



Informed by rigorous evidence: Testing and scaling agricultural information and extension programs in low- and middle-income countries

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Overview

- I. Who we are
- II. Evidence on agricultural information and extension services
- III. Scaling up evidence-informed programs
- IV. Discussion



J-PAL: Connecting the dots from research to action



Research

We fund innovative new research and carry out high-quality randomized evaluations around the world.



Informing policy and practice

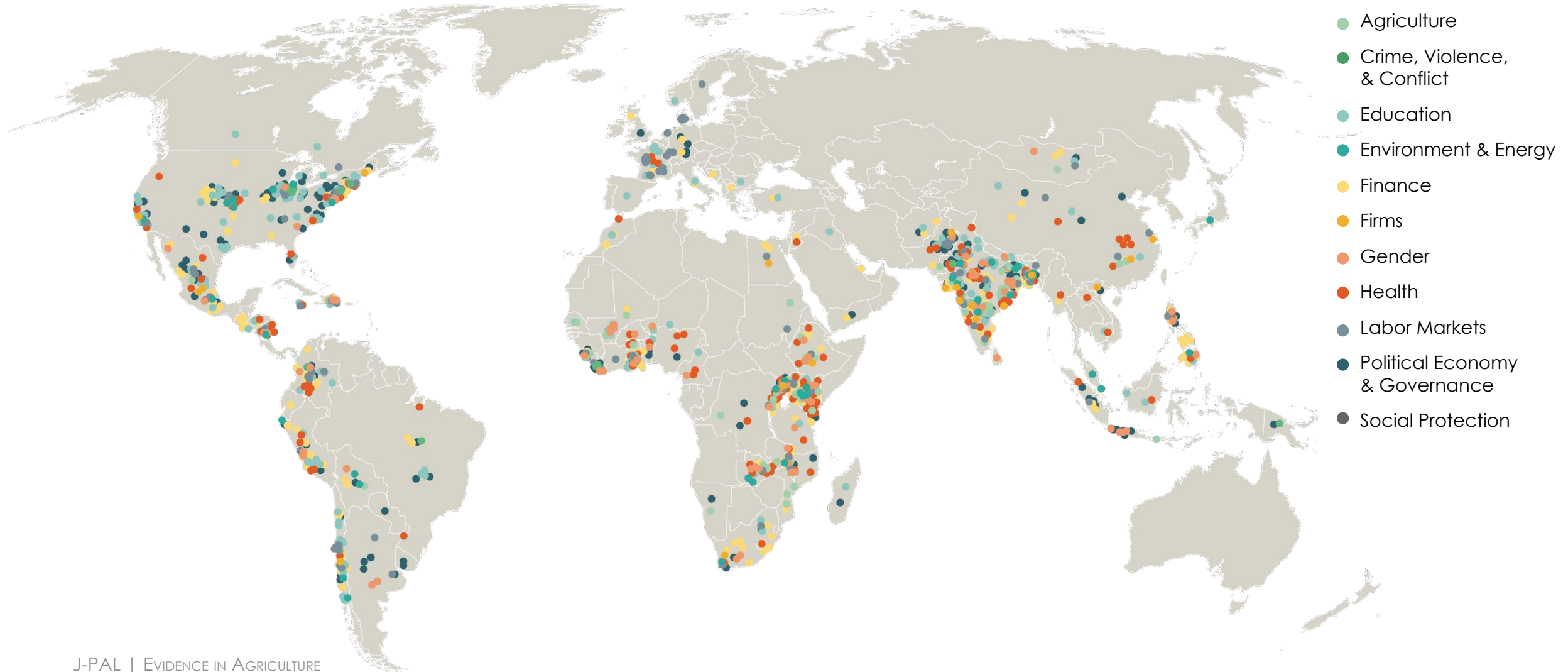
We build partnerships to inform high-level decision-making and catalyze adoption of evidence at scale.



Education and training

We train policymakers and researchers in evaluation methods and develop rigorous online education to make learning more accessible for all.

