocks is forecasted to increase, national social protection budgets will struggle to keep up with the number of households in need. Just as climate scientists use advanced climate modeling to predict long-term changes, we used advanced economic modeling to predict how well different social protection programs can address poverty in the face of climate change. We found that a resilience-based approach to social protection that includes insurance is the only sustainable way to manage poverty in the long-term. However, even this approach will fail if worst-case climate change scenarios come to pass.
- As far as climate change comes to change, weather shocks are happening more frequently and with a greater intensity. This growing threat will make existing social protection programs unable to provide support for an ever-increasing number of poor households. A resilience-based approach to social protection would consider the broader dynamics of low rural household means and use of poverty at risk as well as the impact weather shocks can have across multiple generations.
- Agricultural households all have a measure of productive assets and human capability that shape their wellbeing and economic stability over time. For permanent households, productive assets include the ones or goats a family owns. For a maize farmer it would include the land or tools. Human capital, such as labor, knowledge or social factors, helps determine what a household makes of those assets.
- When catastrophic weather shocks occur, poor and vulnerable households have few options for coping with loss. Some will lose productive assets, such as livestock or equipment, to maintain their consumption, but at the expense of future productivity. Others cut meals and other types of consumption, which compromises adults' ability to work or the long-term physical and cognitive development of their children. Both coping strategies can create feedback loops that lead to poverty that lasts for generations.

**Modeling Social Protection Programs**

We built an advanced economic model with these dynamics and data from practitioners in Kenya to explore the potential impact of three main types of government-based social protection. In the model, a household began with initial levels of productive assets and human capabilities that they manage the best they can over time, seeking optimal levels of consumption, saving and investment for the greatest wellbeing across multiple generations.

We also incorporated a feedback loop as a sign of low coping decisions, such as selling meals or selling assets, impact households across generations. For example, undernutrition during a child's first five years of life can have irreversible damage or physical and cognitive development. For children in poor households, this means a drought can lead to stunting and no money for schooling that would otherwise provide a pathway out of poverty.

The social protection programs we examined with this model include in-kind transfers, such as food aid and school inputs, which protect human capital whether or not they cut income shocks but do not increase household assets. Second, contingent transfers target households at the onset of a catastrophic shock. The example of a contingent transfer program is one that replaces livestock lost to drought.

Insurance is a third type of social protection

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**KEY FACTS**

- In Rwanda, soil fertility is a major challenge for smallholder farmers. Soil fertility is low due to soil erosion and nutrient depletion. This is exacerbated by the use of synthetic fertilizers, which are expensive and often misapplied.
- The use of synthetic fertilizers is often based on blanket recommendations, rather than soil-specific needs. This leads to inefficient use of inputs and increased costs for farmers.
- Dispersed soils and inputs make it difficult for farmers to access and use fertilizers effectively. This is particularly true for smallholder farmers who lack the resources to transport and store large quantities of fertilizer.

**RECOMMENDATIONS FOR PAIZE**

- Promote soil conservation practices to reduce soil erosion and improve soil fertility.
- Encourage the use of organic fertilizers and other soil management practices that are more sustainable and cost-effective.
- Improve access to and use of fertilizers through targeted distribution and extension services.

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**Innovation Lab for Assets and Market Access Policy Brief**

**FERTILIZER ENFORCEMENT COULD HAVE THE UNINTENDED IMPACT OF STOCK COLLAPSE IN RWANDA**  
By Michael Carter, Sarah Janzen, and Sarah Janzen



**KEY FACTS**

- In Rwanda, fertilizer use is a major challenge for smallholder farmers. This is particularly true for women, who often face additional barriers to fertilizer access.
- Fertilizer enforcement can have unintended consequences, such as a stock collapse, which can further reduce fertilizer availability and increase costs for farmers.
- Improving fertilizer access and use through targeted distribution and extension services can improve farmers' productivity and income.

**RECOMMENDATIONS FOR RWANDA**

- Promote fertilizer use through targeted distribution and extension services.
- Avoid fertilizer enforcement that can have unintended consequences, such as a stock collapse.

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**Innovation Lab for Assets and Market Access Policy Brief**

**FERTILIZER RECOMMENDATIONS AND IN-KIND SUBSIDIES INCREASE UPTAKE AND YIELDS AMONG PAIZE FARMERS IN RWANDA**  
By Michael Carter, Sarah Janzen, and Sarah Janzen



**KEY FACTS**

- In Rwanda, fertilizer use is a major challenge for smallholder farmers. This is particularly true for women, who often face additional barriers to fertilizer access.
- Fertilizer recommendations and in-kind subsidies can increase fertilizer uptake and yields among Paize farmers, which can improve their productivity and income.
- Improving fertilizer access and use through targeted distribution and extension services can improve farmers' productivity and income.

**RECOMMENDATIONS FOR RWANDA**

- Promote fertilizer use through targeted distribution and extension services.
- Provide in-kind subsidies to increase fertilizer uptake and yields among Paize farmers.

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**Innovation Lab for Assets and Market Access Policy Brief**

**INNOVATIONS TO IMPROVE INDEX INSURANCE FOR SMALL-SCALE FARMERS IN DEVELOPING ECONOMIES**  
By Michael Carter, Alain de Janvry, Elisabeth Sadoulet, and Alexandros Sarris



**KEY FACTS**

- Index insurance is a promising tool to protect smallholder farmers from catastrophic losses. However, there are several challenges to its widespread adoption, such as high costs and limited coverage.
- Innovations in index insurance design and delivery can improve its effectiveness and reach, making it a more viable option for smallholder farmers.
- These innovations include the use of mobile phones for policy delivery and the development of new risk pools to reduce costs.

**RECOMMENDATIONS FOR INDEX INSURANCE**

- Promote innovations in index insurance design and delivery to improve its effectiveness and reach.
- Develop new risk pools to reduce costs and increase coverage for smallholder farmers.

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**FEED: FUTURE**

**Index Insurance Could Effectively and Efficiently Protect Farmers in Ecuador**

**INDEX INSURANCE COULD EFFECTIVELY AND EFFICIENTLY PROTECT FARMERS IN ECUADOR**

**KEY FACTS**

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**FEED: FUTURE**

**Improved Seed Use and Farming Practices Sustain After Program Ends in Uganda**

**IMPROVED SEED USE AND FARMING PRACTICES SUSTAIN AFTER PROGRAM ENDS IN UGANDA**

**KEY FACTS**

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**FEED: FUTURE**

**Higher Aspirations to a Point, Can Lead to Greater Investment in the Future**

**HIGHER ASPIRATIONS TO A POINT, CAN LEAD TO GREATER INVESTMENT IN THE FUTURE**

**KEY FACTS**

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**FEED: FUTURE**

**Incentives Could Create a Tipping Point in Conservation Agriculture Adoption**

**INCENTIVES COULD CREATE A TIPPING POINT IN CONSERVATION AGRICULTURE ADOPTION**

**KEY FACTS**

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**FEED: FUTURE**

**Household Structure Determines Labor Investment for Agricultural Intensification in Burkina Faso**

**HOUSEHOLD STRUCTURE DETERMINES LABOR INVESTMENT FOR AGRICULTURAL INTENSIFICATION IN BURKINA FASO**

**KEY FACTS**

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**FEED: FUTURE**

**A Minimum Quality Standard to Ensure Index Insurance Contracts Do No Harm**

**A MINIMUM QUALITY STANDARD TO ENSURE INDEX INSURANCE CONTRACTS DO NO HARM**

**KEY FACTS**

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**FEED: FUTURE**

**Conducting a "3-D" Assessment of an Index Insurance Contract's Client Value**

**CONDUCTING A "3-D" ASSESSMENT OF AN INDEX INSURANCE CONTRACT'S CLIENT VALUE**

**KEY FACTS**

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**FEED: FUTURE**

**Identifying an Essential Need for Responsible Index Insurance and Filling the Gap**

**IDENTIFYING AN ESSENTIAL NEED FOR RESPONSIBLE INDEX INSURANCE AND FILLING THE GAP**

**KEY FACTS**

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**FEED: FUTURE**

**Agricultural Index Insurance Has Big Impacts for Farmers in Burkina Faso**

**AGRICULTURAL INDEX INSURANCE HAS BIG IMPACTS FOR FARMERS IN BURKINA FASO**

**KEY FACTS**

**USAID** **UC DAVIS**

**FEED: FUTURE**

**Partnerships to Scale Improved Drought-Tolerant Maize Seeds in Tanzania**

**PARTNERSHIPS TO SCALE IMPROVED DROUGHT-TOLERANT MAIZE SEEDS IN TANZANIA**

**KEY FACTS**

**USAID** **UC DAVIS**

**FEED: FUTURE**

**Low-Cost Cultivation Improvements Have Big Impacts on Food Security and Resilience in Uganda**

**LOW-COST CULTIVATION IMPROVEMENTS HAVE BIG IMPACTS ON FOOD SECURITY AND RESILIENCE IN UGANDA**

**KEY FACTS**

**USAID** **UC DAVIS**

**FEED: FUTURE**

**Shifting Assets, Capacities and Risk to Aid Resilience and End Chronic Poverty**

**SHIFTING ASSETS, CAPACITIES AND RISK TO AID RESILIENCE AND END CHRONIC POVERTY**

**KEY FACTS**

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**NBER**

**National Bureau of Economic Research**

**THE ECONOMICS OF POVERTY TRAPS**

Edited by Christopher B. Barrett, Michael R. Carter, and Jean-Paul Chavas





# PROJECTS





Between 2012 and 2018 the AMA Innovation Lab launched 32 projects, the majority of which have been completed. While many recent projects have initial findings, more analysis may be in progress with academic journal publications forthcoming over the next few years. AMA Innovation Lab projects that will continue beyond 2017 include those funded with USAID Associate Awards as well as the Index Insurance Innovation Initiative (I4) that continues to increase the quality and development impact of index insurance and the Global Action Network, through which we partner with governments, NGOs and other leading international organizations to help build market capacities for agricultural index insurance.





