Microdata for Macro Economists: An Introduction to the **Living Standards Measurement Study**

Talip Kilic
Senior Program Manager
Development Data Group | World Bank
tkilic@worldbank.org

Structural Transformation and Economic Growth (STEG) Virtual Lecture

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LSMS Living Standards Measurement Study

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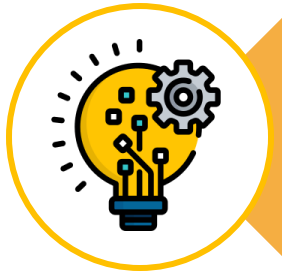
Development Economics • Data

Overview of today's lecture

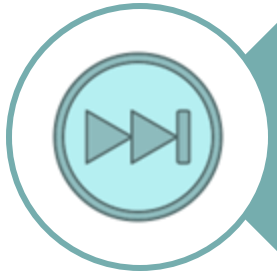
1) The Living Standards Measurement Study (LSMS)

- What does the LSMS do?
- Key features



2) Methodological Innovations

- Time use
- Labor measurement
- Crop yields



3) Looking Forward

- Data integration
- Gearing up for the next phase of our program on longitudinal surveys: **Resilient Futures**

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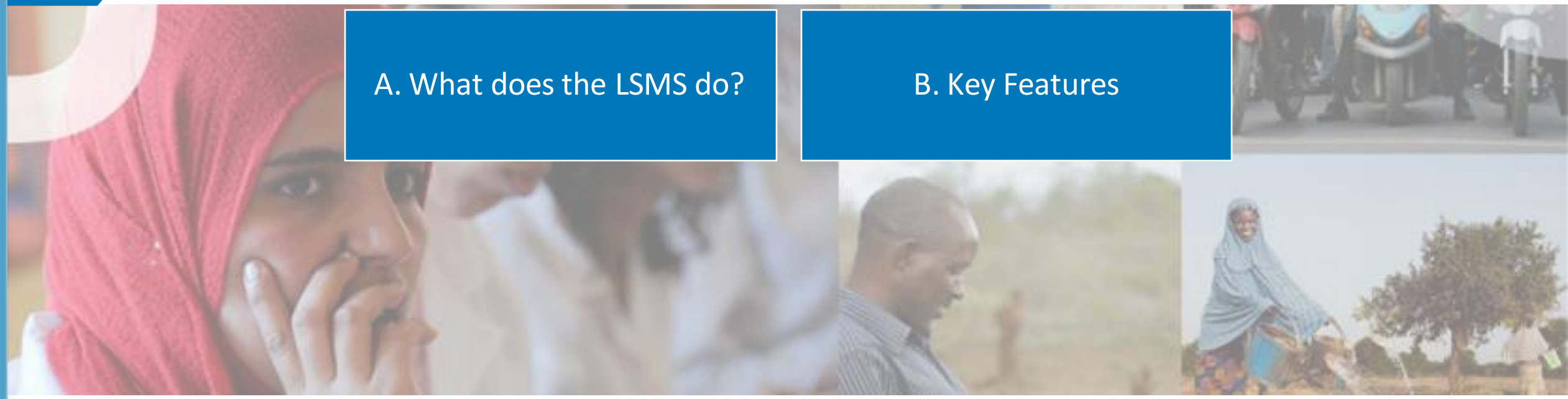
1 The Living Standards Measurement Study (LSMS) Program

A. What does the LSMS do?

B. Key Features



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A. What does the LSMS do?

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What is the Living Standards Measurement Study (LSMS)?