Global knowledge: 1,170+ completed randomized evaluations in more than 95 countries



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- ATAI launched in 2009 to **mobilize the research community** around these questions:
 - What helps and what hinders smallholder farmers' adoption of technologies and access to markets?
 - Which approaches impact farmer profits and welfare?
- **Funded 85 projects (43 RCTs)** in 18 countries in South Asia & Africa
- **Policy outreach** to private sector, governments, public service providers, donors, etc. to build partnerships for research and a culture of evidence use in decision-making
- **Scaling research** as we learn from funded studies

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Traditional extension often has limited effects

- Traditional extension often has relatively low impacts on adoption or yields
 - Test plots
 - Farmer field schools
 - Train and visit
 - Training seed farmers
- Yet, there are 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, it would be hard for farmers to learn about yield potential

[Duflo et al. 2008, 2011](#), [Blair et al. 2013](#), [Kondylis et al. 2017](#), [Beaman et al. 2021](#), [Hanna et al. 2014](#), [Waddington, et al. 2014](#), [Abate et al. 2023](#), [BenYishay et al. 2018](#), [Glennister and Suri, forthcoming](#), [Cole & Sharma 2018](#), [Chandrasekhar et al 2022](#)

How to improve extension?

Social Learning

Incentivizing Trainers

Behavioral Constraints

ICT

Gender Intentional Design

Social learning to disseminate information



Photo Credit: Sk Hasan Ali | Shutterstock.com

- When there is lack of capacity and trust in recommendations, relying on information dissemination through social networks can improve the take-up of new technologies.
- Farmers are more likely to be convinced to adopt the practice themselves when they see someone in their network use a new technology. Particularly when:
 - There are variations in plot characteristics
 - There is a lack of social proximity/connection between messengers and peers

[Bandiera et al. 2023](#), [Beaman and Dillon 2018](#), [Beaman et al. 2021](#), [Behaghel et al. 2020](#), [BenYishay et al. 2018](#), [BenYishay et al. 2020](#), [Emerick et al 2021](#), [Fafchamps et al. 2021](#), [Kondylis et al, 2017](#)

Incentivizing extension agents and trainers

- Extension agents' incentives are not always aligned with outcomes for their trainees.
- Incentivizing trainers helps improve technology adoption among farmers
 - Motivating agro-dealers by linking their profits to expanded sales
- Holding trainers accountable can also improve technology adoption among farmers
 - Offering feedback channels for farmers on trainings



[Bandiera et al. 2023](#), [Beaman and Dillon 2018](#), [Behaghel et al 2020](#), [Dar et al 2020](#), [Jones and Kondylis 2017](#)

Tools that simplify concepts and practices can address behavioral barriers and increase adoption

- **Leaf color charts** for timing of fertilizer use

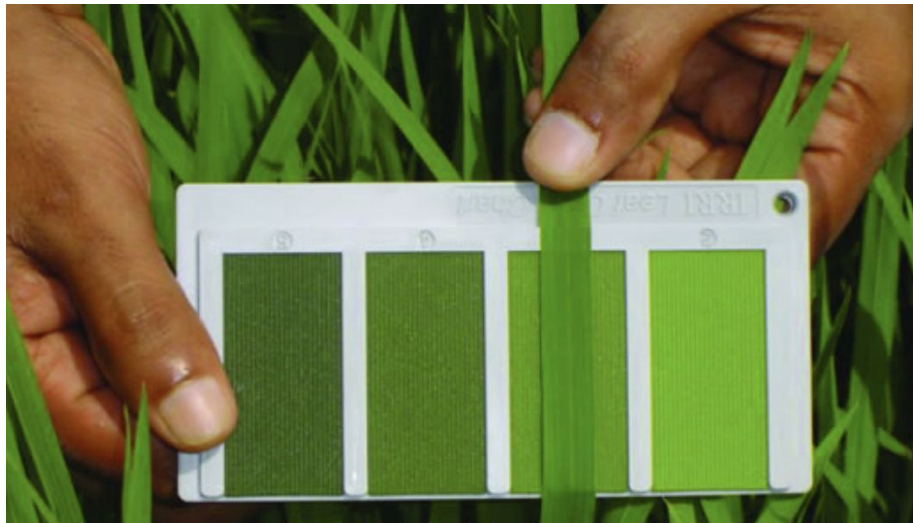


Photo credit: Beg and Islam 2021

Farmers increased their rice yield by about 1.8 kilograms per forty square meters of land and increased their revenue by about US\$22.30.

- **Blue kitchen spoon** to measure fertilizer amounts



Photo credit: Chandrasekhar et al 2022

Reported fertilizer use increased by 8 percent among farmers who were given a spoon.

[Beg and Islam 2021](#), [Chandrasekhar et al 2022](#), [Cole and Sharma 2018](#)

ICT to reach more farmers directly

- Using mobile phones to provide information to farmers can increase farmer knowledge and adoption of technologies and in some cases, improve yields.
- Digital solutions can often be designed and scaled cost-effectively.
- However, lighter-touch, infrequent, or general information shared through phone-based interventions alone may not be as effective as well-timed and tailored ICT.



