

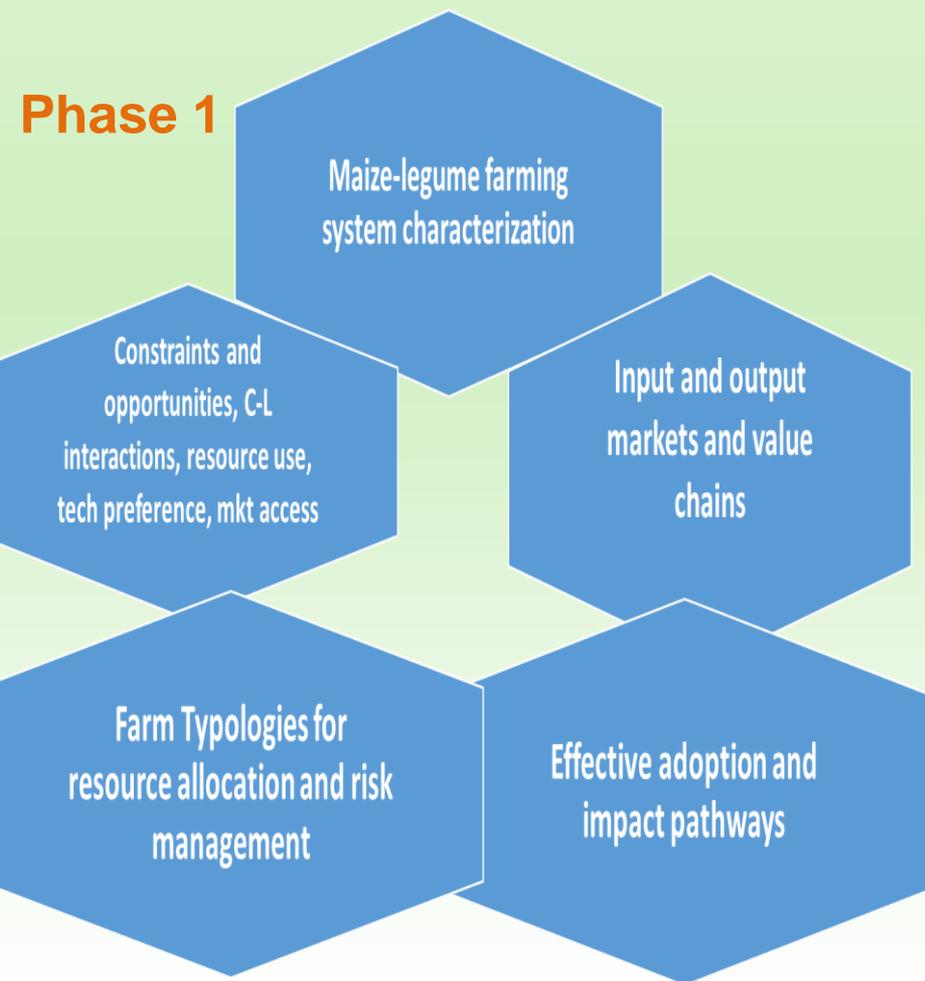
Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa

Paswel Marenja and Objective 1 SIMLESA TEAM
SIMLESA End of Project Review
Addis Ababa March 5-9, 2018

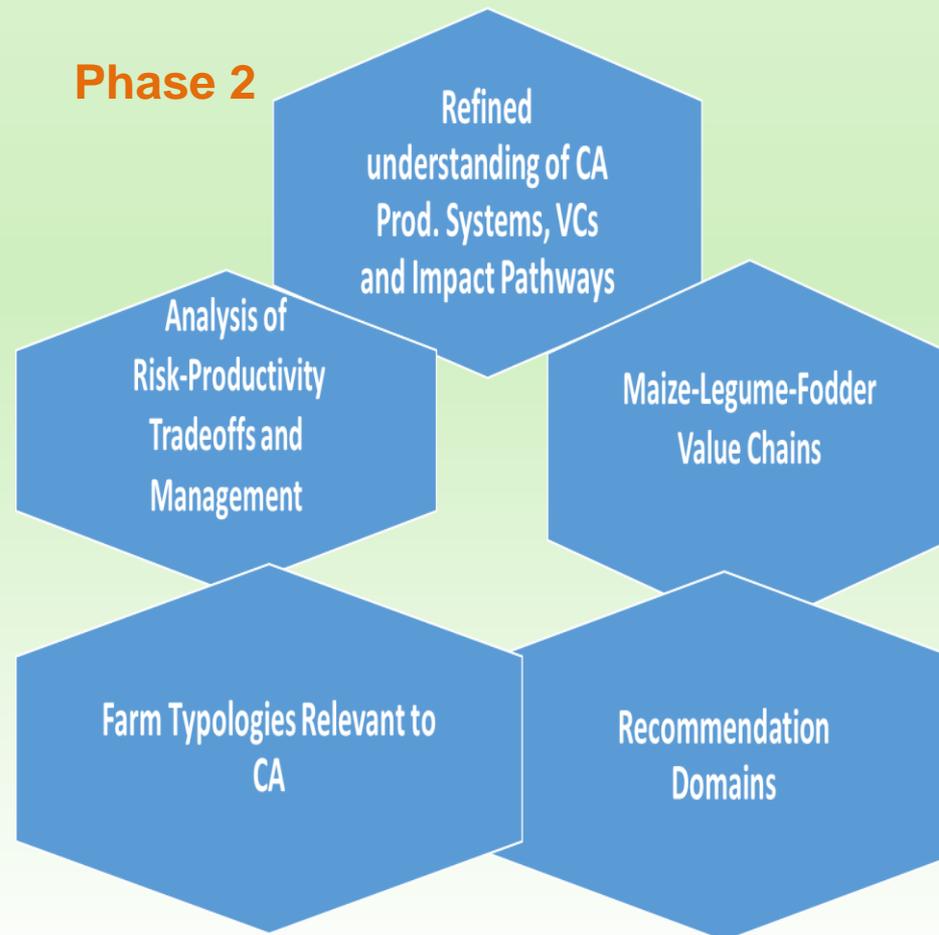


SIMLESA OBJ 1: To enhance the understanding of CA-based intensification options for maize-legume production systems, value chains and impact pathways

Phase 1



Phase 2



Paper Title	Summary message
<p>Hailemariam, T., Kassie, M., Bekele, S. and Kholin, G (2013) Cropping Systems Diversification, Conservation Tillage and Modern Seed Adoption in Ethiopia: Impacts on Household Income, Agrochemical Use and Demand for Labor. <i>Ecological Economics</i>, 93: 85-93.</p>	<p>The importance of integrated adoption of SI options for full impact</p>
<p>Kassie, M., Jaleta, M., and Mattei, A. (2014). Evaluating the impact of improved maize varieties on food security in rural Tanzania: A continuous treatment approach. <i>Food Security</i>, 6:217-230</p>	<p>The importance of improved varieties in food security as an integral part of SI options</p>
<p>Kassie, M., Stage, J., Teklewold, H.; and Erenstein, O. (2015). Gendered food security in rural Malawi: Why is women's food security status lower? <i>Food Security</i>, 7:1299-1320.</p>	<p>Makes the case for a more nuanced approach to closing gender gaps in the impacts of technology and their impacts</p>
<p>Kassie, M., Teklewold, H., Marenja, P., Jaleta, M. and Erenstein, O. 2015. Production risk and food security under alternative technology choices in Malawi. Application of a multinomial endogenous switching regression. <i>Journal of Agricultural Economics</i>. doi: 66(3): 640-659.</p>	<p>The impact of SI options (especially when combined) in reducing the risk of crop failure</p>

Kassie, M., Teklewold, M., Jaleta, M., Marenya, P., and Erenstein, O. (2015). Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa. *Land use Policy*, 42: 400-411.