Photo: Jonathan Malacarne / AMA Innovation Lab

# BUNDLING INNOVATIVE RISK MANAGEMENT TECHNOLOGIES TO IMPROVE NUTRITIONAL OUTCOMES OF VULNERABLE AGRICULTURAL HOUSEHOLDS

**Lead PI:** Michael Carter, UC Davis; Olaf Erenstein, CIMMYT

**Partners:** CIMMYT, UAP Insurance

**Timeline:** 2015-2019

**Funding:** \$2,250,000 (USAID Associate Award No. AID-OAA-LA-15-00002)

**Region:** Tanzania and Mozambique

**Key Innovation:** Complementary drought tolerant maize and index insurance

**Commodity:** Maize

Recent years have seen the development of two technologies that help small-scale farmers manage weather-related stress. The first is seed varieties that better withstand drought. The second is the financial technology of index insurance that transfers risk out of small-scale farming systems by issuing payments when climatic events occur and agricultural production collapses.

These two technologies work in a similar way, but important differences create a potential complementarity between them. In addition to their common ability to stabilize producer incomes in the face of shocks, both seed and financial technologies have the potential to generate a risk reduction dividend as farmers with these risk management tools may invest more heavily in their farms.

Yet, these technologies also have important differences. Most importantly, stress-resistant seeds tend to fail under extremely adverse events, whereas index insurance does not.

“Seeds that enhance the resilience of farmers facing drought has been probably the most popular public and private crop investment in the past 20 years. Adding index insurance expands this resilience to include even the worst possible outcomes.”

— Travis Lybbert  
PI and Professor of Agricultural and Resource Economics at UC Davis.

This AMA Innovation Lab study is testing the impact of bundling drought-tolerant seeds with complementary index insurance for seed replacement to extend the drought protection built into the seeds. Index insurance is a cost-effective risk-management tool when small-scale farmers in an area share a risk of drought or other disasters. Bundling drought-tolerant seeds and index insurance ensures that farmers who suffer losses due to drought are more resilient for coming seasons.

The Drought Tolerant Maize for Africa (DTMA) project has developed over 140 drought-tolerant (DT) maize varieties that have been field-tested and are now beginning to reach farmers. DT field trial data reveal impressive results overall. However, under extreme drought conditions, new DT varieties, like conventional varieties, fail. It is under these conditions that novel financial technologies, like index insurance, can potentially complement and deepen the impact of DT seeds on the livelihood prospects and reduce the vulnerability of poor farmers.

Bundling index insurance with DT maize at the point of sale generates greater drought protection than the two technologies separately. Index insurance expands the biological protection within drought-tolerant seeds while the level of biological drought tolerance lowers the cost of the insurance.

### PROGRESS

The pilot in Tanzania has shown promising results with uptake and payouts. In 2016, 563 farmers across 30 villages bought the insured, drought-tolerant seeds. During the 2016-2017 season, the pilot's first year of implementation, 2,001 packets of seeds, worth about US \$8,000, were insured. The insurance added about 20 percent to the cost of the seeds, but farmers still bought the same amounts as a broader but similar group of farmers bought in improved seeds without insurance.

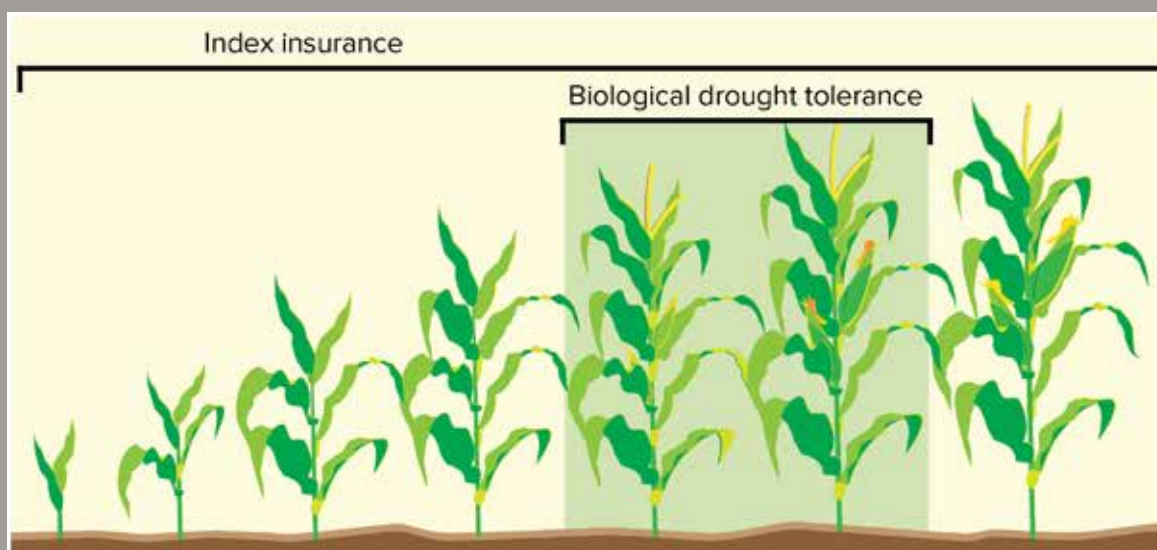
That year, half of the villages received a payout due to early- and full-season drought. The network of seed vendors replaced 1,220 packets of seed as in-

kind payouts. These payouts let farmers with significant losses plant improved seeds in the next growing season.

These results from Tanzania are a credit to the effort and commitment of stakeholders from across the public and private sectors. After the research team calibrated the insurance to local weather patterns, UAP Insurance insured the seeds made available by the seed company partners. All sales were conducted through local Tanzanian seed agents who attended an AMA Innovation Lab training conducted in collaboration with the Tanzanian extension network, CIMMYT and the seed companies.

The broad benefits for successfully scaling this project can be significant. The product improves the income stability and food security of farmers—an objective of a nation's agricultural sector and extension agencies. Seed companies have a higher-value product to help generate interest and sales. Insurance companies have the opportunity to break into the agricultural insurance sector or to expand their portfolios.

## Index Insurance Designed to Protect Maize Beyond Mid-season Drought Tolerance



Drought-tolerant maize is bred to withstand mid-season dry spells. Index insurance expands this protection to early season drought and full-season drought that can both cause drought-tolerant maize to fail.





Photo: Andrew Hobbs / AMA Innovation Lab

## A RANDOMIZED EVALUATION OF AN INTEGRATED GRADUATION AND CONTINGENT SOCIAL PROTECTION PROGRAM IN KENYA

**Lead PIs:** Michael Carter, UC Davis; Andrew Mude, International Livestock Research Institute

**Partners:** International Livestock Research Institute, The BOMA Project

**Timeline:** 2017-2021

**Funding:** \$1,430,340

**Region:** Northern Kenya

**Key Innovation:** Paired social development programs with index-based livestock insurance

**Commodity:** Livestock

Pastoralist and agro-pastoralist households in northern Kenya are vulnerable to natural disasters and to changing and increasingly unpredictable weather. Seven droughts struck Kenya between 1992 and 2012. In the worst of these, households lost upwards of half of their productive wealth over the course of a few months.

The AMA Innovation Lab is conducting a randomized controlled trial (RCT) to evaluate synergies between social development and social protection programs in Kenya. This project will investigate the impacts, alone and in combination, of The BOMA Project's Rural Entrepreneur Access Project (REAP) and Index-based Livestock Insurance (IBLI).

Poverty graduation programs, which transfer assets and skills, can set

women on a path toward higher income and greater empowerment at home, but in the arid rural parts of northern Kenya drought can force these women to liquidate their gains so the family can survive.

*“Empowerment can be a tenuous achievement when there’s drought. Insurance might help women to hold onto gains in income and empowerment while also helping them to avoid coping strategies that can sacrifice their family’s future wellbeing.”*

— Michael Carter  
Director, AMA Innovation Lab

Two recent pilot programs in Northern Kenya provide building blocks for an integrated social protection policy that can potentially alter poverty dynamics. The BOMA Project’s poverty graduation model REAP, launched in northern Kenya in 2013, is a sequence of gender-focused interventions over two years that includes participant targeting, a conditional cash transfer, financial and life skills training, hands-on mentoring and coaching, the establishment of savings and access to credit.

The IBLI program was established in 2010 by Andrew Mude and the International Livestock Research Institute (ILRI) with support from the AMA Innovation Lab. Since then IBLI has had a significant impact on Kenyan pastoralists in Marsabit County, which is just east of Samburu. A 2013 study found that IBLI-insured households were 36 percent less likely than the non-insured to sell their livestock as a way to cope. Insured households were also 25 percent less likely to reduce their meals than non-insured households.

Samburu County is a remote and arid rural area just over 200 miles north of Nairobi. About 92 percent of Samburu County’s agricultural land is categorized as low potential, leaving households there reliant on livestock. An estimated 71 percent of people in Samburu lived in poverty in 2016, which is significantly higher than Kenya’s national poverty rate of 45.2 percent.

**“Women and children disproportionately bear the burden of the cascading effects of extreme poverty. Empowering women, giving them the tools to forge a pathway out of extreme**

**poverty, can solve one of the biggest global challenges facing us this century.”**

— Kathleen Colson  
 Founder and CEO, The BOMA Project

In Samburu, REAP provides women with cash transfers, training and mentorship to start a business and build savings. Women-owned businesses mean more than just higher incomes and greater resources at home. They can also lead women to have a stronger voice in household decisions, allowing them to advocate for themselves and their children.

The research team will measure outcomes at the level of individual households as well as in terms of local poverty measures. A second research goal is to understand the density with which graduation programs like BOMA’s need to be offered.

This project will provide critical information to the Government of Kenya for designing and implementing a pro-graduation social protection

strategy. In addition, this research should be able to answer numerous important and generalizable questions around the design and implementation of integrated, efficient social protection programs to the benefit of policy-makers and development agencies around the world.

**PROGRESS**

So far, all 1,875 women in the study’s sample were selected from rosters developed by The BOMA Project. Women found ineligible were replaced by women currently slated for subsequent waves of the intervention. In the end, as necessary, we will draw in additional women from the control group who are not included in the full intervention.

Key activities over the next six months include, data cleaning and baseline data summary statistics. We will also support verifying insurance sales and correct coupon/coverage accounting, support agent training on coupon use and gender-related research.



The project’s household survey is adapted from the Women’s Empowerment in Agriculture Index (WEAI), developed in 2013 by the International Food Policy Research Institute (IFPRI), the Oxford Poverty and Human Development Initiative and USAID.





Photo: Dean Yang, AMA Innovation Lab

## HEALTH, EDUCATION, AND ECONOMIC INTERVENTIONS FOR ORPHANS AND VULNERABLE CHILDREN IN MOZAMBIQUE

**Lead PI:** Dean Yang, University of Michigan

**Partners:** World Education Inc./ Bantwana

**Timeline:** 2016-2019

**Funding:** \$1,253,897 (USAID Associate Award AID-OAA-LA-16-00004 “Feed the Future Evaluating the Effectiveness of Programs that Enhance the Economic Resilience of Vulnerable Populations.”)