Photo credit: Tanaya Devi

[Abate et al 2023](#), [Baul et al 2022](#); [Casaburi et al 2019](#), [Cole and Sharma 2018](#), [Cole et al 2023](#), [Dar et al 2021](#), [Dzanku et al 2022](#), [Fabregas et al 2022](#), [Hörner et al. 2019](#), [Lecoutere et al 2023](#), [Van Campenhout et al 2020](#), [Cole and Fernando 2021](#).

Mobile phone-based agricultural extension

- Gujarat, India
- 2011-2013
- 1200 cotton, cumin, and wheat farmers
- Centre for Micro Finance (CMF)
- Awaaz.De (Avaaj Otalo)



[Cole and Fernando 2021](#)

Mobile phone-based agricultural extension in India

- High take up and use of mobile platform
 - Income and education were not clear detectors of willingness to use the service
- Addition of in-person extension had an effect on use of the platform and minor effects on cotton producers' outcomes
- Increased expenditure and adoption of inputs
- Suggestive evidence of peers learning from the information of study participants
- No evidence of increased yields or profits in cotton or wheat; some evidence of increase in cumin
- Willingness to pay

[Cole and Fernando 2021](#)

Timing and tailoring ICTs

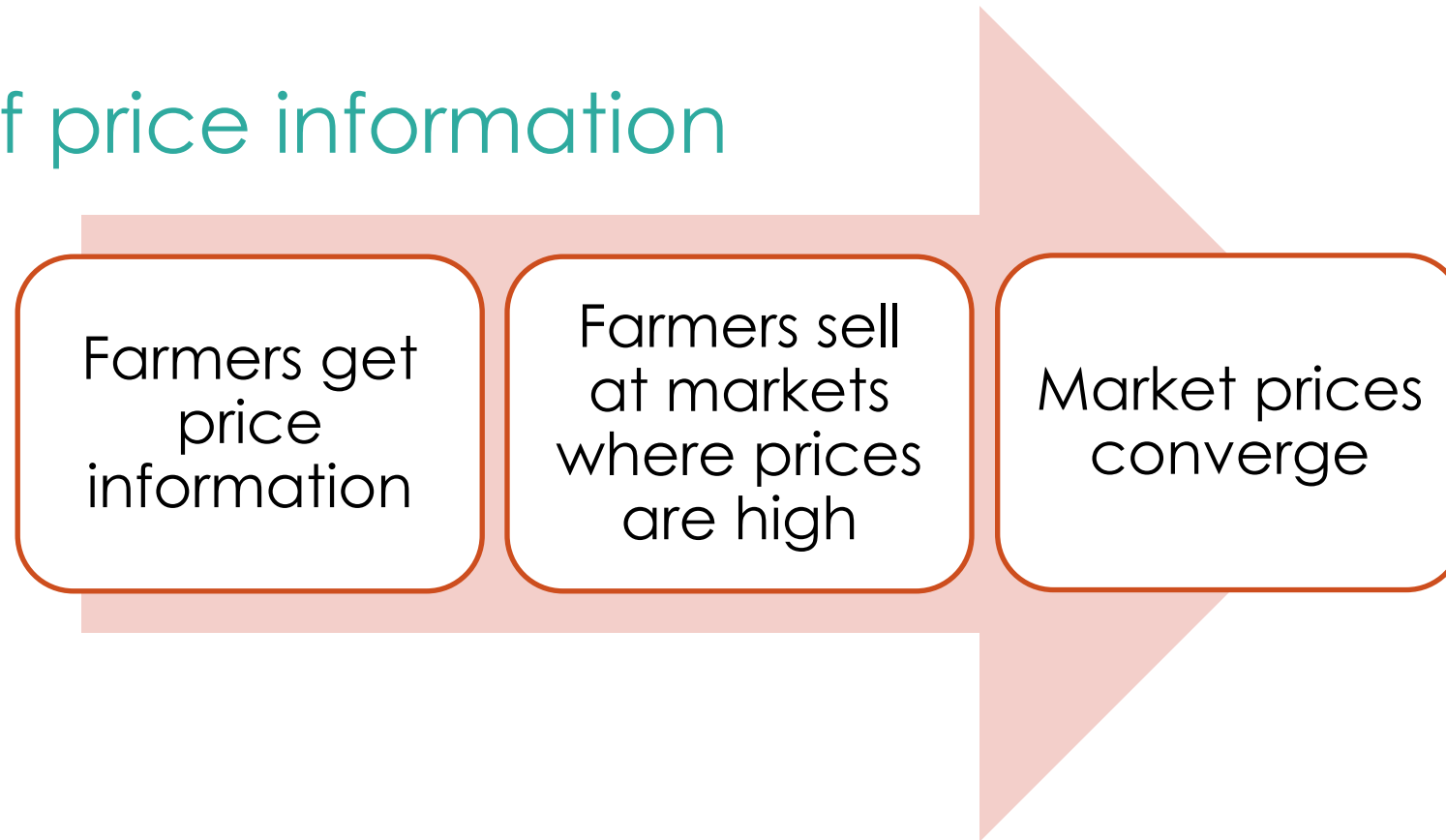
- In Kenya, contracted sugarcane farmers received SMS reminders about agricultural tasks timed to coincide with relevant parts of the growing season.
 - Increased expenditure and adoption of inputs
 - 8 percent increase in yields relative to the comparison group
 - Cost-effective: US\$0.02 per text message while raising farmer revenues by US\$54