The institutional and micro drivers of adoption of SI options

Marenya, P., Kassie, M. and Tostao, E. (2015). Fertilizer use on individually and jointly managed crop plots in Mozambique. *Journal of Gender, Agriculture and Food Security*, 1(2), pp 62-83.

Identifying gender gaps in technology adoption and how to close them to achieve more equitable agricultural technology adoption

Marenya, P., Kassie, M., Jaleta, M., Rahut, D. (2017). Maize market participation among female and male headed households in Ethiopia. *Journal of Development Studies*, 53(4), 481-494.

Differential access to markets based on gender differences and how to correct these. Important for accessing SI options and for sustaining adoption

Marenya, P. P., Kassie, M., Jaleta, M., & Erenstein, O. (2017). Predicting minimum tillage adoption among smallholder farmers using micro-level and policy variables. *Agricultural and Food Economics*, 5(1), 12, <https://doi.org/10.1186/s40100-017-0081-1>.

The role of input subsidies, credit and extension as policy drivers for adoption of minimum tillage, a crucial element of SI options promoted in SIMLESA

<p>Mulwa, C., Marenya, P., & Kassie, M. (2017). Response to climate risks among smallholder farmers in Malawi: A multivariate probit assessment of the role of information, household demographics, and farm characteristics. <i>Climate Risk Management</i>, 16, 208-221.</p>	<p>The paper focuses on how to encourage farmers to take adaptive actions by assessing the relative importance of information compared to other factors. In relative terms the paper finds that even when financial limitations are binding, making climate-related information available can still motivate farmers to adapt.</p>
<p>Jaleta, M., Kassie, M., and Shiferaw, B. (2013) Trade-offs in crop residue utilization in mixed crop-livestock systems and implications for conservation agriculture, <i>Agricultural Systems</i>, 121: 96-101.</p>	<p>The competition for feed constrains the use of crop stover for mulch. This tradeoff has to be resolved by promoting property rights over crop stover through local bylaws that limit livestock indiscriminate livestock grazing.</p>
<p>Kassie, M., Marenya, P., Tessema, Y., Jaleta, M., Zeng, D., Erenstein, O., & Rahut, D. (2017). Measuring Farm and Market Level Economic Impacts of Improved Maize Production Technologies in Ethiopia: Evidence from Panel Data. <i>Journal of Agricultural Economics</i>. DOI 10.1111/1477-9552.12221</p>	<p>This paper focuses on economy wide impacts of SI options</p>
<p>Jaleta, M., Kassie, M., and Shiferaw, B. (2013) Trade-offs in crop residue utilization in mixed crop-livestock systems and implications for conservation agriculture, <i>Agricultural Systems</i>, 121: 96-101.</p>	<p>The need to resolve mulch-feed competition if crop residues are to be used for mulching</p>
<p>Rodriguez D, De Voil P, Rufino MC, Odendo M, van Wijk MT (2017) To mulch or to munch? Big modelling of big data. <i>Agricultural Systems</i> 153, 32-42</p>	<p>Even though the trade-off between mulch and feed can be resolved, the magnitude of the benefits in terms of food security and household income are likely to be small. More transformational changes, e.g. market developments, new value chains, and strategies to diversify sources of livelihoods are required, in addition to incremental adaptations from conservation agriculture practices.</p>

Frelat R, Lopez-Ridaura S, Giller KE, Herrero M, Douchamps S, Djurfeldt AA, Erenstein O, Henderson B, Kassie M, PaulBK, Rigolot C, Ritzema RS, Rodriguez D, van Asten P, van Wijk MT. (2016) Drivers of household food availability in sub-Saharan Africa based on big data from small farms. Proceedings of the National Academy of Sciences of the United States of America, 113 2: 458-463. doi:10.1073/pnas.1518384112

Recognizing and understanding diversity among smallholder farm households in sub-Saharan Africa is key for the design of policies that aim to improve food security.

Wilkus EL, Roxburgh CW, Rodriguez D (2018) Understanding Household Diversity in Eastern and Southern Africa. ACIAR Monograph (to download use: <https://cloudstor.aarnet.edu.au/plus/s/iaV9azl89uWFLNA>)

Description of household diversity across eastern and southern Africa

Wilkus EL and Rodriguez D (2018) Sustainable intensification in the face of climate variability. In: The SIMLESA Book, Chapter 1.4, ACIAR Monograph (to download use: <https://cloudstor.aarnet.edu.au/plus/s/51Ui8CRpHay1jfh>)

A framework for the analysis of risks in the sustainable intensification of agriculture

Wilkus EL (2018) Research and implementation capacity for climate informed sustainable intensification. In: The SIMLESA Book, Chapter 2.3, ACIAR Monograph (to download use: <https://cloudstor.aarnet.edu.au/plus/s/sDXH8mNqKdHHSVE>)

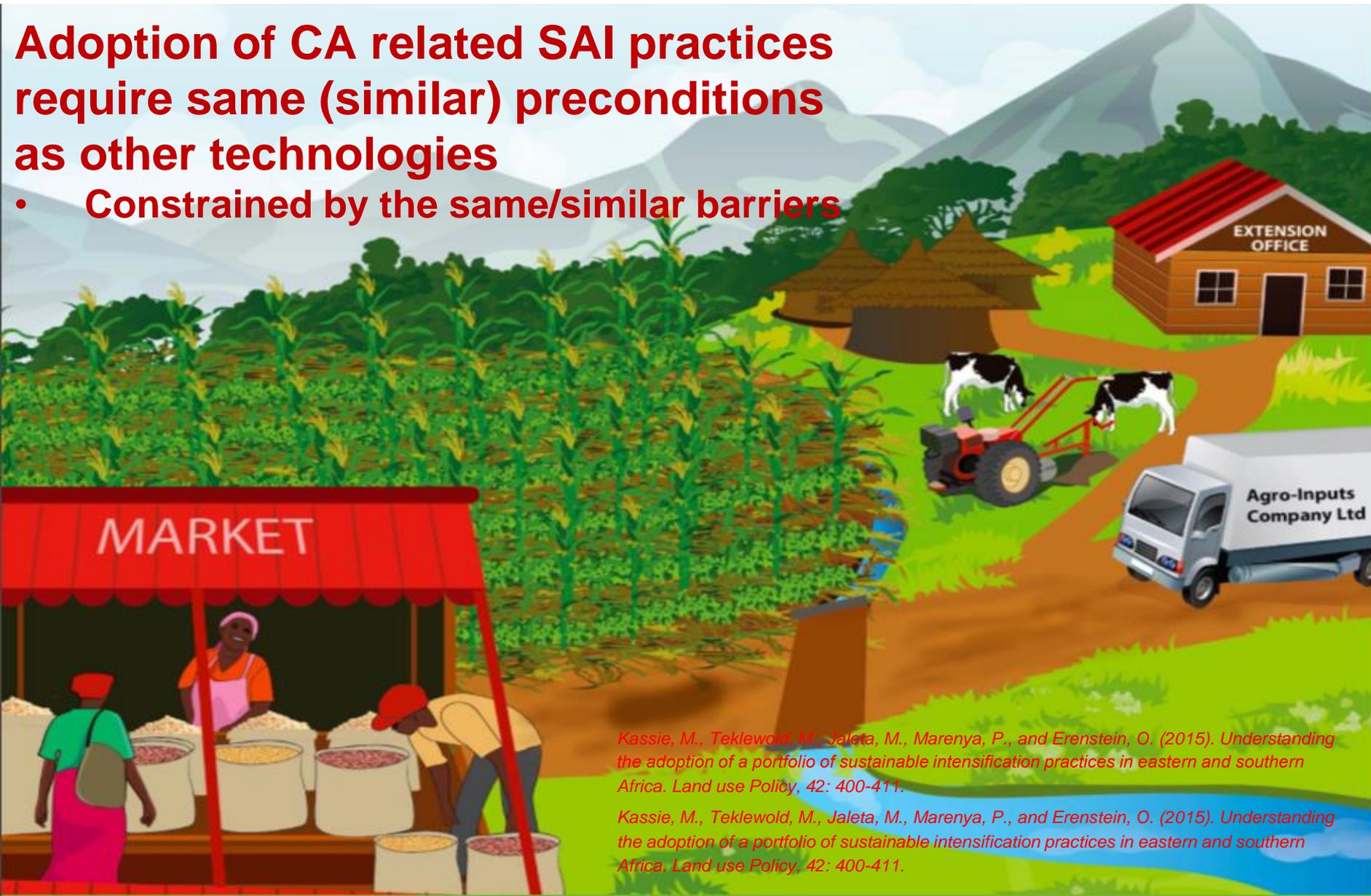
Recount of existing seasonal climate application tools for Sub Saharan Africa