**Region:** Manica, Sofala, Zambezia

**Key Innovation:** Strengthening family and community support to Orphans and Vulnerable Children

The HIV/AIDS crisis in Sub-Saharan Africa has left millions of children orphaned, and millions more suffer direct and indirect effects of the crisis. These children, who are potentially infected with HIV themselves, are highly vulnerable and face a number of serious risks to their health and overall well-being. The U.S. Government’s most important programmatic response to the HIV/AIDS crisis is the President’s Emergency Plan for AIDS Relief (PEPFAR), initiated in 2003.

PEPFAR mandates part of its funding be devoted to programs benefiting children orphaned or made vulnerable by HIV/AIDS. PEPFAR’s programs for these children take an integrated approach, with interventions at child, family and community levels that target child needs at different developmental stages. These interventions are also connected to

other development programs related to education, nutrition and household economic development.

“The HIV/AIDS crisis in Sub-Saharan Africa has left millions of children orphaned, and millions more suffer direct and indirect effects of the crisis. These children, who are potentially infected with HIV themselves, are highly vulnerable and face a number of serious risks to their health and overall well-being.”

— Dean Yang  
PI and Professor of Economics at the University of Michigan

In Mozambique, PEPFAR funding is

supporting the newly established Strengthening Family and Community Support to Orphans and Vulnerable Children (SFCS-OVC), which aims to reduce the socio-economic impact of HIV/AIDS on these children and their caregivers in a five-year program beginning in late 2015. In 2012, 1.6 million people in Mozambique out of a population of 25.2 million were living with HIV. Of these, 200,000 were children aged 14 or below.

The AMA Innovation Lab is evaluating SFCS-OVC programs to improve the health and overall outcomes of these orphans and vulnerable children. The study will exploit the randomized selection of communities selected across nine districts in central Mozambique for the SFCS-OVC program's implementation to provide convincing estimates of its causal effects on orphans, vulnerable children and their caregivers. These effects include HIV testing and diagnosis, morbidity and mortality, school attendance and performance and others.

Another key aspect of this study is to estimate of the economic strengthening component of the SFCS-OVC program, both separately and in interaction with the four community support components. This will be achieved via randomization of the economic strengthening component separately from the community support components. The independent effect of these components, and their interaction, have not previously been estimated.

## POTENTIAL IMPACTS

The HIV/AIDS pandemic has been one of the largest global health crises of the last few decades. This study aims to shed light on the effectiveness and impact of one of the most prominent and well-funded efforts at

ameliorating the impacts of the crisis, the set of PEPFAR community and economic interventions for orphans and vulnerable children. The results will therefore be of direct relevance for policy, by allowing cost-benefit analyses of this program so as to best prioritize scarce aid resources in the context of the HIV/AIDS crisis.

We anticipate that the impacts of this project will be in two major areas. The first area is academic. Dissemination of working papers, submission and presentation at conferences and academic seminars, and submission for publication in journals will inform the larger academic and policy community of the evidence we generate on the effectiveness of the SFCS-OVC community support and economic strengthening treatments on the outcomes of OVCs and the households in which they live. Dissemination of our findings will potentially deepen the understanding of the types of interventions that

help vulnerable populations exposed to HIV/AIDS in developing countries, stimulating follow-on research that builds on our findings.

Second, we aim to have an impact on policies and programs aimed at improving the outcomes of OVCs and their households. This research program has been requested by the USAID Mission in Mozambique, and will provide direct insight into the effectiveness of a large-scale development program they are funding.

Insight into the impact of the community support treatment, the economic strengthening treatment, and their interaction can influence future roll-out and scale-up of the program. Impacts would be most direct in Mozambique, but could also influence the design and implementation of the policy in other parts of Sub-Saharan Africa and the rest of the developing world.



Impact evaluation of the SFCS-OVC program will help the U.S. government prioritize its development aid resources so as to allocate funds towards the most cost-effective programs in Mozambique.





**A PRODUCTIVE SAFETY NET FOR NORTHERN KENYA’S ARID AND SEMI-ARID LANDS: THE HSNP+ PROGRAM**

**Lead PI:** Christopher Barrett, Cornell University  
**Partners:** UC Davis, Syracuse University, International Livestock

index of factors that correlate with livestock losses to help pastoralist households affordably manage risk.

The research team analyzed a series of potential indexes that can be used to provide the best possible IBLI in terms for vulnerable populations in Kenya’s northern arid and semi-arid lands. Building on lessons learned from earlier work in Peru, the team introduced index insurance to voluntary participants through games that realistically simulate the product. The team evaluated the impact of both the HSNP and PSN, which will help inform the design of future cash transfer programs and assess the utility of including PSN programs.



**SAVINGS, SUBSIDIES AND FOOD SECURITY: A FIELD EXPERIMENT IN MOZAMBIQUE**

**Lead PI:** Michael Carter, UC Davis  
**Partners:** University of Wisconsin, Madison; University of Michigan, Ann Arbor; IFDC Mozambique - Banco Oportunidade de Mocambique

# COMPLETED PROJECTS

Research Institute, Oxfam  
**Timeline:** 2008-2012  
**Funding:** \$2,000,000  
**Region:** Arid and semi-arid lands of northern Kenya  
**Key Innovation:** Index-based livestock insurance paired with an asset transfer program  
**Commodity:** Livestock

The Hunger Safety Net Program (HSNP) in Kenya provides reliable cash transfers to poor households. AMA Innovation Lab researchers developed a Productive Safety Net (PSN) based on Index-based livestock insurance (IBLI) to augment Kenya’s HSNP. IBLI is an innovative, proven insurance product that bases payouts on an

**Key Results**

- There are potentially large returns to social protection policy that stakes out a productive safety net below the vulnerable and keeps them from slipping into a poverty trap.
- Much of the value of the productive safety net comes from mitigating the ex-ante effects of risk and crowding in additional investment.
- In the presence of poverty traps, modestly regressive targeting based on critical asset thresholds may have better long-run poverty reduction effects than traditional needs-based targeting.

**Timeline:** 2009-2012  
**Funding:** \$878,448  
**Region:** Manica  
**Key Innovation:** Fertilizer subsidies  
**Commodity:** Various

A pressing question, in particular across Sub-Saharan Africa, where permanent input subsidies are common, is whether one-time or temporary provision of subsidized fertilizer can set households on a long-run positive growth path, or whether input utilization and farm output eventually return to previous levels after subsidies are phased out. This graduation question is especially important from the perspective of long-term poverty dynamics in Africa.

This project shed light on the short- and long-run impacts of fertilizer subsidies and savings accounts on smallholder farmers in Mozambique. Specifically, this project investigated whether subsidies have greater long-run impacts when they are provided in combination with savings facilities, whether savings matches motivate farmers to save, whether farmers continue saving on their own once matches end and how group-based incentives for savings differ in their effects from individual-based incentives.

In partnership with a local financial institution, the AMA Innovation Lab research team randomized offers of savings accounts to farmers. Some savings accounts were ordinary accounts with standard interest rates, while others were matched savings accounts with match rates of up to 50 percent. To examine the impact of group incentives, another treatment group involved savings matches that rise in group-level savings balances. A random lottery was used to determine the specific savings intervention offered to each farmer group.

**Key Results**

- Below a certain level of wealth, the time horizon of an individual in poverty decreases, resulting in a behavioral poverty trap.
- Improvement in economic prospects results in a significant increase in the planning horizon of poor beneficiaries. Moreover, the increase in horizon significantly predicts asset accumulation of beneficiaries during the two years following the intervention.
- The value of a subsidy equivalent to USD \$65 increased the time horizon of small maize producers by more than half while an average transfer of USD \$34 in matched savings increased the time horizon 29 percent.
- One-time provision of a voucher

for fertilizer and improved seeds leads to substantial increases in fertilizer use, which persist through two subsequent agricultural seasons.

- One’s own fertilizer use rises in the number of social network members receiving vouchers.
- The impact of the voucher coupons on use of seeds and fertilizers are large for those that choose to use them. The treatment effect on per capita daily household consumption amounts to a 36% increase over the control group mean, indicating that the vouchers had an impact on poverty’s incidence and its depth.



**INDEX-BASED WEATHER INSURANCE FOR COFFEE COOPERATIVES IN GUATEMALA**

**Lead PI:** Elisabeth Sadoulet, UC Berkeley  
**Partners:** Landivar University, International Fund for Agricultural Development, KfW Banking Group  
**Timeline:** 2010-2013  
**Funding:** \$493,667  
**Region:** Guatemala  
**Key Innovation:** Group-level index insurance  
**Commodity:** Coffee

In Guatemala, coffee production is the source of livelihood for hundreds of thousands of poor small-scale farmers organized into producer cooperatives. Exposure to risks is

high, with risks originating in both prices and weather. Price risks are due to large fluctuations on the international market. Weather risks are due to erratic rainfall, leading to both droughts and floods, and to extreme events.

The AMA Innovation Lab research team launched this project to understand index-based insurance products can improve risk management and risk coping for coffee cooperatives and their members. The team identified the reasons why index-based group insurance may be superior to index-based individual insurance in terms of uptake.

The team worked with partners in Guatemala to develop and offer hybrid contracts to coffee cooperatives and individual cooperative members. The research team used randomized experiments to test the relative merits of group versus individual contracts, to offer a menu of contracts from which cooperatives and individuals can choose and to explore different ways of promoting use of the product.

**Key Results**

- Willingness-to-pay increases with background risk, consistent with preference being vulnerable.
- The effect is similar if in uninsured states, even controlling for uninsurable risk.
- The response of willingness-to-pay to the benefit of insurance increases with risk aversion, when lowest income states insured.
- Worst state of nature uninsured reduces demand for insurance but not differentially more for risk averse producers.
- The results suggest that consumers value probabilistic insurance using a prospect-style utility function that is concave both in probabilities and in



income, and that group insurance mechanisms are unlikely to solve the issues of low demand that have bedeviled index insurance markets.