[Casaburi et al 2019](#)

ICTs can help farmers access market-level price information

Theory of price information



Using ICT to inform farmers about market prices

- When farmers have better knowledge about prevailing market prices or about buyers near them ready to trade, they can:
 - take advantage of markets for their goods
 - negotiate better sale prices with traders
 - increase production
 - reduce price dispersion across markets
- Providing price information to intermediaries (traders) or producers with direct access to markets, can have an impact on market price.
- Studies have not generally shown an impact on average prices that farmers received across markets.

[Bergquist et al. 2021](#), [Mitra et al. 2018](#), [Nakasone 2018](#), [Soldani et al. 2023](#), [Camacho and Conover 2019](#), [Goyal 2010](#)

Connecting buyers and sellers through digital app

- Buyers and sellers of maize connect through marketplace and e-commerce app, Kudu, to increase access to timely price information and reduce search costs
 - Led to an increase in flow of trade and reduction in price dispersion across markets, especially among markets close to each other.
 - Revenues of farmers in relative surplus areas (where there was a larger supply of maize) rose, and average trader profits decreased.



Photo Credit: Hiren Ranpara | Shutterstock.com

[Bergquist et al. 2021](#)

Gender intentional design: Targeting men and women

- Targeting both men and women of farming households can increase women's engagement with advisory services, knowledge of new technologies and women's agricultural decision-making power.
 - In Uganda, women were included in extension services featuring a video about improved maize management practices.
 - Involving women improved their knowledge and adoption of the recommended practices by 13 percentage points relative to when only male members of the household received information.
 - Women who received information also experienced an increase in agricultural decision-making power.

[BenYishay et al. 2020](#), [Lecoutere et al. 2023](#)

Gender intentional design: Bundling to alleviate constraints

- Women small-scale farmers face multidimensional constraints
 - Cultural and social norms
 - Household demands
 - Access to an ownership of land
- Bundling agricultural advisory services with other offerings like gender sensitization training can improve outcomes
 - In Bangladesh, agricultural training was bundled with nutrition information and gender sensitization training and delivered to both male and female members of farming households.
 - Receiving all 3 interventions together increased the number of women who felt empowered by 52 percent, which was higher than the impact of any individual intervention.

[Donato et al. 2020](#), [Olney et al. 2016](#), [Quisumbing et al. 2023](#)

Why might well-designed extension offerings not result in measurable productivity and profit gains?

- Many studies find changes in behavior/adoption
- Limited take-up of extension services, limited adoption of practices
- Heterogeneity in the profitability of promoted technologies
- Smaller-scale experiments early on lead to delays before meaningful gains
- Challenges in measuring agricultural yields and profits...noisy and weather-dependent
- Relatively low power even for MDEs that have very high benefit/cost ratio
- Meta-analyses may be helpful (e.g., Fabregas et al. 2019)



Photo credit: Digital Green

[Abate et al. 2023](#), [Bandiera et al. 2023](#), [Behaghel et al. 2020](#), [Beg and Islam 2021](#)



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Precision Development (PxD)



33

PxD at a Glance

Global non-profit organization serving **10M+ users** in **5 countries in Africa and Asia**

Offices in three countries and the ability to start operations quickly elsewhere. **Partnerships with national and state-level governments**

Scaling the findings from studies in Kenya (Michael Kremer) and India (Shawn Cole) that showed promising results for digital extension



Key intervention: Customized Digital Agricultural Advice

Farmer profile information

- Location
- Agro-ecological zone
- Socio-demographics
- Crop variety
- Water management