Micro and Macro Perspectives

1. At farm level SAI requires: adoption of **suites of practices** and technologies
2. At Macro level it requires a major **policy rethink**

Adoption of CA related SAI practices require same (similar) preconditions as other technologies

- **Constrained by the same/similar barriers**



Kassie, M., Teklewold, M., Jaleta, M., Marenja, P., and Erenstein, O. (2015). Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa. Land use Policy, 42: 400-411.

Kassie, M., Teklewold, M., Jaleta, M., Marenja, P., and Erenstein, O. (2015). Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa. Land use Policy, 42: 400-411.

Adoption of CA related SAI practices require same (similar) preconditions as other technologies

- **Constrained by the same barriers**

Kassie, M., Teklewold, M., Jaleta, M., Marenja, P., and Erenstein, O. (2015). Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa. Land use Policy, 42: 400-411.

Kassie, M., Teklewold, M., Jaleta, M., Marenja, P., and Erenstein, O. (2015). Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa. Land use Policy, 42: 400-411.



Social Capital is Key to facilitate information sharing learning and resource mobilization (Farmer groups, Relatives in important positions)

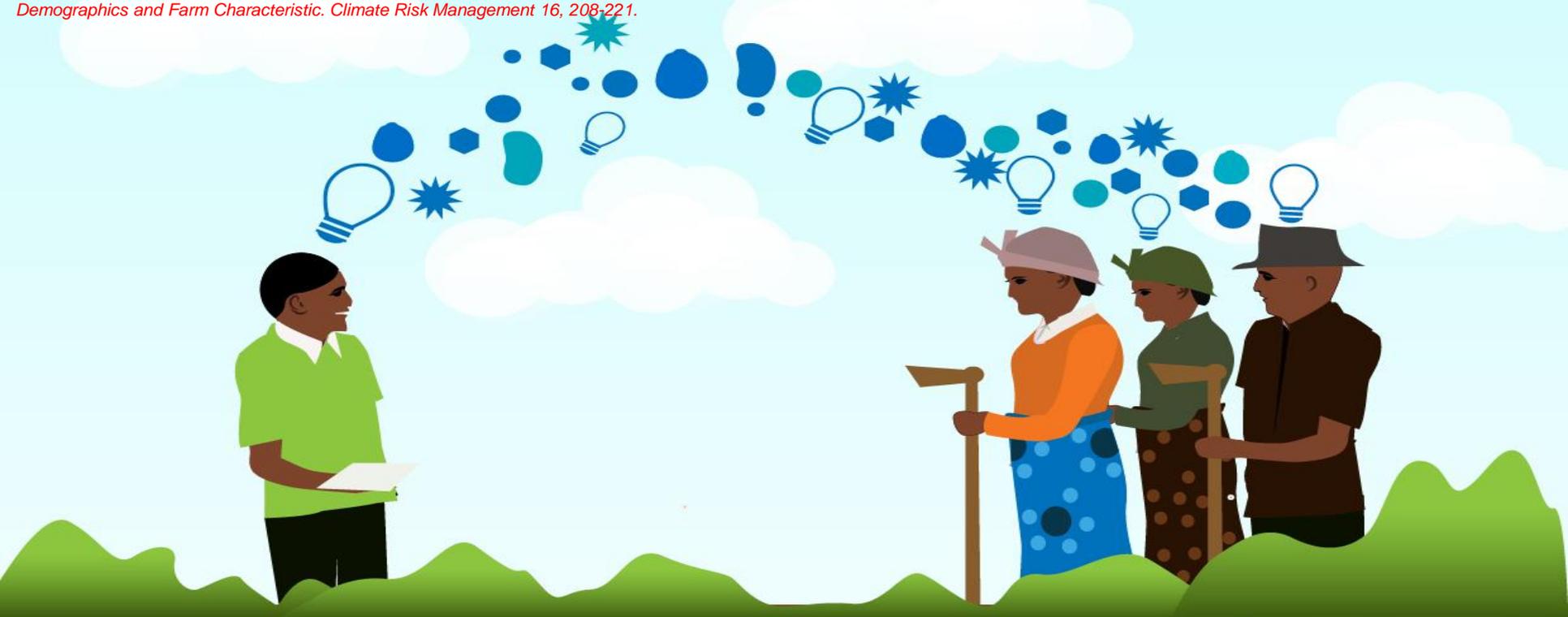
Kassie, M., Teklewold, M., Jaleta, M., Marenja, P., and Erenstein, O. (2015). Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa. Land use Policy, 42: 400-411.



Positive outcomes from CA-based practices are possible but for them to spread widely among farmers require strong information systems