### DEMAND FOR AND PRODUCTIVITY IMPACT OF WEATHER INDEX INSURANCE IN ETHIOPIA

**Lead PI:** Craig McIntosh, UC San Diego

**Partners:** Food and Agriculture Organization of the United Nations, University of Athens, European Commission (EC) Joint Research Center, Nyala Insurance

**Timeline:** 2010-2014

**Funding:** \$516,534

**Region:** Amhara

**Key Innovation:** Index insurance linked to credit contracts

**Commodity:** Various

One of the well-known problems of African agriculture is its low productivity, despite its acknowledged potential. The use of irrigation, fertilizers and pesticides is much less than in other regions, and sharply limits yield gains associated with high yielding varieties. Any prospects of growth in Ethiopia must deal with improving smallholder farm productivity.

AMA Innovation Lab researchers developed a fully scaled product innovation that implements and assesses the potential of index insurance to crowd in credit, so as to improve agricultural productivity and incomes among Ethiopian

smallholders. Rather than addressing only a credit constraint or insurance failures, the project tested a form of insured credit. Through collaboration with Nyala Insurance of Ethiopia, the team sought to provide insurance through credit contracts. Local cooperatives that borrow in order to make in-kind loans of fertilizer were the target population for the product. The innovation was evaluated through a randomized controlled trial (RCT), and additional price variation will be injected at the individual level in order to study demand elasticities.

### Key Results

- Significant profitable opportunities for fertilizer use are there for Ethiopian farmers, but farmers are still constrained by risk aversion, low cash availability and poor access to credit.
- Subsidy vouchers, even at very small cash amounts, are an effective way of driving index insurance uptake.
- The ex-ante and ex-post demands for index insurance do not appear highly correlated, but actual demand tends to be significantly affected by premium subsidies.
- Results suggest that weather index insurance may provide protection primarily to those who already use inputs at high levels, rather than enabling a ‘transformative’ increase in input use among those not previously using them.



### INSURING AGAINST THE WEATHER: INTEGRATING

### GENERIC WEATHER INDEX PRODUCTS WITH GROUP-BASED SAVINGS AND LOANS IN ETHIOPIA AND BANGLADESH

**Lead PI:** Ruth Vargas Hill, IFPRI

**Partners:** University of Colorado, Oxford University, IFPRI

**Timeline:** 2012-2014

**Funding:** \$898,952

**Region:** Ethiopia and Bangladesh

**Key Innovation:** Integrated loan/index insurance hybrid

**Commodity:** Various

This AMA Innovation Lab research project in Ethiopia and Bangladesh focused on how to develop simple, flexible and inclusive index insurance products, and how to provide them to risk-sharing, savings and credit groups as a means to reduce basis risk. In particular, the project sought to develop formal insurance products to insure covariate shocks experienced by a community of farmers, and combine them with mechanisms that formalize group risk-sharing through group savings and loans as a means of insuring farmers against idiosyncratic losses.

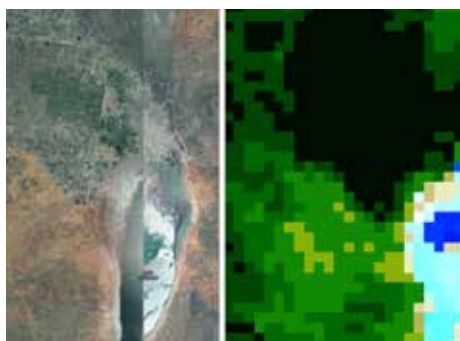
In Ethiopia, researchers worked in three disparate sites in the Oromia region. Although the three sites have quite distinct agro-ecological characteristics, the major source of covariate risk in all three sites is drought. In all locations researchers worked with funeral insurance societies, called *iddir*, which have formalized in recent years and started providing other insurance and financial services to their members.

In Bangladesh researchers worked in two districts—Bogra and Manikganj—that reflect the nature of agriculture risk in much of non-coastal Bangladesh. In these two proximate districts there are three main sources of covariate agricultural risk: drought, flooding and outbreaks of crop

pests and disease. In Manikganj river inundation is particularly problematic.

**Key Results**

- Farmers who are highly risk averse or sensitive to basis risk prefer a rebate to a discount, suggesting that the rebate may partially offset some of the implicit costs associated with insurance contract nonperformance.
- Having insurance yields both ex-ante risk management effects and ex-post income effects on agricultural input use.
- The risk management effects lead to increased expenditures on inputs during the aman rice-growing season, including expenditures for risky inputs such as fertilizers, as well as those for irrigation and pesticides.
- The income effects lead to increased seed expenditures during the boro rice-growing season, which may signal insured farmers’ higher rates of seed replacement, which broadens their access to newer seeds as well as enhancing the genetic purity of cultivated seeds.



**DEVELOPING A SATELLITE-BASED INDEX TO PREDICT CROP YIELDS IN SMALLHOLDER AGRICULTURE IN TANZANIA**

**Lead PI:** Michael Carter, UC Davis  
**Partners:** World Vision  
**Timeline:** 2013-2014

**Funding:** \$122,920

**Region:** Northeastern and north-central Tanzania

**Key Innovation:** Satellite-based index to predict crop yields

**Commodity:** Rice

An idea that has received surprisingly little attention in the literature is to use a satellite-based index that could increase the precision of using environmental and weather factors to estimate actual yields. This higher precision could be key to both lowering the costs of index-insurance products and to reducing basis risk. Several rainfall-based insurance products that rely on weather station data currently exist on the market, but such contracts suffer from a lack of historical data, poor coverage for farmers and high scaling costs.

AMA Innovation Lab researchers developed an innovative satellite-based index to reliably predict local crop yields. This work is the centerpiece of a larger project to design an index insurance contract that can successfully protect smallholder farmers against environmental and weather shocks such as droughts and floods. This project utilizes satellite-based indicators, such as the Normalized Difference Vegetation Index (NDVI) or measures of evapotranspiration (ET), to build an index that more strongly correlates with crop yields at a very low cost. The process of developing this satellite-based yield model is divided into three phases: 1) creation of the index, 2) collection of actual yield data and 3) estimation of the yield model.

**Key Results**

- This project’s audit rule that empowered farmers to send the insurance company a text message if payments did not trigger but they believed average yields are below 60% of normal.

If more than 30% of farmers registered a complaint, the company would be bound to carry out an audit.

- Despite the overall strong performance of this combined index, it would still fail to trigger for severe losses 13% of the time. This failure rate highlights the imperfection of even this multi-index insurance contract and the importance of the fail-safe audit option so farmers can be confident in the product.
- Insurance-backed contingent credit increases demand for credit as well as increases high-return investments significantly. Furthermore, these effects hold under both individual and joint liability loan contracts and increase in borrowers’ degree of risk aversion.



**SELLING FORMAL INSURANCE TO THE INFORMALLY INSURED IN INDIA**

**Lead PI:** Ahmed Mushfiq Mobarak, Yale University  
**Partners:** Agricultural Insurance Company of India  
**Timeline:** 2013-2015  
**Funding:** \$285,722  
**Region:** India  
**Key Innovation:** Index insurance  
**Commodity:** Various

Providing index-based insurance to low-income farmers has the potential to reduce underinvestment



in agricultural technology, increase productivity and reduce wealth inequality. Despite strong government support for index-based insurance products, take-up rates have been surprisingly low. This poses a puzzle: if insurance products truly have the potential to improve outcomes for low-income farmers, why do we not see greater interest in these products?

This AMA Innovation Lab project used a randomized controlled trial (RCT) to study the demand for and effects of offering formal index-based rainfall insurance in an environment of tightly knit informal risk sharing networks among sub-castes in India. The project took advantage of natural variation in informal insurance among Indian farmers based on their membership in a sub-caste-based risk-sharing network, with designed (randomized) variation in the insurance contract offered.

The randomized design component of the project was intended help identify the causal effects of constraints to liquidity, credit and savings in explaining low take-up rates. Marketing to farmers from different sub-castes, or *jatis*, who are differentially indemnified through their informal risk-sharing networks was also intended to help identify whether farmers are reluctant to purchase formal insurance contracts simply because they are already informally insured.

**Key Results**

- Access to formal rainfall insurance helps rural households gain financial stability by raising average income and allowing a shift to higher-yield, more risky production strategies, a key ingredient for growth. Offering formal index insurance increases risk-taking, even when farmers already had risk-sharing mechanisms through *jatis*.
- Informal risk-sharing networks reduce risk-taking and thus

average incomes.

- Landless laborers exhibit substantial demand for rainfall insurance. These laborers are the poorest segment of the rural population and are often excluded from formal financial services. Thus index-based rainfall insurance offers a risk-coping strategy and benefits to more people than crop insurance.
- Basis risk is a significant impediment to index insurance take-up. Households further from rainfall stations are less likely to purchase an insurance contract.
- Households are very responsive to randomly assigned price subsidies. Specifically, we found that a 50% subsidy increases probability of take-up by 17.6 percentage points.



**USING INDEX INSURANCE TO PROMOTE INVESTMENT IN WEST AFRICA’S COTTON INDUSTRY**

**Lead PI:** Michael Carter, UC Davis  
**Partners:** University de Namur, Duke University, Sofitex, Ecobank, PlaNet Guarantee, Hanover RE, Allianz Bank  
**Timeline:** 2013-2015  
**Funding:** \$593,779  
**Region:** Mali & Burkina Faso  
**Key Innovation:** Dual Strikepoint Area Yield Index Insurance  
**Commodity:** Cotton  
 Cotton farming in West Africa is a potentially lucrative, but high-risk opportunity for small-scale farmers. Given cotton’s high cost of cultivation,

as well as its vulnerability to the region’s extreme weather patterns, events such as drought can be devastating to farmers. As a result, farmers in the region often minimize their exposure to risk by limiting their cotton cultivation.

AMA Innovation Lab researchers designed an innovative multi-scale index insurance product that pays farmers when they most need help. The multi-scale design minimizes contract failure while still ensuring that it limits opportunities for moral hazard. An innovation of the insurance design is the use of a double trigger. The insurance is triggered when the group’s area yield reaches a certain level and when the neighboring group’s area yields also fall below a (higher) threshold. In partnership with private sector implementation partners, the research team conducted an evaluation of both the efficacy of this contract design and the impact on the wellbeing of the small-scale farmers who purchased the insurance.

A secondary goal was to better understand the dynamics of the joint-liability credit groups which these groups of cotton producers form. To do so, the team randomized the intensity of monitoring of these groups by the agents managing these groups for two consecutive years. They also analyzed the impact of this increase in external monitoring on internal monitoring inside the group, sanctioning inside the group and input diversion.