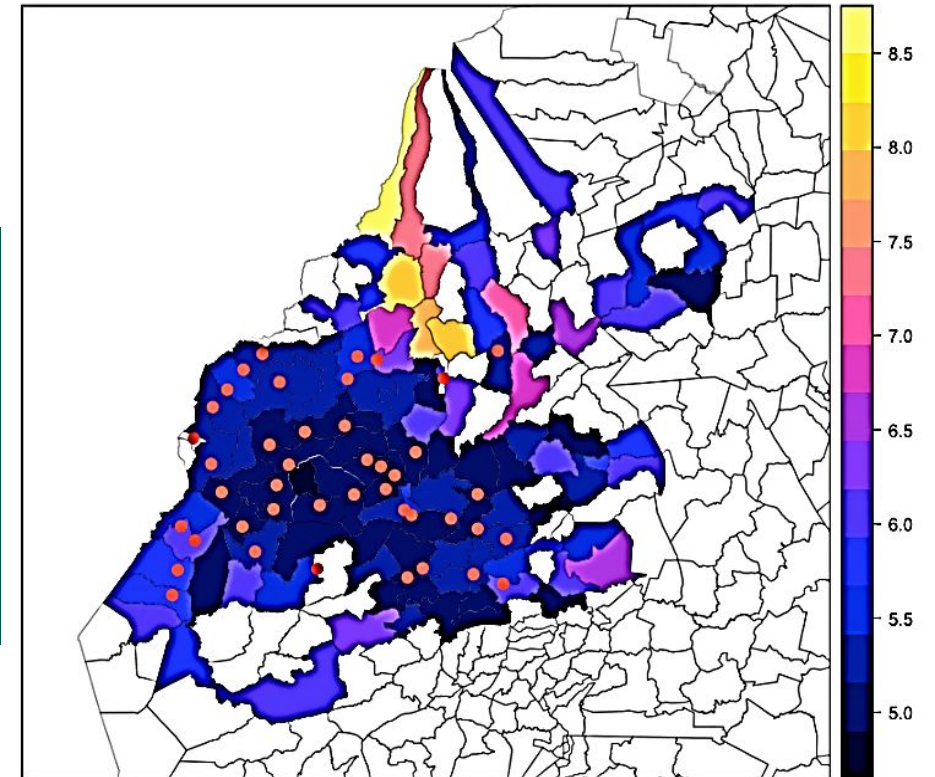


Agricultural data

- Soil type
- Rainfall
- Market prices
- Pest/disease outbreaks

Customized advice

- Real-time weather information
- Input use (type, quantity, and timing)
- Recommended farming practices
- Market and price information



Key Elements Differentiating PxD's Model

Using **behavioral science** and **human-centered design** to design actionable and **customized** messages and services