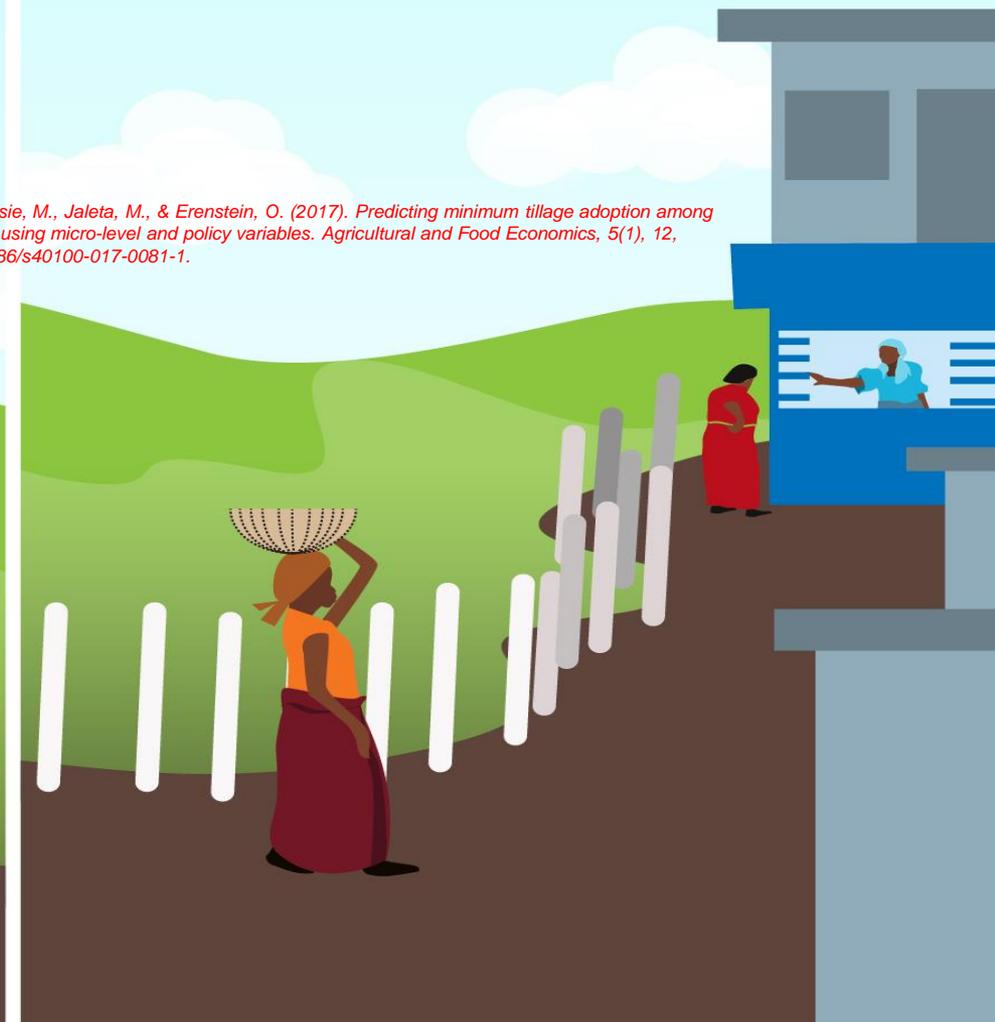
Marenya, P. P., Kassie, M., Jaleta, M., & Erenstein, O. (2017). Predicting minimum tillage adoption among smallholder farmers using micro-level and policy variables. Agricultural and Food Economics, 5(1), 12, <https://doi.org/10.1186/s40100-017-0081-1>

Mulwa, C. Marenya, P., Rahut, D. and Kassie, M. (2015) Response to Climate Risks among Smallholder Farmers in Malawi: A Multivariate Probit Assessment of the Role of Information, Household Demographics and Farm Characteristic. Climate Risk Management 16, 208-221.

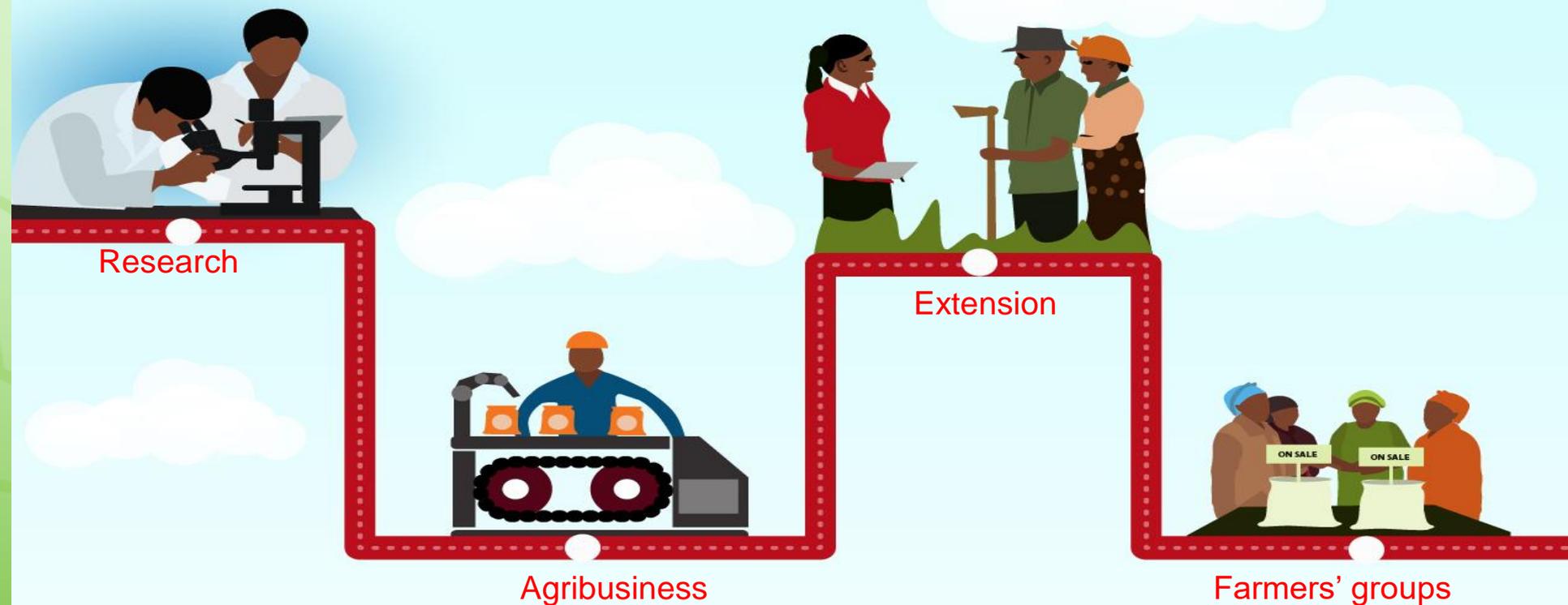


Linkages to markets are critical for adoption. Markets mediate profitable opportunities to underwrite technology adoption

Marenya, P. P., Kassie, M., Jaleta, M., & Erenstein, O. (2017). Predicting minimum tillage adoption among smallholder farmers using micro-level and policy variables. Agricultural and Food Economics, 5(1), 12, <https://doi.org/10.1186/s40100-017-0081-1>.