**Key Results**

- Reducing the index scale to bring it closer to the farmer reduces basis risk, but increases moral hazard issues. One solution to this conundrum is to design multi-scale contracts.
- For the same cost, a two-scale

contract can radically reduce the probability that a village is not paid when their yields are low (from 45% under the single scale contract to only 7% under the multi-scale contract).

- In the first year of the program, 16 of the 58 treatment cooperatives (30%) agreed to purchase the index insurance contract.
- The results from the first sales period in Mali indicated that those farmers who purchased the insurance were more likely to expand their cotton cultivation, increase use of productive inputs and increase the use of seeds.
- In Burkina Faso, sesame cultivation among insured households was 17.3 percentage points higher than among non-insured households, an indirect impact because implementation challenges prevented impacts on cotton cultivation.
- Burkina Faso insured households also increased their livestock substantially. On average, insured households increased their holdings by 1.6 cattle and 6.8 chickens.



**DISSEMINATING INNOVATIVE RESOURCES AND TECHNOLOGIES TO SMALLHOLDERS IN GHANA (DIRTS)**

**Lead PIs:** Chris Udry, Yale University; Dean Karlan, Northwestern University

**Partners:** International Food Policy Research Institute (IFPRI), Savanna Agricultural Research Institute (SARI)  
**Timeline:** 2013-2016  
**Funding:** \$643,499  
**Region:** Ghana’s Northern Region  
**Commodity:** Maize

In Ghana’s Northern Region, smallholder farmers face significant risk of weather shocks, achieve just a fraction of potential yields, maintain limited liquid savings and are often food insecure. The DIRTS project improved access to financial markets in order to provide a less risky environment for farmer investment while providing complementary access to extension advice and inputs with potential to improve per-acre production and profits.

DIRTS provided AMA Innovation Lab researchers an integrated examination of three barriers to the adoption of highly profitable fertilizer/seed technology. First, to test the importance of imperfect farmer knowledge of farming best practices, randomly selected communities were provided with more intensive extension through a Community Extension Agent (CEA), a community member trained to use Android phone extension applications as a supplement to existing government extension. Second, to test the importance of unsure, untimely and costly access to appropriate inputs, DIRTS made commercial inorganic fertilizer and improved seed available just prior to land preparation at varying prices in a community. Third, farmers were able to purchase a commercial rainfall index insurance product at individually varying prices.

**Key Results**

- Farmers adjust timing of planting and agrochemical application in response to text messages of 48-hour weather forecasts.
- Text messages for current prices of

grains at major markets influence decisions regarding storage.

- There is limited demand for rainfall index insurance. But farmers granted substantial amounts of rainfall index insurance invest more heavily in agrochemical use.
- Free delivery and community marketing did not increase demand for inputs. Demand was driven by expectations given the availability, timing, and value of subsidies for inputs.
- CEAs increased farmer knowledge and improve farmer practices. Appropriate timing of message delivery matters. Technology can be harnessed to leverage human resources.
- Adoption of improved practices by some farmers did not increase average yields or profits for the full group of farmers.
- There is limited demand for rainfall index insurance.
- Free delivery and community marketing did not increase demand for inputs.
- Currently-available improved seeds can perform better than the most commonly used seeds. An imported hybrid variety was the most profitable in these trials.



**EVALUATING THE SOCIO-ECONOMIC IMPACTS OF WESTERN SEED’S HYBRID MAIZE PROGRAM IN KENYA**

**Lead PI:** Michael Carter, UC Davis



**Partners:** Tegemeo Institute of Agricultural Policy & Development, Western Seed Company

**Region:** Kenya

**Timeline:** 2013-2016

**Funding:** \$431,030

**Commodity:** Maize

Unlike many parts of sub-Saharan Africa, hybrid seed adoption rates among Kenyan maize farmers are relatively high, reflecting decades of efforts by the Kenyan government and Kenya Seed Company. In the mid-1990s, the government of Kenya began to slowly liberalize the domestic seed market. Western Seed Company, an early entrant in the newly opened market, released its first commercial maize varieties in 1999. Its varieties quickly garnered attention by out-yielding existing Kenya Seed varieties by some 30 percent, especially in the mid-altitude regions that are home to many small-scale Kenyan farmers.

AMA Innovation Lab researchers leveraged funding already received from the Acumen Fund to evaluate the impact of Western Seed Company's (WSC) hybrid maize program on the welfare of smallholder farmers in Kenya's mid-altitude regions. The project examined two key issues: the effectiveness of a local seed company in developing technologies fine tuned to the local agro-ecological environment, and the impact of relaxing liquidity constraints on the poverty-reduction potential of new agricultural technologies. This locally based and locally focused seed company expanded into new areas, powered by recent infusions of venture capital. By collaborating closely with WSC, the research team exploited this geographic expansion with a two-year randomization design in parts of western and central Kenya.

**Key Results**

- Social network effects are weaker in villages that are more

- heterogeneous.
- The more variable the environment, the more important learning-by-doing becomes. Seed packet recipients were 10% more likely to purchase and plant the seeds in the next main season.
- In areas where soil type varies significantly across farms, policy-makers should consider focusing attention (and subsidies) on encouraging learning-by-doing, while in homogeneous areas they might get bigger impact on the by leveraging social learning.
- In Kenya's mid-altitude regions, maize farmers who had opportunities to purchase hybrid seed developed for their agro-ecological niche increased their per-acre productivity by 41% compared to the control group.
- In these regions, treated farmers who had historically used hybrid seed increased maize productivity by 85%, compared to 30% among treated farmers who did not regularly use hybrid seed.
- Farmers who historically used hybrids appear to be better resourced than those who did not, suggesting that financial constraints limit the impacts of even an appropriate seed technology in a poor population.
- Bundled use of improved seed and fertilizer increase both maize yield and per capita staple availability.
- Households with exposure to demo plots are more likely to adopt use of inorganic fertilizer and/or improved seed.
- Without liquidity constraints, households tend to adopt improved seed and fertilizer to boost productivity.
- Households using both improved seed with fertilizer are associated with a more diversified diet.

- In areas with more variation between localities, demonstration plots and news about higher yields could help spread information through social networks.
- Greater variation within localities means that the recommended type and amount of fertilizer and other productive inputs may have no impact on crop yields. These farmers will benefit from tailored recommendations and the appropriate fertilizer and seed is available in their local stores.



**INDEX-BASED LIVESTOCK INSURANCE IN EAST AFRICA**

**Lead PI:** Andrew Mude, International Livestock Research Institute

**Partners:** UC Davis, Cornell University, Oromia Insurance Company, Mercy Corps

**Timeline:** 2013-2016

**Funding:** \$190,000

**Region:** Ethiopia and Kenya  
**Commodity:** Livestock

The Index-Based Livestock Insurance (IBLI) project in Ethiopia, with support from the AMA Innovation Lab, has already made groundbreaking contributions to strengthening resilience and economic viability of pastoralists in East Africa. This project explored the next phase of improvements and expansion for the IBLI program in Ethiopia including how to better integrate IBLI into mission programming, particularly the Pastoralist Areas Resilience

Improvement and Market Expansion (PRIME) project. PRIME promotes the viability and resiliency of vulnerable pastoralist communities through myriad activities, including those directed toward economic growth and climate change adaptation. IBLI is a supplemental mechanism to reduce fluctuations in asset stocks in times of crisis, as well as to reduce poverty, promote food security, and improve productivity.

This project also improved extension and education. A major challenge for index insurance remains client understanding of the product, which is necessary to catalyze demand. Funding also assisted in the identification of imaginative, cost-effective solutions to improve the sales delivery infrastructure, especially by reducing the density of sales agents and reducing the cost of the sales transaction. Finally, funding was used to improve information provision, both to build salience and awareness of the program and to provide regular updates of the state of the index to clients.

**Key Results**

- Controlling for assets, education and a host of other factors, simply being female increases the probability of IBLI purchase by 31-55%.
- Women may respond differently to the opportunity to purchase risk management products either due to differences in their risk preferences, their experience of complementary or substitute insurance strategies through informal means, or how they receive information about the product.
- IBLI coverage has strong positive impacts on subjective, economic, and health-related indicators of well-being. The gains are especially pronounced in the midst of drought events.

- The marginal benefit/cost ratio of IBLI substantially exceeds that of unconditional cash transfers.
- These gains emerge despite IBLI's imperfect coverage of purchaser's risk exposure.
- Uptake of the product has been significant, with more than 40% of sampled households purchasing IBLI at least once.
- Insurance is not an easy, off-the-shelf solution to the problem of climate risk and food insecurity. Creativity in the technical and institutional design of contracts is still required, as are efforts to forge the more effective public-private partnerships needed to price insurance at levels that will allow insurance to fulfill its potential as part of an integrated approach to social protection and food security in an era of climate change.



**PROMOTING ADOPTION OF IMPROVED PRODUCTION TECHNOLOGIES VIA COUPLED CREDIT AND INSURANCE CONTRACTS AMONG SMALLHOLDERS IN GHANA**

**Lead PI:** Mario Miranda, Ohio State University

**Partners:** African Center for Economic Transformation (ACET), Ghana Agricultural Insurance Programme (GAIP)

**Timeline:** 2013-2016

**Funding:** \$844,012  
Region: Northern

**Key Innovation:** Interlinked credit and insurance  
**Commodity:** Maize

Index insurance has proven to be ineffective in some cases when borrowers can easily default on loan repayments without suffering major consequences such as loss of collateral. When widespread default occurs due to a natural disaster, lenders suffer along with the farmers. In such situations it is clear that the farmer, the insurer, and the lender are undeniably linked.

If insured farmers experience widespread drought, the insurer experiences heavy losses and consequently demands higher insurance rates than most smallholder farmers in a developing country can afford. If farmers cannot afford the insurance, they will not buy it. Without insurance, they are reluctant to take on the additional risk of a loan and are thus unable to afford to adopt new technologies that would allow them to increase their income. Lenders who experience widespread loan defaults due to disasters either raise the interest rates for agricultural production loans or engage in more restrictive credit rationing.

AMA Innovation Lab researchers sought to break one part of this vicious cycle by introducing a new type of loan product. In the event of a drought or other insured event, the amount of the loan the farmers are required to repay to the lender is reduced (if not eliminated) since the outstanding balance is automatically covered by the insurance payout received by the lender.

**Key Results**

- When index insurance is integrated into lender's credit portfolios and loan policies, the incentives for strategic default by smallholders



are curtailed, substantially reducing the negative impacts of widespread loan defaults on lenders due to an extreme weather event.