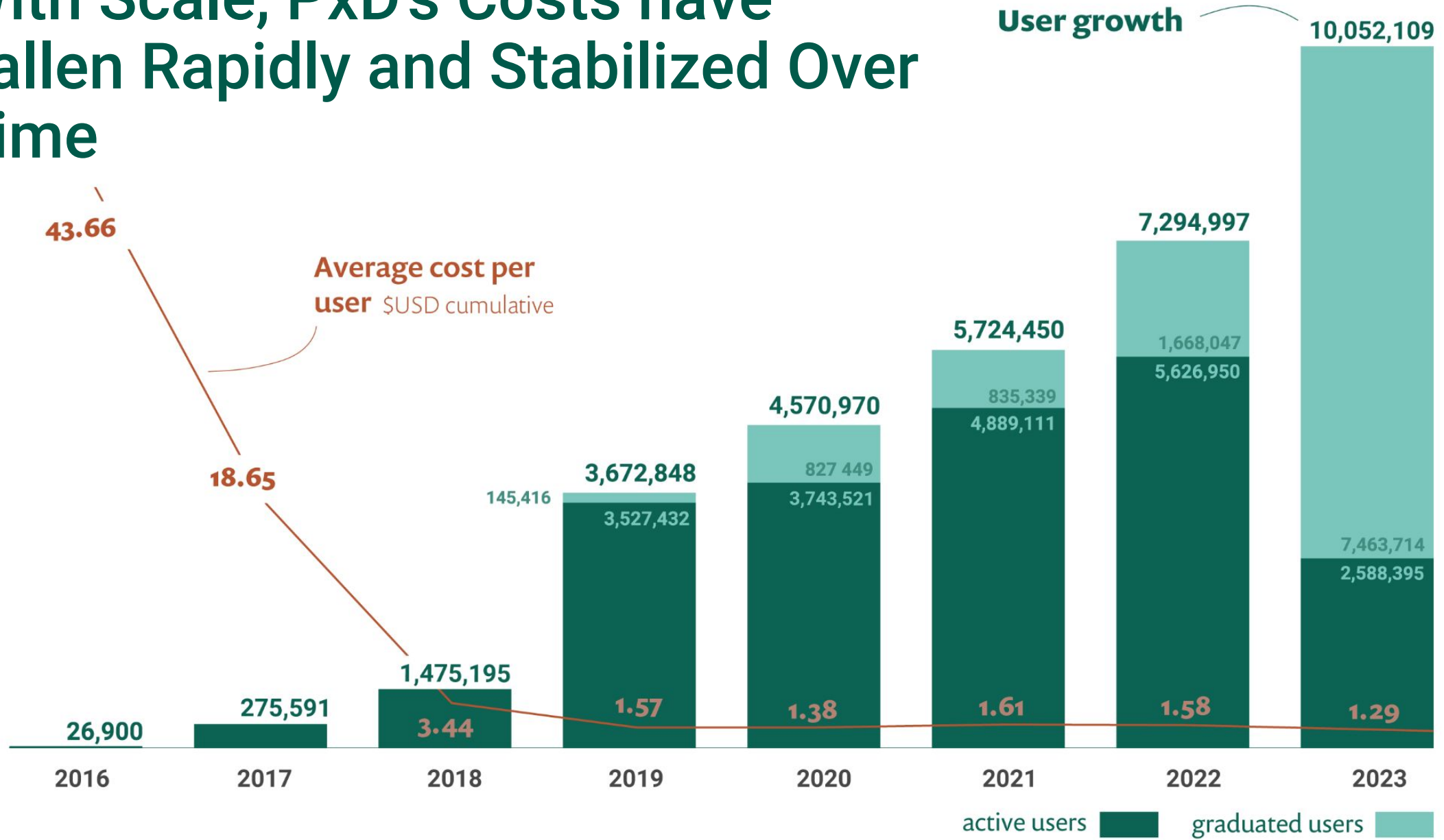


Scale rapidly through partnerships with governments, NGOs, and private companies, while remaining **free to the user**

