



# Evidence in Agriculture: Extension and Information Delivery

Kyle Murphy Policy Manager, J-PAL April 6<sup>th</sup>, 2017



### Overview

- Background on J-PAL Agriculture Sector and ATAI
- Our approach
- Evaluations on Extension Service Delivery Models
- Providing Price Information
- Conclusion



# Agriculture project map





# Randomized evaluations provide the most rigorous estimate of program impact



# Since the start of ATAI

| Category                           | Total   |
|------------------------------------|---------|
| Farmers surveyed                   | 111,351 |
| Female farmers surveyed            | 47,845  |
| Farmers whose behavior has changed | 17,932  |
| ATAI Awards                        | 55      |
| Unique ATAI projects               | 42      |
| Countries with ATAI projects       | 14      |
| Researchers on ATAI projects       | 89      |

# What comes to mind when you think of agricultural technologies?

### Cereal yields (metric tons/hectare)



# Fertilizer use (kilograms/hectare)



# What is hampering technology adoption?

# Inefficiencies constraining tech adoption

- 1. Credit markets
- 2. Risk markets
- 3. Information
- 4. Externalities
- 5. Input and output markets
- 6. Labor markets
- 7. Land markets

- I. Constraints in Agriculture
- II. Policy Lessons I: Information
- III. Policy Lessons II: Credit
- IV. Policy Lessons III: Risk
- V. Policy Lessons IV: Input/Output Markets
- VI. Conclusion



# Preview: Information

- General extension is often ineffective
- Information given to farmers may be wrong
- Extension may be improved
  - Incentives
  - Feedback
  - Leveraging social networks
- Successes
  - ICT
  - New crops
  - Behavioral barriers





- Governments and NGOs provide advice is designed to maximize yield, rather than maximize farmer profit
- Farmer decisions are based on profit, not yield

# Why do farmers need information?

- Learning about a new agricultural technology is a fundamentally hard
  learning problem
- Information helps famers assess novel technologies, their risk profile and potential profitability
- If a farmer is to use a new technology effectively they need to know:
  - That it **exists**
  - Something about its benefits and costs
  - How to use it effectively

What extension service model does your organization typically use?



# How do farmers receive information?

- Government or NGO extension
   services
  - Test plots
  - Trainings
- Social learning
- Direct to farmers
  - Door-to-door
  - ICT



# Often, traditional extension has limited effects

- Traditional extension often has relatively low impacts on adoption
  - Test plots
  - Farmer field schools
  - Train and visit
  - Training seed farmers
- Extension services have sometimes been ineffective because they promote a technology that is unprofitable.

Duflo et al 2008, Blair et al. 2013, Kondylis et al. 2014, Beaman et al. 2015, Duflo and Suri, forthcoming

# And yet, potentially big costs to ignoring extension

- Upland Nerica Rice introduced in Sierra Leone
  - In villages where seeds coupled with extension, yields increased by 16%
  - In villages where seeds were simply distributed, yields fell
  - Without extension, would be hard for farmers to learn about yield potential

How to improve extension?

Contracting

Technology (ICT)

Social Learning

**Behavioral Constraints** 

# Improving extension services

- Incentives may improve adoption
  - Extension officers
  - Lead farmers
- Feedback on extension may help
  - Improves satisfaction
  - Improves knowledge in certain circumstances

BenYishay and Mobarak 2015, Ben Yishay et al. 2015, Jones and Kondylis 2015, Masset and Haddad 2014

# ICT to reach farmers directly

 Interventions using mobile phones to provide information to farmers have been shown to increase adoption and improve yields



Cole and Fernando 2016, Casaburi et al. 2014

# Mobile phone-based agricultural extension

- Gujarat, India
- 2011-2012
- Center for Microfinance
- Awaaz.De



# Mobile Phone-Based Agricultural Extension in India



Cole and Fernando 2012, Cole and Fernando 2014

# Mobile phone-based agricultural extension

- High take up and use of mobile platform
- Traditional extension had no effect
- Switch to more effective pesticides
- Increased adoption of cumin
- Some evidence of increased yields in cotton and cumin

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• Estimated return of \$10 per \$1 spent

### Precision Agriculture for Development (PAD) Gujarat, Kenya, Ethiopia

#### Based on India and (ongoing) Kenya ATAI RCTs:



#### System Characteristics

Hybrid model data generation (experts and farmers) Constant experimentation and learning Farmer feedback – two way communication

# Harnessing ICT to Increase Agricultural Production in Kenya (ATAI)



Casaburi et al. 2014

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# Social learning

- (Much) extension relies centrally on social learning for the last mile
  - Too expensive to train everyone who you hope to reach
- Lots of good evidence that social learning happens in agriculture
- Key question: How to design extension services to maximize social learning?
  - Breadth versus depth of treatment with limited resources



Ben Yishay et al. 2015, Beaman et al. 2015, Tjernstrom 2015, BenYishay and Mobarak 2013

# Pit Planting in Malawi

- Malawi Department of Agriculture Extension Services (DAES) wanted to promote pit planting
- In villages, selected 2 lead farmers to train in pit planting
  - Business as usual (agent selection)
  - Selection so as many people as possible will be reached by one contact (simple contagion)
  - Selection so as many people as possible will be reached by two contacts (complex contagion)



# Results

- Large differences in social learning comparing business-asusual partner selection to Treatment partner selection
- 46% in Benchmark villages have no evidence of social learning after 3 years – compared to 16% of complex (2 contact) contagion villages
- Estimation: 70% of farmers need
   2 contacts to adopt



# Social learning

- The messenger matters
  - A farmer is more likely to demand a new technology if a greater proportion of his/her network is demonstrating it
  - Lead farmers most closely resembling target farmers were more effective at promoting a new technology
- Designing extension systems so that some farmers will be able to observe multiple data points is critical
  - need multiple demo plots or lead farmers per village – and intensity of exposure may be more important than equity



Ben Yishay et al. 2015, Beaman et al. 2015, Tjernstrom 2015, BenYishay and Mobarak 2013

## Behavioral Barriers: Solving Procrastination

# Timing the information

# Reminders to use inputs

Duflo et al. 2011, Casaburi et al. 2014, Cole and Fernando 2014

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# Behavioral Barriers: Extension helps when learning is hard

# Farmer-led experimentation

# Simple tools to aid learning

Hanna et al. 2012, Duflo et al. forthcoming, Islam 2014

# Ongoing Information Delivery Studies

- An Evaluation of Digital Green's Agricultural Extension Program in India
- Harnessing ICT to Increase Agricultural Production in Kenya (ATAI)
- Precision Agriculture for Development in India

# Summary: Extension Services

- General extension is often ineffective
- Improved extension may be critical for new tech adoption:
  - When tech is not readily understood, and/or is complicated by heterogeneity
- Extension may be improved
  - Incentives
  - Feedback
  - Technology
  - Leveraging social networks
  - Adapting the pedagogical model
- Successes
  - ICT
  - New crops
  - Behavioral biases

# Conclusions

- A lot of specific information is necessary for farmers to make informed decisions on technology adoption
- In this information needy context: higher adoption can be achieved through increasing the efficiency of information transfer
- Information is only useful to the degree that it is profitably actionable







# Thank you!

Kyle Murphy <u>kmurphy@povertyactionlab.org</u>