- Index-insured agricultural loans increased access to credit for smallholder farmers, which enables the adoption of more productive agricultural technologies.
- Farmers in all experimental groups applied for loans at similar rates (90-93%), but women offered loans in which payouts go to them rather than directly toward retiring the loan were 15-17% more likely than women in the Control group to apply.
- Banks were 32% more likely to approve loans for farmers who applied for insurance-backed contingent loans in which payouts go directly toward retiring the loan.
- Roughly 54-60% of farmers were willing to pay above the market price for insured agricultural loans.



**COMPLEMENTARITIES OF TRAINING, TECHNOLOGY, AND CREDIT IN SMALLHOLDER AGRICULTURE IN SENEGAL AND UGANDA**

**Lead PI:** Stephen Smith, George Washington University  
**Partners:** Senegal Government PAPSEN Project, Consortium pour la Recherche Economique et Sociale

(CRES), Senegal, Israel MASHAV, Brookings AGI, BRAC Uganda  
**Timeline:** 2013-2017  
**Funding:** \$580,269  
**Region:** West Africa  
**Key Innovation:** Training, Technology and Credit Commodity Varied

**Senegal:**  
 Drip irrigation is widely considered to be a promising technology for sustainable agricultural intensification, as it can achieve a simultaneous increase of yields and a decrease in input use (water, fertilizer and pesticide), and has a high rate of return on investment and potential for poverty alleviation. However, while highly effective in controlled conditions or in demonstration farms, its adoption by smallholder farmers in developing countries, especially in Sub-Saharan Africa, is still limited. Failures have been attributed to factors such as mismanagement, disregard for agronomic recommendations, lack of maintenance, small plot size, and lack of access to technical support, complementary inputs, spare parts, and markets.

**Uganda:**  
 Some development programs are designed on the premise that they can trigger lasting changes in poverty or food security. A BRAC intervention in eastern Uganda to increase the use of improved seed varieties and basic farming practices among women smallholders was phased out after four years due to a loss of funding.

**Key Results**

- Farmers in eligible villages were 5.4 percentage points more likely to have sufficient food over the previous year than those in ineligible villages. These impacts are largest just before the harvest, when food security is generally most precarious.
- Three seasons after BRAC programming in eastern Uganda

ended there was no decline in rates of improved seed adoption and farmers still used the program’s cultivation techniques.

- Gains attributable to BRAC programming sustained despite a village supply network established by the program going into decline.
- Researchers are still working to analyze the impacts and sustainability of a PAPSEN intervention, a project that combines the implementation of a drip irrigation system in a model farm setting with a locally optimized package of improved inputs and intensive extension services.



**DEMAND AND SUPPLY CONSTRAINTS TO IMPROVED SORGHUM TECHNOLOGY ADOPTION AND THEIR GENDER-DIFFERENTIATED EFFECTS IN BURKINA FASO**

**Lead PI:** Andrew Dillon, Michigan State University  
**Partners:** National Agricultural and Environmental Research Institute  
**Timeline:** 2013-2017  
**Funding:** \$848,721  
**Region:** Burkina Faso  
**Key Innovation:** Targeting based on social network characteristics  
**Commodity:** Sorghum

Sorghum is the most widely cultivated dryland crop and a main food staple among rural people of the West African Sahel. However, supply and

demand constraints reduce adoption of improved sorghum technology. One approach to improving sorghum yields has been the introduction of a technology for applying small amounts of fertilizer at the time of planting. This technique, known as “microdosing,” raises yields considerably when applied to the seeding of improved sorghum varieties.

AMA Innovation Lab researchers worked with sorghum breeders and agro-input suppliers in Burkina Faso to conduct a randomized controlled trial (RCT) that compares different methods of encouraging rural farmers to adopt improved seed and fertilizer microdosing. Researchers targeted a demand-side treatment by social network characteristics with a randomized distribution of seed and fertilizer micro-packs. The supply-side treatment tested whether consistent market supply, credit constraints and farmer commitment suggest low adoption and potential supply-side marketing mechanisms to increase adoption. As microdosing in particular requires significant use of labor, the researchers also examined how labor is reallocated between individual household members across different crops testing welfare implications for women and children.

**Key Results**

- Nuclear family households invested more labor into sorghum farming when they adopted microdosing compared to extended households consisting of multiple nuclear families.
- The increasing household fragmentation into smaller units and technology adoption’s important role in higher productivity suggest that nuclear households have a greater potential to benefit from labor intensive technologies for agricultural intensification.



**HOUSEHOLD-LEVEL IMPACTS OF SYSTEM OF RICE INTENSIFICATION (SRI) IN HAITI**

**Lead PI:** Travis Lybbert, UC Davis  
**Partners:** Université d’Etat d’Haïti, Oxfam America  
**Region:** Artibonite Valley  
**Timeline:** 2013-2017  
**Funding:** \$688,952  
**Key innovation:** System of Rice Intensification (SRI)  
**Commodity:** Rice

In Haiti, improvements in productivity for staple crops such as rice are crucial to improve rural income and food security. The System of Rice Intensification (SRI) is touted as a high-yielding, low external input rice cultivation method that can increase rice yields and improve household welfare, but these claims remain controversial and inconsistent with widespread dis-adoption.

AMA Innovation Lab researchers conducted a rigorous evaluation of a coordinated SRI intervention being launched by Oxfam America in Haiti’s Artibonite Valley. This intervention not only tested the coordination of SRI adoption, but also subsidized credit for inputs and land preparation, as well as insured credit that offers, in essence, a money-back guarantee if yields don’t reach a certain minimum increase. The research team tested different combinations of coordination, subsidies, and insured credit. In this way, the project

will address multiple barriers to technology adoption - knowledge and training, coordination, public goods management, and risk.

**Key Results**

- Compared to control farmers, treated farmers improved and paid closer attention to their agronomic practices.
- Treated farmers reaped 14% higher rice yields but had no measurable income increase due to higher input costs – and were less food secure during the growing season when these costs were incurred.
- While benefits were zero on average, farmers with access to cheap family labor were more likely to benefit and suffered no food security penalty.
- Farmers who participated in experimental public goods games framed to mimic the real trade-off they face between private work and participation in the management of shared canals were 66% more likely than the control group to volunteer.
- The mechanism through which the experiments seem to operate is by affecting participants’ expectations of others’ contributions to the public good, suggesting that experiments provide a setting in which to learn about one’s neighbors and develop common norms of behavior.



**A MULTIPLE INTERVENTIONS**



**APPROACH TO INCREASING TECHNOLOGY ADOPTION (MITA) WITH A VIEW TOWARDS SCALING-UP IN MEXICO**

**Lead PI:** Aprajit Mahajan, UC Berkeley

**Partners:** Instituto Tecnológico Autónomo de México, World Bank, Qué Funciona para el Desarrollo AC

**Timeline:** 2013-2017

**Funding:** \$691,360

**Region:** Tlaxcala, Mexico

**Key Innovation:** Technology adoption

**Commodity:** Maize

Increasing our understanding of the drivers of yields remains a first-order question for policy-makers, as different drivers suggest different interventions to improve agricultural yields. AMA Innovation Lab researchers conducted a randomized control trial (RCT) in Mexico to measure the impact of providing small-scale maize farmers with in-kind grants to acquire personalized inputs and precision drills that allow them to fertilize at sowing. The researchers evaluated the effects of these in-kind grants on productivity and household welfare. By separately measuring the impact of each intervention, the research team paid special attention to bottlenecks in the causal chain limiting adoption of these technologies. This work seeks to understand the limited adoption of these technologies.

**Key Results**

- Tailored fertilizer package take-up rates among farmers who received in-kind subsidies were over 75%, compared to 7% among unsubsidized farmers.
- Farmers in the program reported yield increases between 16% and 22%, although this masks considerable variation between farmers.



**RISK REDUCTION FOR VULNERABLE DAIRY FARMERS IN THE DOMINICAN REPUBLIC**

**Lead PI:** Michael Carter, UC Davis

**Partners:** REDDOM

**Timeline:** 2013-2017

**Funding:** \$393,194

**Region:** Dominican Republic

**Key Innovation:** Index Insurance

**Commodity:** Dairy

The AMA Innovation Lab launched a project in the Dominican Republic that aimed to offer smallholder farmers tools to cope with climate risk and to improve their livelihoods. The program was to include four complementary interventions. The first was to develop access to climate and weather information. The second was to implement “climate smart” agricultural practices: Demonstration plots that promote the use of risk mitigating technologies (water tanks, dwells, etc.) have been implemented in key areas to help farmers learn about safe production practices. The third was to increase access to risk transfer mechanisms: The fourth was to increase access to credit for small producers.

**Key Results**

- Though the project was not able to move forward, as part of the preliminary work on index design, the AMA Innovation Lab made significant investments in developing the

use of satellite imagery and crop masking, allowing researchers to distinguish pasture land from non-pasture land. These investments in crop masking will prove valuable in future projects that use these technologies.



**TAILORING CONTRACT FARMING TO SMALLHOLDERS: EXPERIMENTAL EVIDENCE ON ENROLLMENT IMPACT, INSURANCE PROVISION, AND COMMUNICATION TECHNOLOGIES IN KENYA**

**Lead PI:** Lorenzo Casaburi, Stanford University

**Partners:** Harvard University, Maseno University School of Business and Economics, Mumias Sugar Company

**Timeline:** 2013-2017

**Funding:** \$715,000

**Key Innovation:** Contract farming, insurance and communication technologies

**Commodity:** Sugar

It is not known exactly how and if contract farming schemes increase and sustain smallholder welfare. Does income increase? Do participating farmers adopt new technologies at higher rates or invest more in complementary stabilizing products like insurance? Also, can mobile technology reduce communication problems along the supply chain?

This AMA Innovation Lab project measured the impacts of such

schemes along several dimensions, including farmer income, technology adoption, and take-up of insurance products. In addition, researchers explored variations in the details of the contract offered to the farmers in order to shed light on which features of the contract farming model drive impact. Mumias Sugar Company, which enrolls several thousand new farmers each year, planned to expand to new locations and agreed to randomly select a portion of their new contract farmers for the purposes of this study.

### Key Results

- Sending SMS messages with agricultural advice to smallholder farmers increased yields by 11.5% relative to a control group with no messages. These effects are concentrated among farmers who had no agronomy training and had little interaction with sugar cane company staff at baseline.
- Enabling farmers to report input provision delays to the company reduces the proportion of delays in fertilizer delivery by 21.6%.
- There is evidence that reporting a complaint has positive geographic spillovers, since it induces the company to deliver inputs to several neighboring plots.