Using **experiments and data science** to test, iterate, and improve

Share data and learnings transparently as public goods

With Scale, PxD's Costs have Fallen Rapidly and Stabilized Over Time

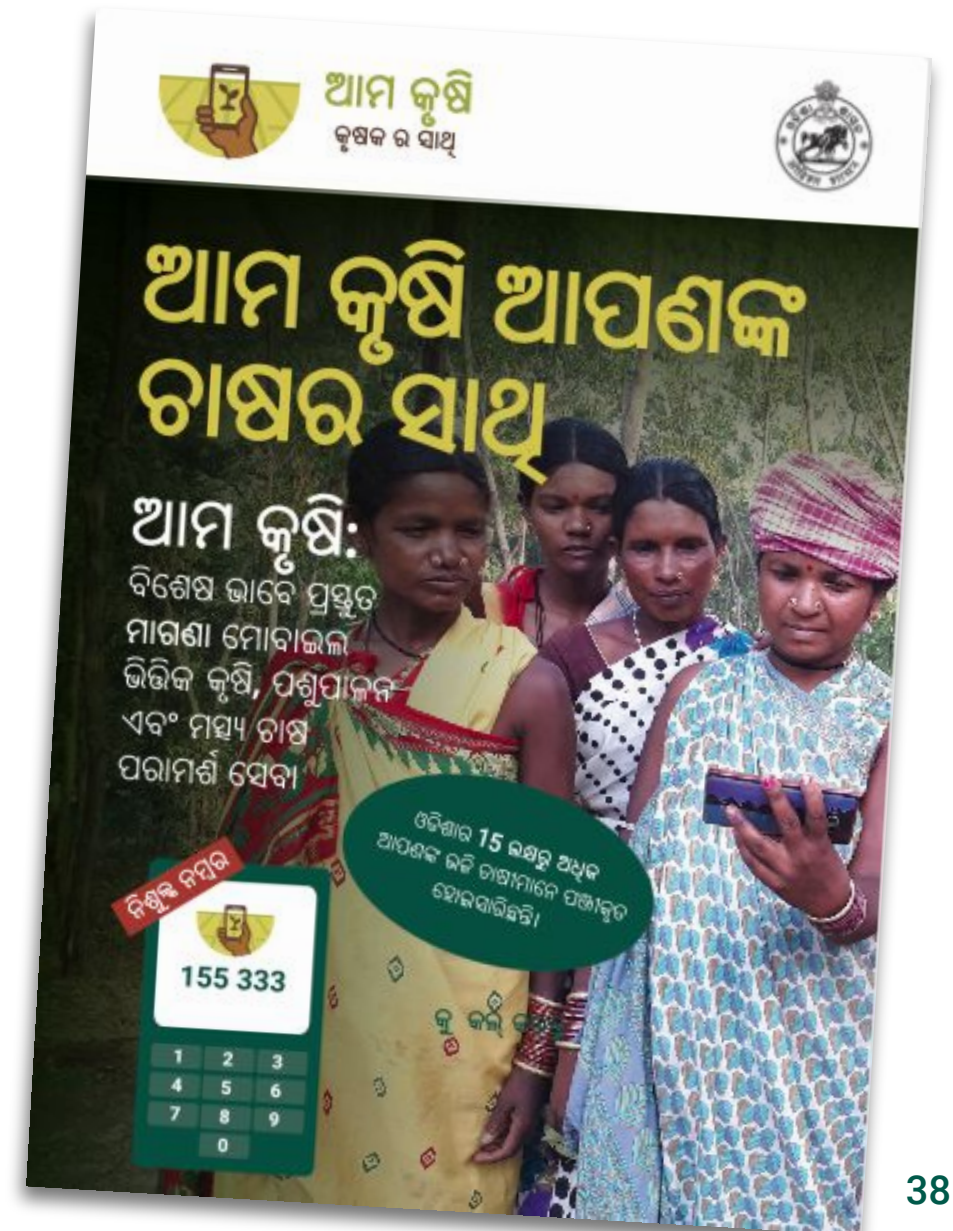


Ama Krushi: A Deep-Dive

Model	Build - Operate - Transfer programme with state government in India; 2018 - 2021
Reach	Serving 6 million + farmers
Content	Content across 20+ crops, 8 forms of livestock & marine and freshwater fish
Partners	Government, Bill & Melinda Gates Foundation + other ecosystem partners

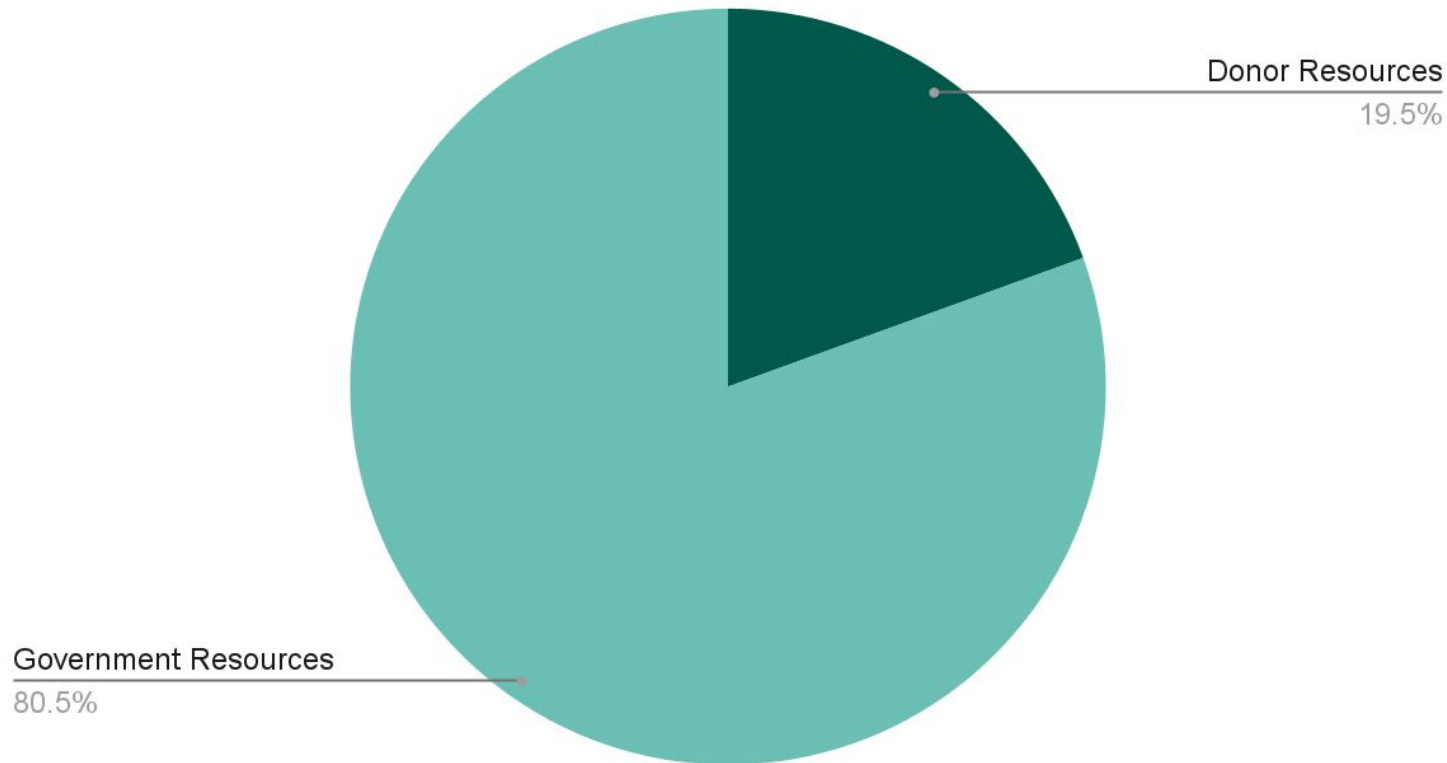
Since transition (May 2022), Ama Krushi is entirely funded by the Government, and continues to grow in scale and improve its service offerings