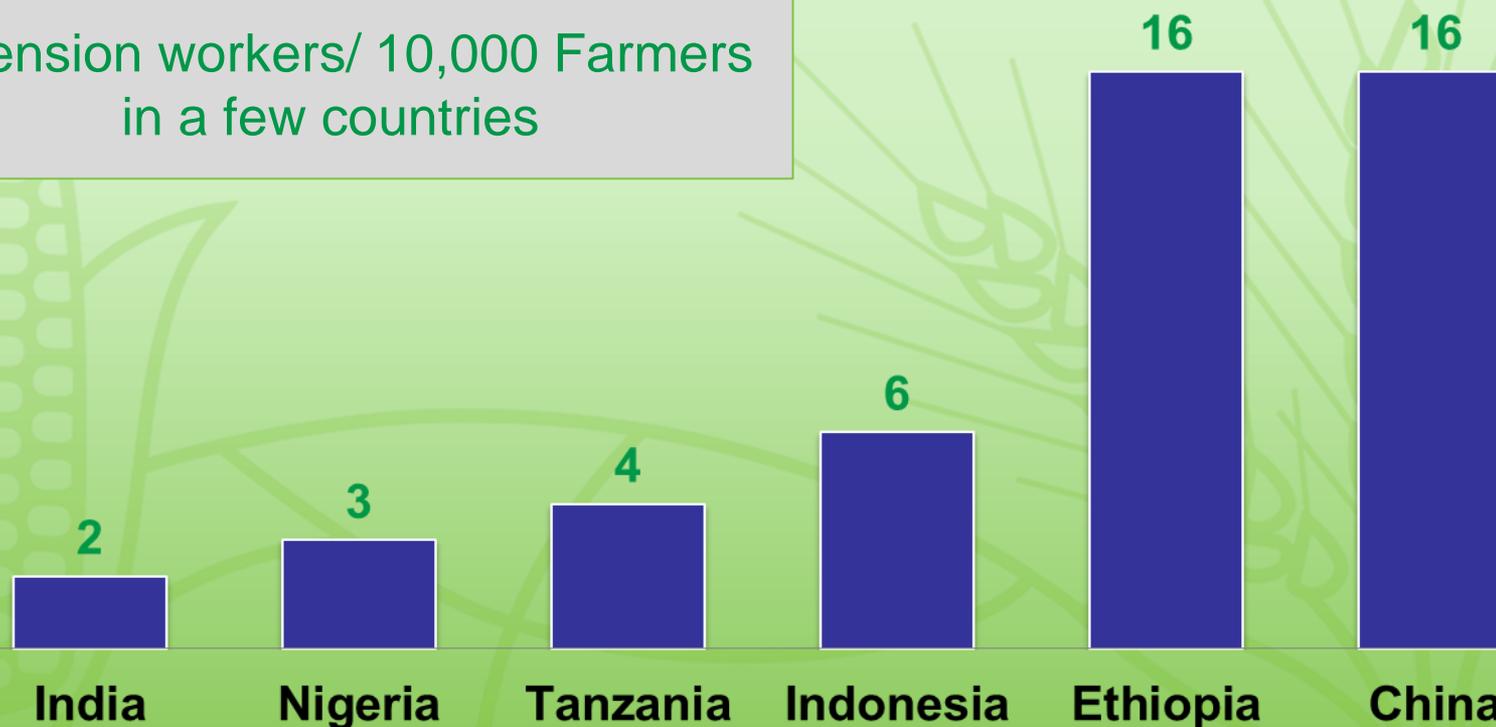


Working in multi-stakeholder process across the value chain to facilitate division of labor. In recognition that technology transfer happens in a pipeline



Policy Action 1: Increase frequency and access to extension information

Extension workers/ 10,000 Farmers
in a few countries

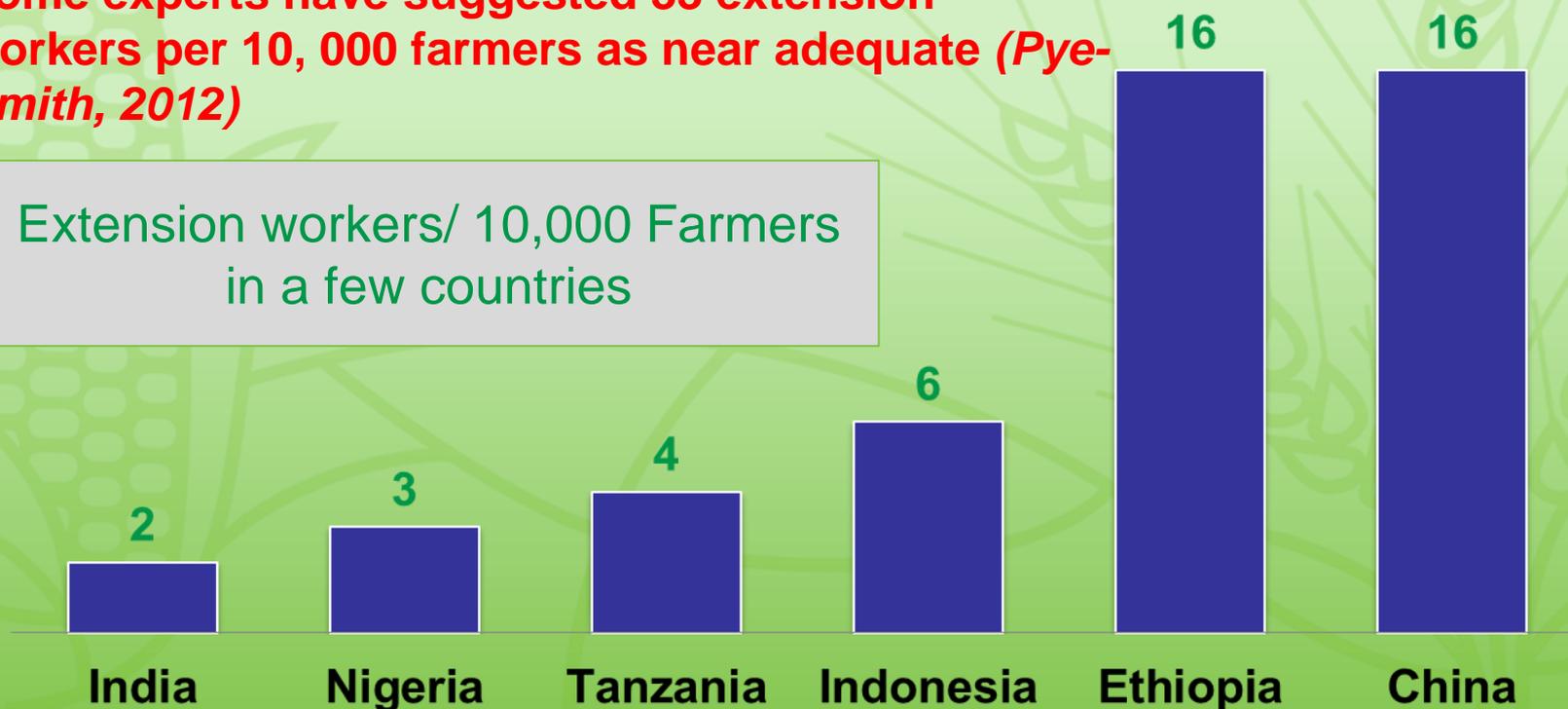


Marenya, P. P., Kassie, M., Jaleta, M., & Erenstein, O. (2017). Predicting minimum tillage adoption among smallholder farmers using micro-level and policy variables. *Agricultural and Food Economics*, 5(1), 12, <https://doi.org/10.1186/s40100-017-0081-1>.

Policy Action 1: Increase frequency and access to extension information

Some experts have suggested 33 extension workers per 10,000 farmers as near adequate (*Pye-Smith, 2012*)