### A QUASI-EXPERIMENTAL “POST-MORTEM” STUDY OF A DISCONTINUED INSURANCE PRODUCT IN HAITI

**Lead PI:** Emily Breza, Columbia

University

**Partners:** Quisqueya University, State University of Haiti

**Timeline:** 2014-2015

**Funding:** \$100,027

**Region:** Haiti

**Key Innovation:** Integrated credit/index insurance hybrid

**Commodity:** Various

Agriculture is the primary source of income in rural areas of Haiti, employing 60 percent of the population. In January 2011, Fonkoze, the largest microfinance institution in Haiti, began jointly addressing missing credit and insurance markets by simultaneously providing weather index insurance along with credit to 60,000 borrowers. The insurance was intended to have a positive impact, particularly for women. While the product became financially unsustainable, the collapse of the program offered a unique opportunity to investigate the failure of the product. AMA Innovation Lab researchers conducted a quasi-experimental study of the discontinued product using a variety of identification strategies and data sources, including new survey data, administrative banking data, cellular carrier and remittance data, and prior survey data. The research team focused on two sources of problems that are potentially interrelated: basis risk in the parametric-based insurance arm and moral hazard in the peer loss adjustment- and indemnity-based insurance arm.

Flooding risk is particularly complex to model physically. Even with a well-designed index based on granular, real-time weather data in developed country settings, significant idiosyncratic variation in damages to property due to flooding and extreme rainfall means that index insurance policies will retain large basis risk; and all the more so in mountainous, degraded topographies with sparse

weather sensors and high variation in the slope of land.

### Key Results

- Greater insurance increased a beneficiary’s demand for credit on the extensive margin, e.g. made formal lending relationships more durable. This suggests formal credit and insurance are complements.
- In contrast, formal insurance substantially reduced informal borrowing as well as the duration of informal risk sharing relationships.
- Greater insurance benefit increases the frequency with which a borrower switches joint liability groups. This suggests formal insurance increases the fungibility of the informal financial ties that underpin risk sharing arrangements, such as informal insurance.
- The differential informal proximity between claimants and peer reviewers substantially biased within-village payouts.
- The insurance policy strengthened formal credit markets at the cost of weakening informal risk sharing networks that, themselves, influenced the allocation of the policy’s benefits.
- When insuring the merchandise and property of small-scale entrepreneurs, the idiosyncratic component of exposure is more important than the covariate component.
- The main policy implication of this study is that the benefits to an MFI of providing indemnity insurance using peer reviewers includes substantially greater demand for credit. In contrast to the challenge of accurately estimating idiosyncratic damages with an index, peers can leverage their private information to assess claims.





## RURAL LIVELIHOODS AND INSTITUTIONAL REFORM IN SMALL-SCALE FISHERIES IN TANZANIA

**Lead PI:** Yaniv Stopnitsky

**Partners:** University of Alaska-Anchorage, University of Dar es Salaam, UC Davis

**Timeline:** 2014-2015

**Funding:** \$99,999

**Region:** Lake Victoria and Tanzania coast

**Key Innovation:** Experimental games to improve fishery management

**Commodity:** Fish

Institutions are important in shaping how development improves livelihoods for small-scale agricultural producers, but research to understand how institutions emerge, adapt and change is still in its infancy. Top-down command-and-control approaches to fisheries management, which focus on input restrictions and catch limits, have largely been ineffective for managing small-scale fisheries in developing countries.

AMA Innovation Lab researchers tested a novel approach of using experimental games to improve cooperative fishery management. Prior research has shown that individuals gain experience when repeatedly playing experimental games, which alters their patterns of coordination and cooperation. In many cases, this experience translates into increased cooperation in other similarly structured games, and may

change behaviors outside of game settings. For more than a decade now, development agencies have promoted co-management strategies based around community associations known as “beach management units” (BMUs). Evidence on the effectiveness of these institutions is both limited and mixed.

The project’s aim was to produce the following outputs: (1) generate new data on BMU performance and processes, (2) generate new data on how BMU members play and learn the pilot experimental games, as well as on individual and village characteristics that affect game play, (3) a completed experimental design/plan for continued funding, and (4) evidence on whether experimental games can affect fishermen behavior outside of the game setting.

### Key Results

- In an experimental game that simulates the complexity of fishery co-management, real fishers were 50% more likely to deplete their shared resource when the game included the threat of punishment for using illegal fishing gear.
- While the possibility of enforcement did reduce illegal gear use in the game from 5.6% to 2.8% of the time, fishers under the enforcement regime harvested and degraded the fishery at much faster rates.



## COMMUNICATION, SEARCH, AND MOBILE PHONES:A

## TELEPHONE DIRECTORY INTERVENTION IN TANZANIA

**Lead PI:** Brian Dillon, University of Washington

**Partners:** Institute of Rural Development Planning (Tanzania), Tufts University

**Timeline:** 2014-2016

**Funding:** \$124,929

**Region:** Dodoma, Tanzania

**Key Innovation:** Printed phone directory to link smallholder farmers to SMEs

**Commodity:** Various

The expansion of information and communications technology (ICT) throughout the developing world is among the most profound and all-encompassing instances of technological change in modern economic history. But one particular element of ICT that remains poorly understood is the extent to which ICTs create private returns for smallholder households by lowering the costs of both searching for and communicating with agricultural suppliers and buyers.

AMA Innovation Lab researchers measured how a paper telephone directory that lists descriptions and contact information for small and medium-sized agricultural enterprises (SMEs) in the surrounding area can increase communication between smallholder households and SMEs in sub-Saharan Africa. Results were based on randomized, controlled trial with experimental variation based on the number of directories distributed that list an SME and its effect on key firm outcomes such as phone calls received, revenues, number of employees, number of customers, location of activities and prices.

Phones reduce communication costs between linked agents who purchase phones and exchange numbers, but they do not significantly alter the

cost of searching for new contacts. Although it is possible to learn new phone numbers by asking around the village or calling a friend, this type of information seeking is limited entirely to one's pre-existing connections. As a consequence, the individual payoffs to mobile telephony, especially in rural areas, may be higher for those who have strong pre-existing networks, higher wealth, greater mobility and better education.

**Key Results**

- A printed mobile phone directory of agriculture-related enterprises significantly increased the use of mobile phones to source inputs, the use of mobile money and potential productivity-related impacts for farmers.
- A strong willingness-to-pay for the directory among both farmers and enterprises suggests that this kind of directory could have important implications for SME growth in agriculture.



**BUILDING RESILIENCE AND ASSETS FOR FOOD SECURITY IN BANGLADESH**

**Lead PI:** Elisabeth Sadoulet, UC Berkeley

**Partners:** BRAC, IRRI

**Timeline:** 2014-2017

**Funding:** \$575,000

**Key Innovation:** Combined technological and financial innovations for risk management

**Commodity:** Rice

Uninsured risks in rural Bangladesh, in particular to recurrent floods and droughts and to health and disability risks, take a heavy toll on welfare, productivity, income, and asset ownership for small-scale farmers. Established micro-finance institutions may be able to adapt their traditional financial products to meet these farmers' demands for risk management tools.

In this project, AMA Innovation Lab researchers worked together with MFI BRAC and International Rice Research Institute (IRRI) partners in Bangladesh to design and offer a portfolio of risk-handling instruments to smallholder farmers and rural inhabitants. In particular, this research explored the implications and impacts of combined risk-reducing technological innovations (drought-tolerant rice varieties) with risk-handling financial instruments (flexible dedicated savings and indexed contingent pre-approved lines of credit).

For borrowers with high credit scores, access to emergency contingent credit was triggered by these indexes and events. A savings account for risk management was held for precaution, restricted to verifiable emergency conditions in order to create an incentive not to withdraw for other reasons. In this way, the financial and agricultural technologies create layers of risk management for vulnerable farmers and rural population

**Key Results**

- Between September and November of 2015, BRAC disbursed 271 emergency loans. A year later, BRAC reported that over half of the clients who took the loan were repaying ahead of schedule.
- BRAC also found a 5% increase in savings among the emergency loan borrowers, compared to

just 1% for non-borrowers.

- Households who knew they were pre-qualified planted about 25% more rice than households who were not offered the emergency loan. As a consequence, households who did not suffer any flood losses produced about 33% more from their crops.
- This unique type of microcredit improves household welfare through two channels: an ex-ante insurance effect, where households increase investment in risky production, and an ex-post effect, where households are better able to maintain consumption and asset levels after a shock.
- Households have taken costly action to preserve their loan. Importantly, the extension of this additional credit improves loan repayment rates and MFI profitability, suggesting that this product can be sustainably extended to households already connected to microcredit networks.



**BUILDING MARKET LINKAGES FOR SMALLHOLDER FARMERS IN UGANDA**

**Lead PI:** Craig McIntosh, UC San Diego

**Partners:** UC Berkeley, Makerere University, Agrinet, Innovations for Poverty Action

**Timeline:** 2014-2017

**Funding:** \$833,474

**Region:** Uganda



**Key Innovation:** Digital trading platform

**Commodity:** Grain

East African grain markets are plagued by poor integration. In the face of growing food demand from a burgeoning population, poor roads and infrastructure frequently get much of the blame for the isolation of African food markets. However, price data from the region show that the impact of commodity price variation regularly exceeds estimates of transport costs. Poor market integration has potentially severe welfare costs in numerous dimensions. AMA Innovation Lab researchers used highly scalable technologies to develop a suite of tools and methods that measure both the shallowness in African food markets and offer solutions to deepen markets. The three prongs of the study worked to simultaneously alter intermediaries, information and the contracting options available in food markets.

First, the research team worked with AgriNet, the major private-sector supply chain company in Uganda, to implement a randomized expansion of their Commission Agents model across 15 districts of the country. Second, the research team worked with Innovations for Poverty Action, a major international research nonprofit, to implement a high-frequency market price survey using innovative SMS-based tools developed specifically for the project. Third, they collaborated with Kudu, a digital food trading platform developed by computer scientists at Makerere University. This innovative use of information and communications technology (ICT) allows farmer groups to sell directly to major buyers with market contracts that are optimal for both sides.