More information on how the Ama Krushi service works can be found [here](#)



Building long-term sustainability: Build-Operate-Transfer

PxD's Flagship Program - State in India (2018-2026)



Philanthropic funding pays for the risk capital: innovation, R&D, tech set up, proof-of-concept

Public funding pays for service delivery at scale

Content example: Realizing the theory of change



Flood-tolerant seeds

25% Increase in self-reported adoption

7.5% increase in knowledge

\$30 Estimated increase in profit per year per adopter (using Emerick et al., 2016)

13:1 Estimated marginal benefit-cost

Namaskar. Welcome to Ama Krushi. Today we want to tell you about Swarna Sub-1 and CR1009 Sub-1, which are two paddy varieties suitable for flash flood and water submergence conditions. (District name) district regularly experiences flooding and cyclones, such as the recent Cyclone Amphan. The Odisha government has categorized (district name) district as a flood hazard district. We recommend planting Swarna Sub-1 and CR 1009 Sub-1, because these varieties reduce your chances of crop losses under water submergence for up to 15 days. For farmers who are practicing transplanting, we recommend using CR1009 Sub-1 for seedlings that can survive submergence right after transplanting. Thank you!

Ama Krushi evidence: What has worked?

Preliminary findings

- **Increased climate resilience**, reducing the likelihood of severe crop loss from weather events by ~10%
- **Economically meaningful increases in yield** in areas that experienced excess rainfall (year 1) as well as areas that experienced water stress (year 2)
- Increased service usage following extreme weather events

Insights

- Different farmers face different constraints across seasons and geographies
- Who benefits the most from the service, and by how much, will change across seasons
- Overall, evidence that the service helps farmers prepare for unanticipated weather shocks

Reflections: Scaling a proven intervention is an iterative process

- A scalable model replicates the theory of change (as opposed to the intervention itself)
- Optimizing a proven intervention for scale requires tweaking and testing
- New barriers that emerge in the process of scaling may require further R&D and add-on interventions
- Different types of funding are needed for different phases of scaling

Thank you!



Considerations for scaling evidence-informed programs

- Research is critical for assessing impact, showing which aspects of program delivery are important to hold when taking an intervention to scale, and validating effectiveness of links along a value chain.
 - In other words, research shows what SHOULD BE scaled but does not show what WILL scale. How are these questions different?
 - If you have a government partner willing to scale based on impact evidence, that is one path.
 - If the private sector is to scale, profitability of the intervention is key, not the impact of the intervention.
 - Example of [Market Linkages Project](#).
 - Scaling may require a set of things that are not what pilots study: advertising, brand reputation, protection of IP, etc.
 - Example of [Quality Upgrading studies](#).

Public or Private Sector Scaling?

- Precision Development is a good example of an institution that has thought carefully and strategically about what to scale, with whom to scale.
- There are important tradeoffs between choosing a scaling partner:
 - Governments as scaling partner can focus on welfare argument, but:
 - Do they have the resources?
 - Do they have the infrastructure?
 - Do government employees have the right incentives to serve as scaling partner?
- Private sector can invest, scale, build quickly, but:
 - Does the intervention generate enough profit for scaling?
 - Will a scaled private sector entity have the incentives to continue to provide the intervention in a manner that generates the same welfare?

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Thanks!

For questions related to evidence presented today, please email:

atai@povertyactionlab.org