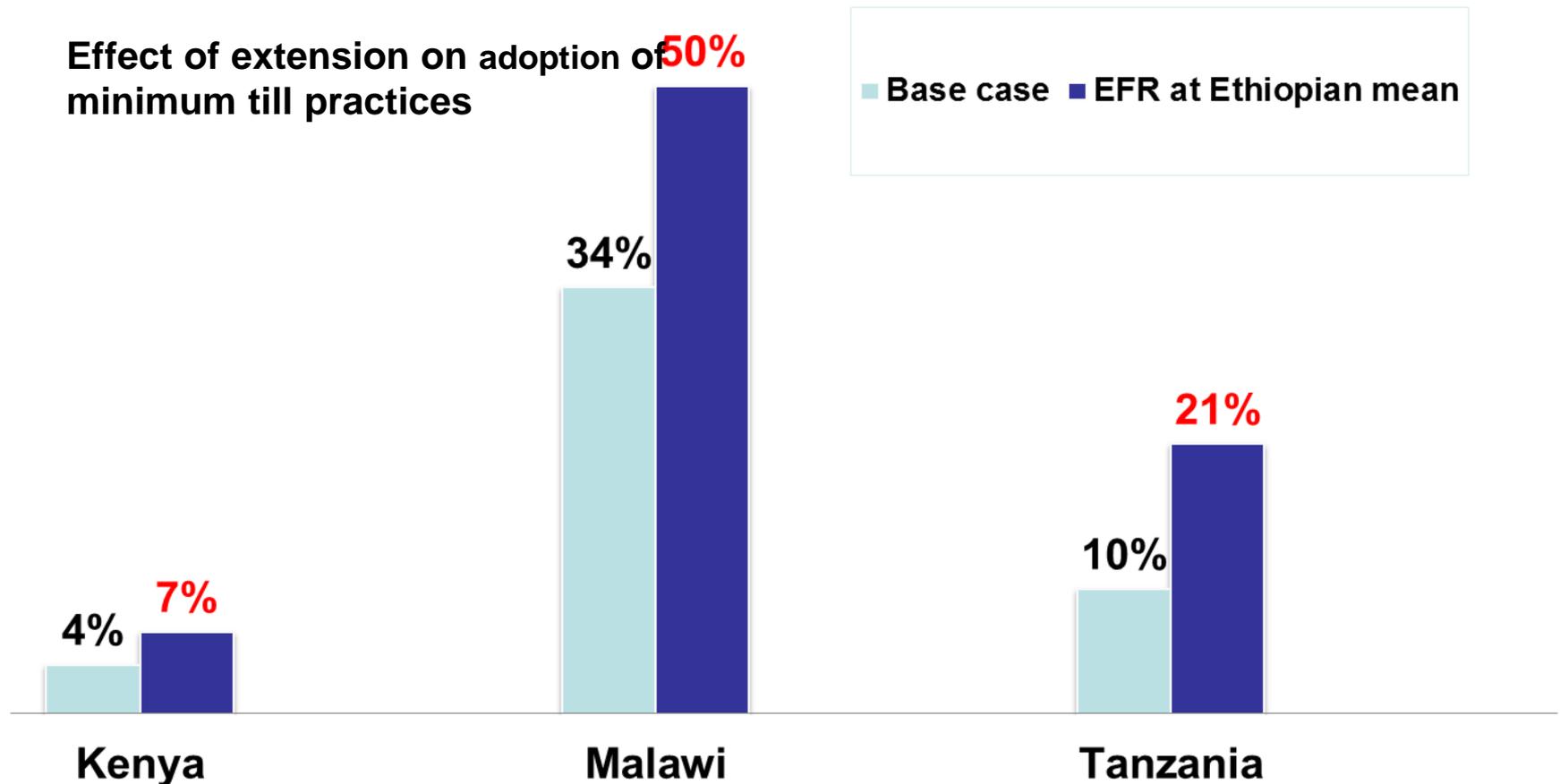
Extension workers/ 10,000 Farmers in a few countries



Policy Action 1: Increase frequency and access to extension information

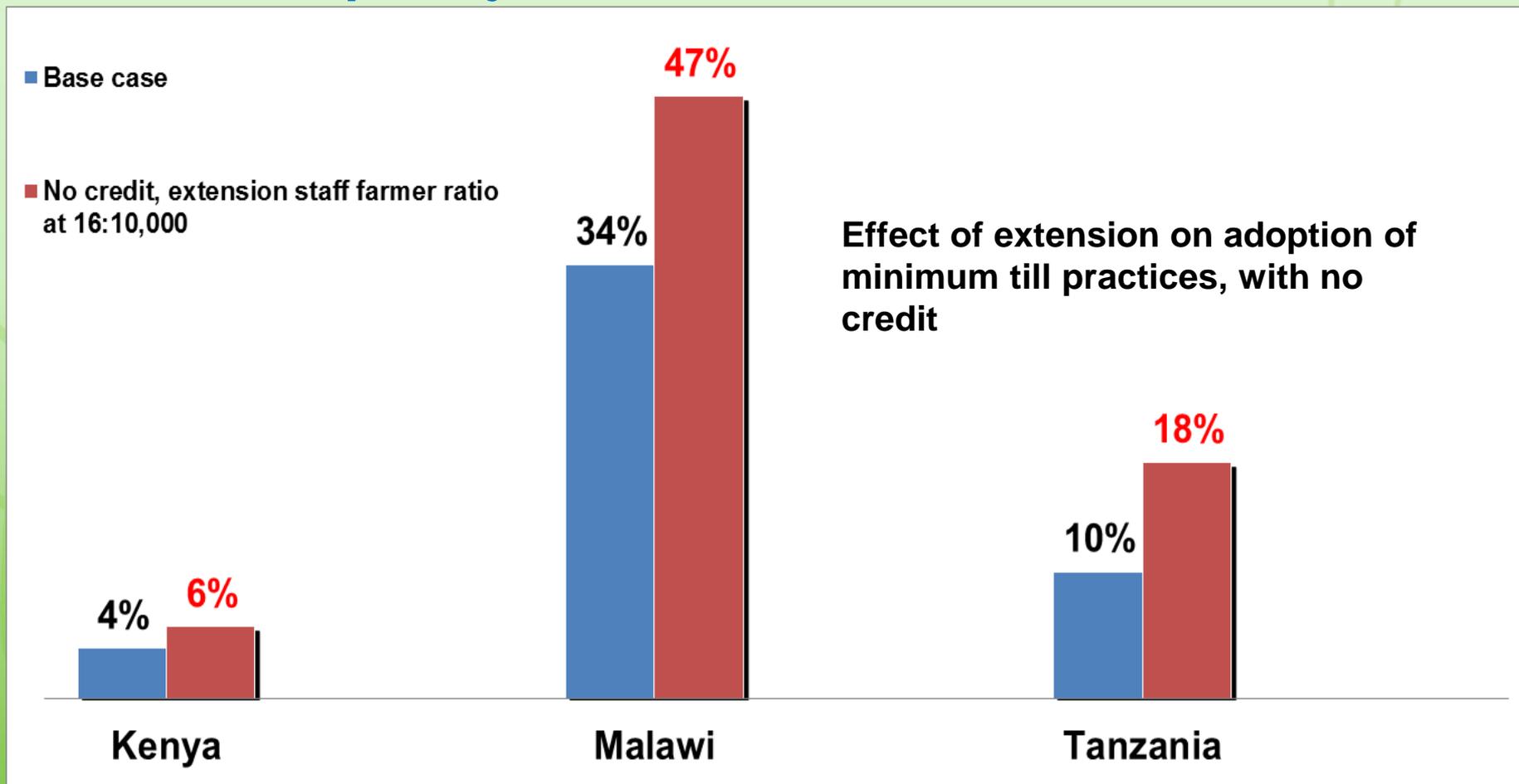
Increasing Extension Farmer Ratio to Ethiopia Levels

Effect of extension on adoption of minimum till practices



Policy Action 1:

Increase frequency and access to extension information

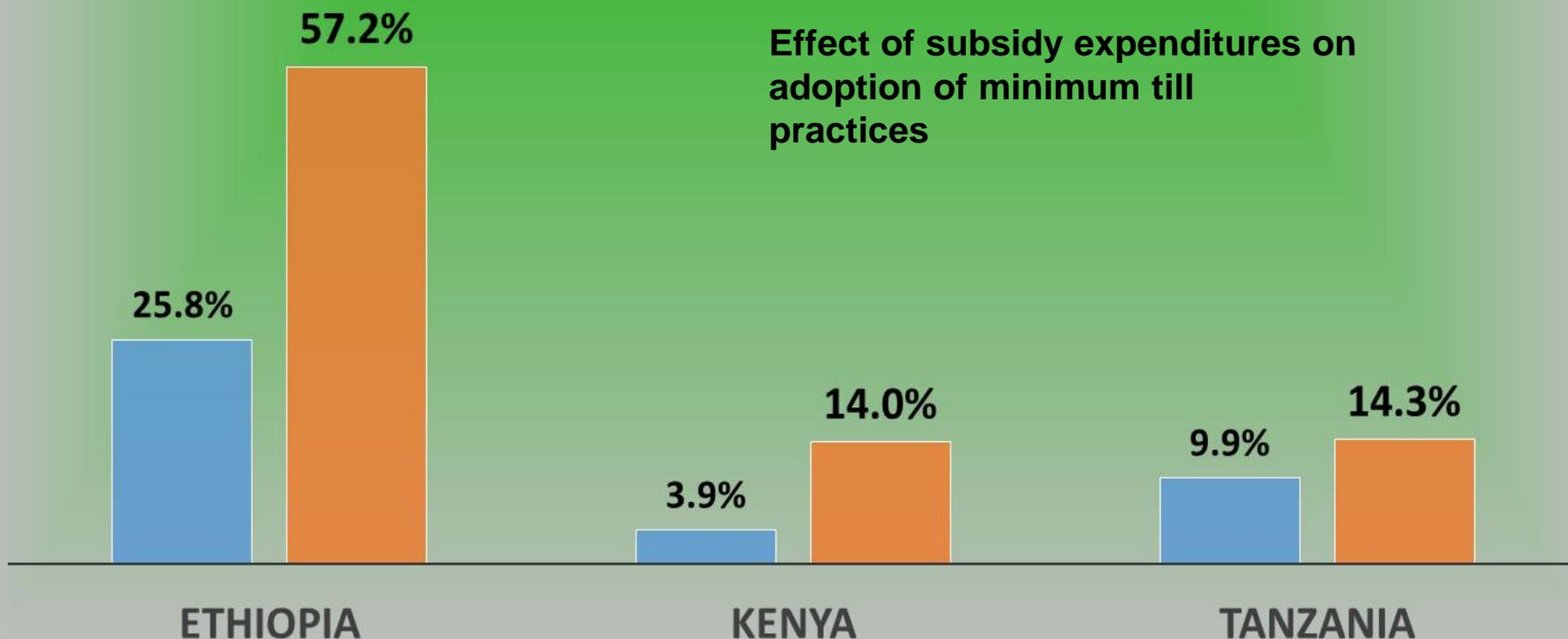


Policy Action 2:

Improve market access, lower input costs, widen access to finance

■ Base ■ Subsidy expenditure at 58% (Malawi level)

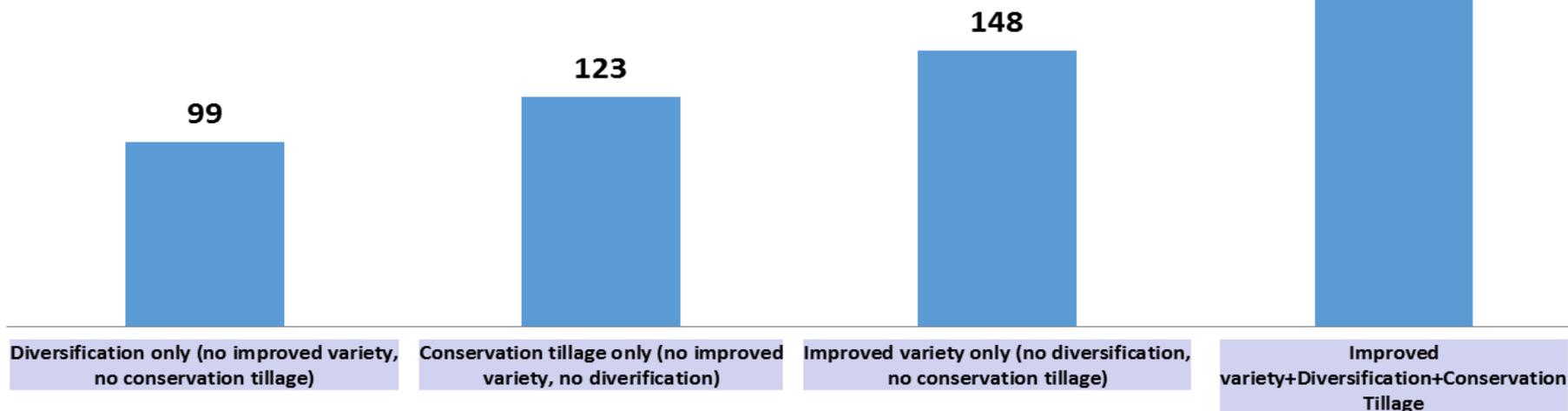
Effect of subsidy expenditures on adoption of minimum till practices



Policy Action 3: *Support integrated approaches to technology development and dissemination*

Adoption of sustainable practices in Ethiopia: impacts on income (\$/ha)

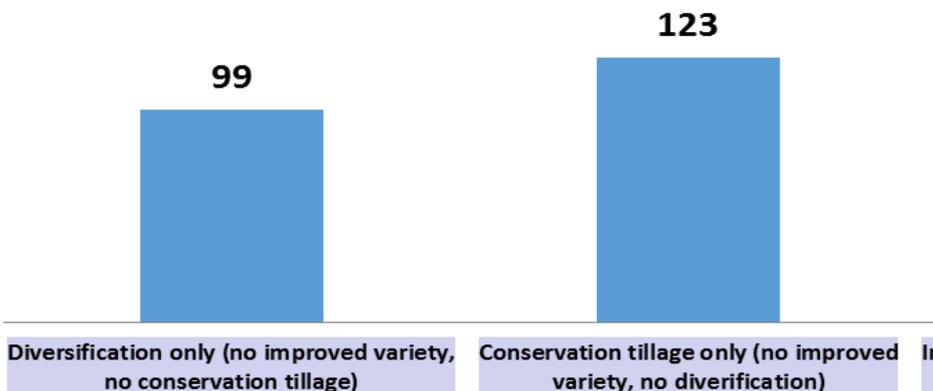
Kassie, M., Teklewold, M., Jaleta, M., Marenja, P., and Erenstein, O. (2015). Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa. *Land use Policy*, 42: 400-411



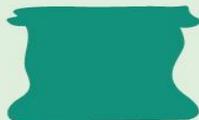
Policy Action 3:

Support integrated approaches to technology development and dissemination

Adoption of sustainable practices in E income (\$/ha)



In Tanzania, the probability of adopting fertilizer

increased 
from 4% to 8%

when the technology combination involved **minimum tillage, soil and water conservation (SWC)** and **improved varieties**.