### Key Results

- Forthcoming



### EVALUATING THE EFFECT OF SITE-SPECIFIC SOIL INFORMATION ON FARMER INPUT CHOICES AND THE RELATIONSHIP BETWEEN POVERTY AND SOIL QUALITY IN TANZANIA

**Lead PI:** Cheryl Palm, Columbia University

**Partners:** University of Maryland, University of Illinois at Urbana-Champaign, Sokoine University of Agriculture

**Timeline:** 2014-2017

**Funding:** \$768,037

**Region:** Morogoro, Tanzania

**Key Innovation:** On-site soil diagnostic kit (SoilDoc)

**Commodity:** Various

Poor soil quality and the associated low productivity is linked to the pervasive of poverty and malnutrition ensnaring much of Africa. In Sub-Saharan Africa, labs that conduct soil tests and make recommendations are lacking, and the costs are beyond the reach of most farmers in the region. Given that soil quality has been shown to have an inverse relationship with farmer wealth, site-specific diagnoses and recommendations may be of particular use to poorer farmers.

AMA Innovation Lab researchers tested whether better information about soil quality helps farmers apply inputs more effectively and increase yields. The project was a randomized to evaluate how this information impacts production input decisions,

yields and the welfare of farming households in the Morogoro district of Tanzania. The project included four primary objectives. The first was to determine how plot-specific soil information affects farmers' agricultural input decisions and yields, relative to information received via traditional extension services. The second was to closely examine the link between soil quality, poverty and input decisions. SoilDoc—a portable, on-farm soil testing kit that provides cost-effective, farmer-specific soil and crop management recommendations—presents a unique opportunity to empirically test these relationships. The third was to determine whether farmer input decisions are constrained by access to cash and credit. Because SoilDoc has already captured the interest of several Ministries of Agriculture in Africa, the fourth objective was to disseminate the results to other interested governments, practitioners and key stakeholders where discussions on the roll-out of SoilDoc have already begun.

### Key Results

- Results of field-level soil tests found considerable variation in soil nutrient deficiencies in nitrogen, phosphorus, potassium and sulfur across farms in Morogoro District, Tanzania.
- Evidence of such variation among farms suggests that national-level fertilizer recommendations issued by the government may not be appropriate for many farmers.



## **EVALUATION OF THE WELFARE IMPACTS OF A LIVESTOCK TRANSFER PROGRAM IN NEPAL**

**Lead PIs:** Nicholas Magnan, University of Georgia; Sarah Janzen, Kansas State University

**Partners:** NEPA School for Social Sciences and Humanities, Heifer International

**Region:** South Asia

**Timeline:** 2014-2017

**Funding:** \$923,849

**Key innovation:** Physical, Human and Social Capital Transfers

Productive asset transfer programs, often involving livestock, are a particularly popular form of social protection for vulnerable populations. Heifer International is widely recognized as a global leader among organizations providing livestock transfers to poor households. Programs like Heifer’s typically seek to improve the productive capacity of households through the provision of physical, human or social capital, and often some combination of the three “packaged” together.

This AMA Innovation Lab project sought to disentangle the importance of physical assets relative to human and social capital in the provision of social protection designed to improve (and permanently alter) the nutritional and economic outcomes for the chronically poor in Nepal by evaluating the welfare impacts of a social protection program implemented by Heifer. Through a randomized control trial (RCT), researchers compared the average treatment effect of different “packages.” This research project, as a program evaluation, sought to add to our understanding of how asset transfers and human and social capacity building programs contribute to the key Feed the Future concerns of improved nutrition, gender

integration and inclusive agricultural sector growth. Another major focus of this study was the intersection of gender and caste/ethnicity, religion, class, and other vectors, and how the intersection affects the aspirations and ability of specific women to benefit from these interventions.

### **Key Results**

- Targeted beneficiaries of the SLVC program experienced 0.31 standard deviation greater financial inclusion and 0.24 standard deviation greater overall empowerment compared to women in the control group who did not participate in the program.
- Women who were brought into the SLVC program through the “pay it forward” mechanism experienced similar impacts in women’s empowerment and financial inclusion.
- Moderate aspirations related to a better financial situation and higher education for children are related to positive savings.
- Low and overly high aspirations in those areas are related to low savings.
- Aspirations are associated with having higher-achievers in one’s social network.



## **SMART SUBSIDIES TO PROMOTE PEER MONITORING OF CONSERVATION AGRICULTURE COMPLIANCE IN MALAWI**

**Lead PI:** Andrew Bell, New York University

**Partners:** Lilongwe University of Agriculture and Natural Resources, University of Leeds, IFPRI

**Timeline:** 2014-2017

**Funding:** \$772,951

**Key Innovation:** Agglomeration payments and peer monitoring for conservation agriculture compliance

Development agencies and governments are advancing Conservation Agriculture (CA) to promote food security and to improve the environment. CA promotes soil fertility and sustainable yields, and reduces soil erosion and sedimentation. In Malawi, as in much of the developing world, adoption of CA practices has been disappointing, arguably due to inadequately designed CA policies with insufficient incentives to overcome the barriers to adoption for local farmers.

AMA Innovation Lab researchers built on prior research that suggests that agglomeration bonus payments (AP) may offset some program costs by reducing moral hazard and encouraging sustained adoption. These payments provide 1) a flat subsidy that induces landowners to participate in the CA program, and 2) an agglomeration bonus paid to landowners when their land enrolled in the CA program shares a common border with a neighboring parcel also enrolled in the CA program.

This interdependence between neighboring landowners’ agriculture decisions creates a positive network externality that provides an incentive for each adopting landowner to serve as an “extension agent” promoting CA to their neighbors, potentially increasing community adoption rates.

### **Key Results**

- The most important factor that



shaped the decision to adopt any of the three practices of conservation agriculture was whether neighbors had adopted them.

- The importance of neighbors transcended both the availability and structure of a financial incentive.
- The potential these practices have in reducing sedimentation in waterways could provide the basis for payments from hydropower producers for farmers to adopt conservation agriculture.



## AGRICULTURAL INSURANCE IN NEPAL

**Lead PI:** Michael Carter, UC Davis  
**Partners:** Interdisciplinary Analysts (IDA), USAID Mission Nepal  
**Timeline:** 2015-2017  
**Funding:** \$94,300  
**Region:** Terai  
**Key Innovation:** Index Insurance  
**Commodity:** Rice

Index insurance is an innovative product designed to manage the main agricultural risks shared by many farmers in a region at the same time, including drought and floods. However, insurance markets remain underdeveloped in developing countries such as Nepal. One of the most important factors explaining this is the prohibitive cost of insurance. Insurance companies often cannot supply affordable insurance products for these farmers due to the high cost of assessing crop yield losses and

delivering indemnities.

AMA Innovation Lab researchers conducted a feasibility study exploring the possibility of agricultural insurance in Nepal. This study assessed both the technical options available and the development impacts to determine where – and for what commodity – an index-based insurance product might be of high value to farmers. In this study, researchers looked across commodities and geographic areas to create a short list of those commodities and geographic areas where risk reduction strategies can open up investment opportunities for smallholder farmers. Then researchers closely examined the areas and crops to identify the most promising opportunities for a safe and effective insurance product.

### Key Results

- Yield data from the Terai and showed that in 2014 an area yield contract would have issued insurance payouts for individual farmers who experienced a loss 60% of the time. While not perfect, a contract based on average area yield would appear to remove enough risk to be of value to farmers.
- Low-cost satellite measures are poor predictors of on-the-ground yields (largely due to extended period of cloud coverage), indicating that it would be infeasible to use these predictors as the basis for an insurance contract in the Terai.
- We recommended implementation of a small pilot study across 125 multi-ward zones to assess both the implementation costs and the development impacts of an area yield contract. Scaling up an area yield approach would only be worthwhile if its social and economic impacts are large enough to justify the costs.



## ASSESSING THE VALUE OF INDEX INSURANCE FOR HERDERS: COMPARING NDVI-BASED INSURANCE PRODUCTS IN ETHIOPIA AND KENYA

**Lead PI:** Chris Barrett, Cornell University  
**Partners:** International Livestock Research Institute, University of Twente, Universität für Bodenkultur Wien, JRC European Commission, UC Davis  
**Timeline:** 2016-2016  
**Funding:** \$123,231  
**Region:** Ethiopia and northern Kenya  
**Key Innovation:** Indices for insurance  
**Commodity:** Livestock

The Index Based Livestock Insurance (IBLI) and the Hunger Safety Net Programme (HSNP) are among the most prominent social safety net programs in Kenya and in Sub-Saharan Africa. These programs have a common objective of protecting livelihoods from shocks, but they rely on very different logics and mechanisms. These differences could have important consequences in terms of impact on pastoralists' wellbeing and productive investments.

This AMA Innovation Lab project measured which index is most appropriate for a product that aims to protect households from drought-related shocks. It also explored the quality of indices depending on methods of raw data aggregation. The team compared two NDVI indices currently used for index insurance

products. One index, eMODIS (NDVI\_eMODIS), composited and filtered by the US Geological Survey, is publicly available at no charge but comes with a five-week lag. BOKU (NDVI\_BOKU) is an index based on data filtered in near-real-time by Universität für Bodenkultur Wien, though this project focused on accuracy rather than timeliness.

The BOKU index is provided for a fee to Kenya's National Drought Monitoring Authority (NDMA), who then provide the data for HSNP. By developing hypothetical insurance policies for Kenya and Ethiopia using parameters from the asset replacement products available in Marsabit in 2012-2014 and in Ethiopia from 2012-2015, researchers then backcast indemnity payments for the period covered by the household surveys and calculate actuarial premium payments to assess their relative value to the customers.

### **Key Results**

- The analysis of the observed seasons point towards the ZC products, but cannot distinguish between the BOKU and eMODIS products. In all of the remaining analysis, the CZ eMODIS index as the most accurate.
- Insurance providers should focus their attention on the non-index parameters of the contracts specifically, identifying the temporal cycle of risk and working to reduce premium rates.
- Developing contracts that explicitly provide coverage for late onset precipitation may be at least as important as choosing an index. The move to early indices, allowing indemnity payments to come early is another approach to ensuring that the timing of payouts is as beneficial as possible.



## ABOUT FEED THE FUTURE

As the U.S. Government's global hunger and food security initiative, Feed the Future works to give families and communities in some of the world's poorest countries the freedom and opportunity to lift themselves out of food insecurity and malnutrition. By equipping people with the knowledge and tools they need to feed themselves, we are addressing the root causes of poverty and hunger, helping people end their reliance on aid, and creating important opportunities for a new generation of young people—all while building a more stable world.

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Photo: Jonathan Malacarne / AMA Innovation Lab





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