LSMS is the World Bank's flagship household survey program focused on:

- Strengthening household **survey systems** in countries
- Improving the **quality of microdata** to better inform development policies

It was created in 1980 in response to a need for policy **relevant data**

- Initial focus was on **poverty**
- **Expanded to other areas** such as labor, climate, human capital, etc.
  - » To allow policy makers to understand drivers, inter-relationships

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Our workstreams

DATA PRODUCTION

Supporting the **design**, **implementation**, and **dissemination** of surveys - households, farms, firms, and facilities

METHODS AND TOOLS

Improving methods and tools for survey data collection and analysis - through field experiments and rigorous research

POLICY RESEARCH

Conducting and promoting research to inform evidence-based development policies

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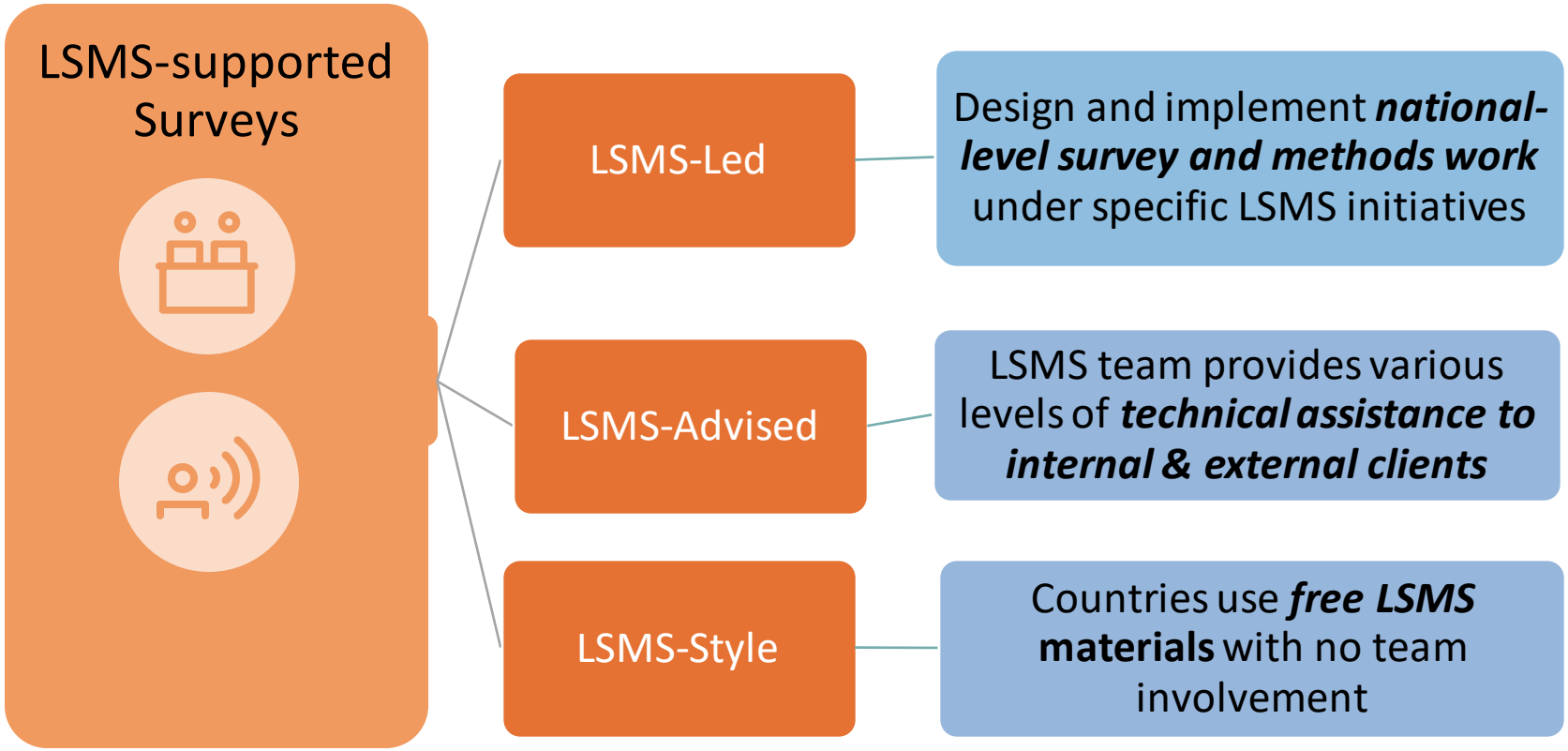
Types of “LSMS Surveys”