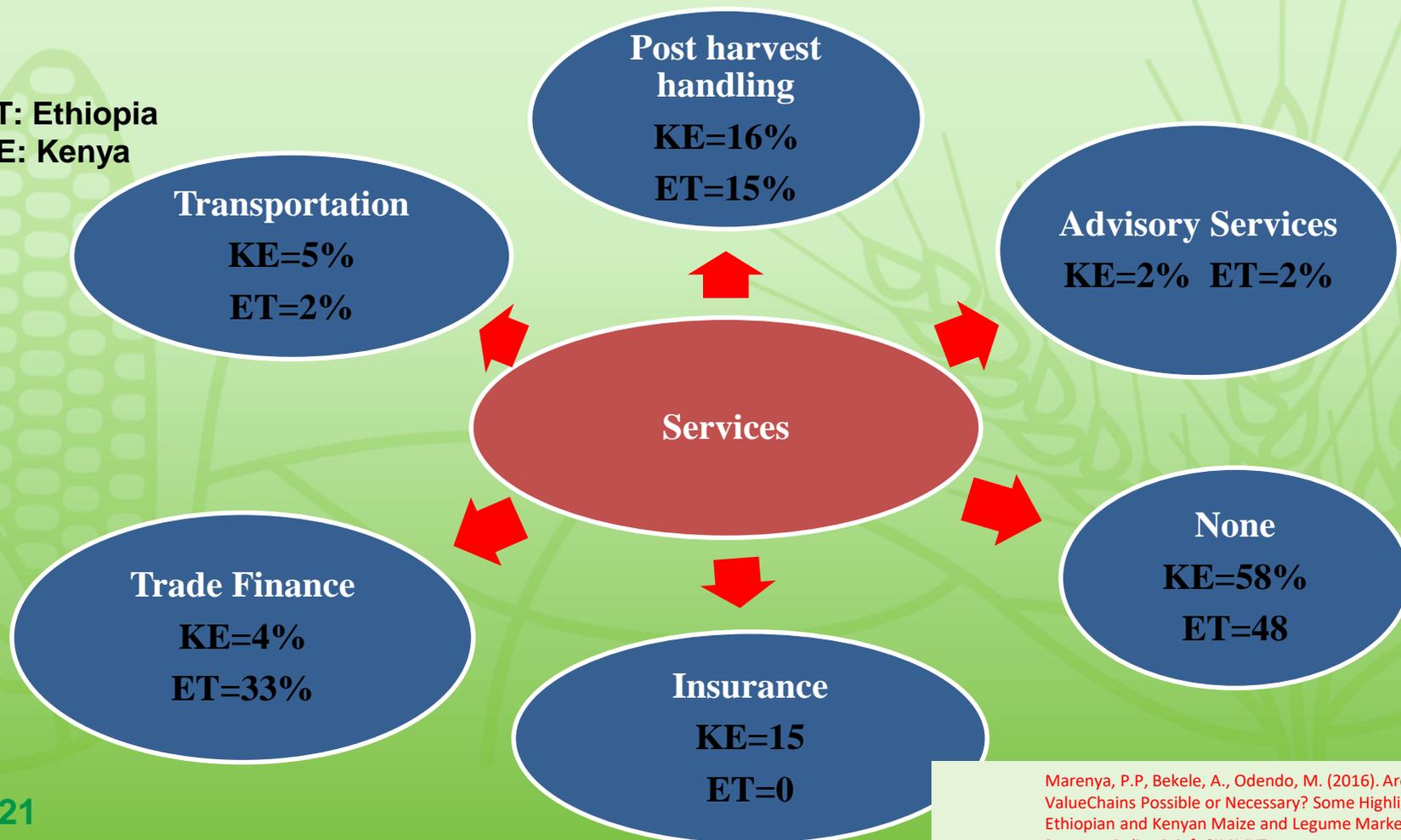
In Ethiopia,
adoption of crop diversification and SWC
was slightly less than 20% but

doubled
in the presence of all
the other SAIPs.

Policy Action 4

Invest in value staples chains

ET: Ethiopia
KE: Kenya



Marenya, P.P, Bekele, A., Odendo, M. (2016). Are Structured ValueChains Possible or Necessary? Some Highlights from Ethiopian and Kenyan Maize and Legume Markets. SIMLESA Program Policy Brief, CIMMYT.

Linking SIMLESA to Policy



Data linkage: Protocols for data assembly and dissemination



Data linkage: Feedback mechanisms, from grassroots to top echelons of the policy community



Data linkage: A system for documentation, communication and dissemination

A Proposal: Demonstrate and Pilot



- **Demonstrate** agricultural technologies
 - At farm scale, in real world circumstances
 - For extended periods



- **Pilot** policy ideas: at reasonably small but realistic scale (district or Woreda, selected villages)



- **Invite** those who need to use the evidence to observe for themselves



- **Document**, disseminate and communicate

Demonstrate and Pilot to Whom?



- To Agriculture ministry decision makers
 - cascading from bottom up



- To extension leadership and frontline staff



- To development organizations
 - including official agencies



- To business community



- To farmers

What does all this mean?



It means researchers should walk an extra mile

- It means we need **their boots on the ground to test their findings in real life** (before or after publication)
- It means proving that the evidence **CAN** work



It means getting out of their comfort zone

- It means applying for research funds, but also...
- It means applying for “**piloting and demonstration funds**”

**Those with responsibility
for decision-making will
certainly take note of
[...and seriously
consider...]
*demonstrated evidence!***

SIMLESA OBJ 1 OUTPUTS

Phase 1

Maize-legume farming
system characterization

Constraints and
opportunities, C-L
interactions, resource use,
tech preference, mkt access

Input and output
markets and value
chains

Farm Typologies for
resource allocation and risk
management

Effective adoption and
impact pathways

Phase 2

Refined
understanding of CA
Prod. Systems, VCs
and Impact Pathways

Analysis of
Risk-Productivity
Tradeoffs and
Management

Maize-Legume-Fodder
Value Chains

Farm Typologies Relevant to
CA

Recommendation
Domains

ESCALATE SIMLESA Results



We plan to use various outlets to scale SIMLESA results out and up to reach various points in the “ecosystem”



1. Farmer Extension Materials



2. Manuals for Extension Staff



3. Business Briefs for Private Sector



4. Policy Briefs for Public Sector



5. Development Briefs for NGOs

Some Questions to Tackle in next 12-14 months

1. How to avoid the valley of death? *Institutionalization, Ownership and Domestication of SIMLESA in-country and across Africa*
2. The key **social, economic and policy failures** and how to correct them. Does SAI scaling require: social, economic or policy changes? Where?
3. Thinking carefully why the **private sector has “failed”**
– to solve some of the intractable issues around agricultural development.
4. What is **missing for Private Sector?**
 - Are we sure the private sector is really leaving money on the table?
5. How can farmers be assisted to **take the risks of experimentation**, adaptation and sustainable adoption
6. What are the specific **policy failures** and how to correct them?
7. Will require meta-analyses of all multi-disciplinary results using *panel socio-economic and agronomic data and bio economic, systems and transdisciplinary modeling*

Some Questions to Consider

1. How to move from plot to field to community level analysis
2. How to move from incremental to transformational changes
3. How to move from commodity focus to livelihood emphasis



Thank you
for your
interest!

Photo Credits (top left to bottom right): Julia Cumes/CIMMYT, Awais Yaqub/CIMMYT, CIMMYT archives, Marcelo Ortiz/CIMMYT, David Hansen/University of Minnesota, CIMMYT archives, CIMMYT archives (maize), Ranak Martin/CIMMYT, CIMMYT archives.

Sustaining long term panel data generation and analysis.



**Seeking answers to outstanding questions on the
dynamics of technology adoption and impact analysis.**



Prioritizing women empowerment as a critical pillar in sustainable agricultural intensification.



Capacity development



Scaling up project research outputs and policy dialogue



We have produced a series of take away information briefs to inform the SIMLESA research community

We hope to continue the consolidation process to focus on the following steps



Extension materials to be used directly by farmers to offer recommendations on how to try out most promising elements of CA-based production



Extension guides for extension workers on the most promising CA options that they can recommend to farmers (e.g. wall charts, posters, leaflets)



Business briefs to show the potential of agribusinesses to engage farmers in structured value chains



Policy briefs for key decision makers in government to guide extension messaging and agricultural programmers



Development briefs to inform programming for development NGOs