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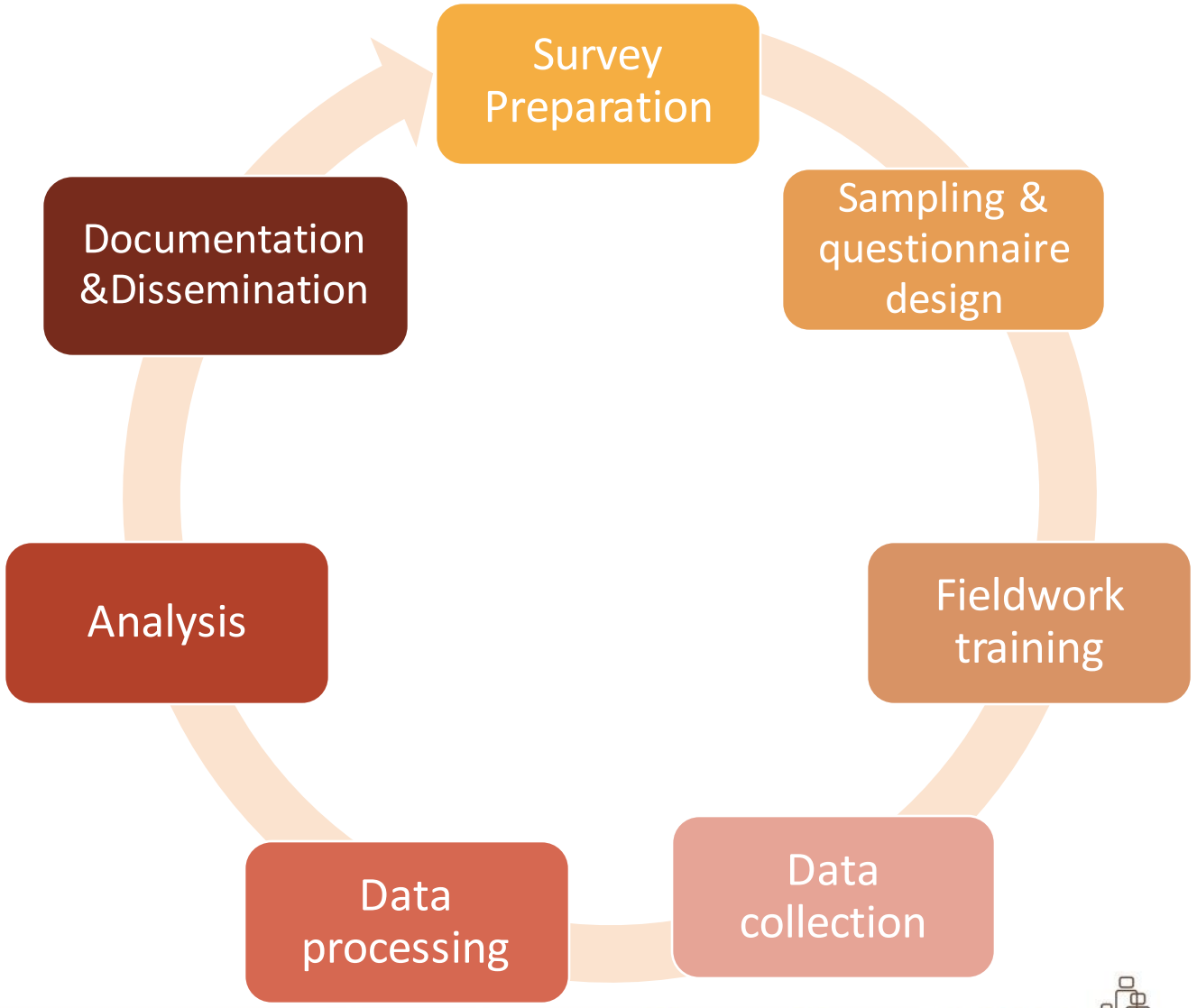
Scope of our expertise

Working with World Bank teams and NSO staff on survey life cycle from beginning through end

Provide Technical Assistance & Advice Across Survey Cycle



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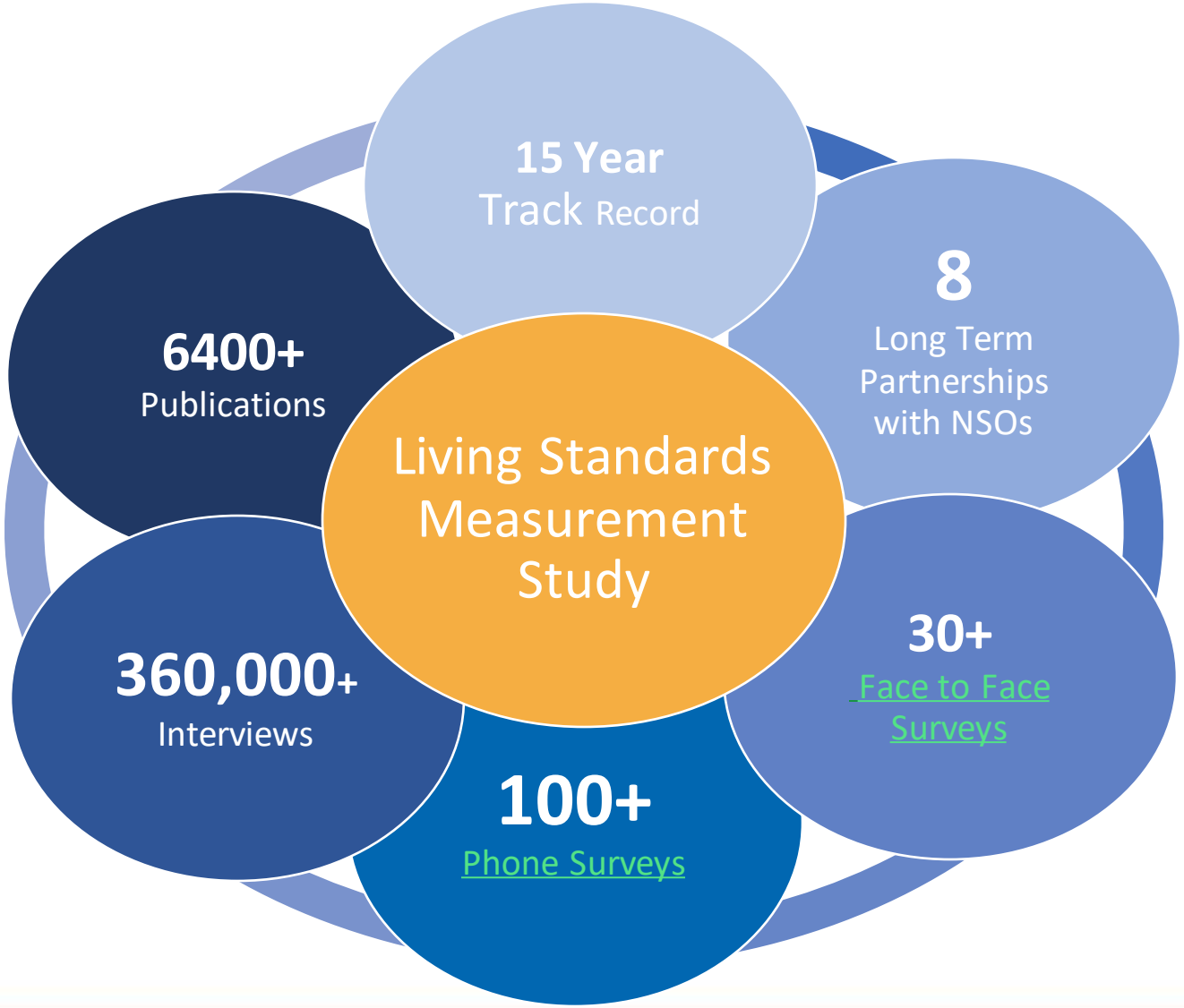
A special focus on longitudinal survey systems



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LSMS guidebooks as global public goods

The LSMS team has been pushing the methodological frontier:

- **By developing and validating improved methods** for survey data collection and integration with other data sources.
- **By disseminating these methods through guidelines** on several topics, such as labor, energy, agriculture, disability, etc.

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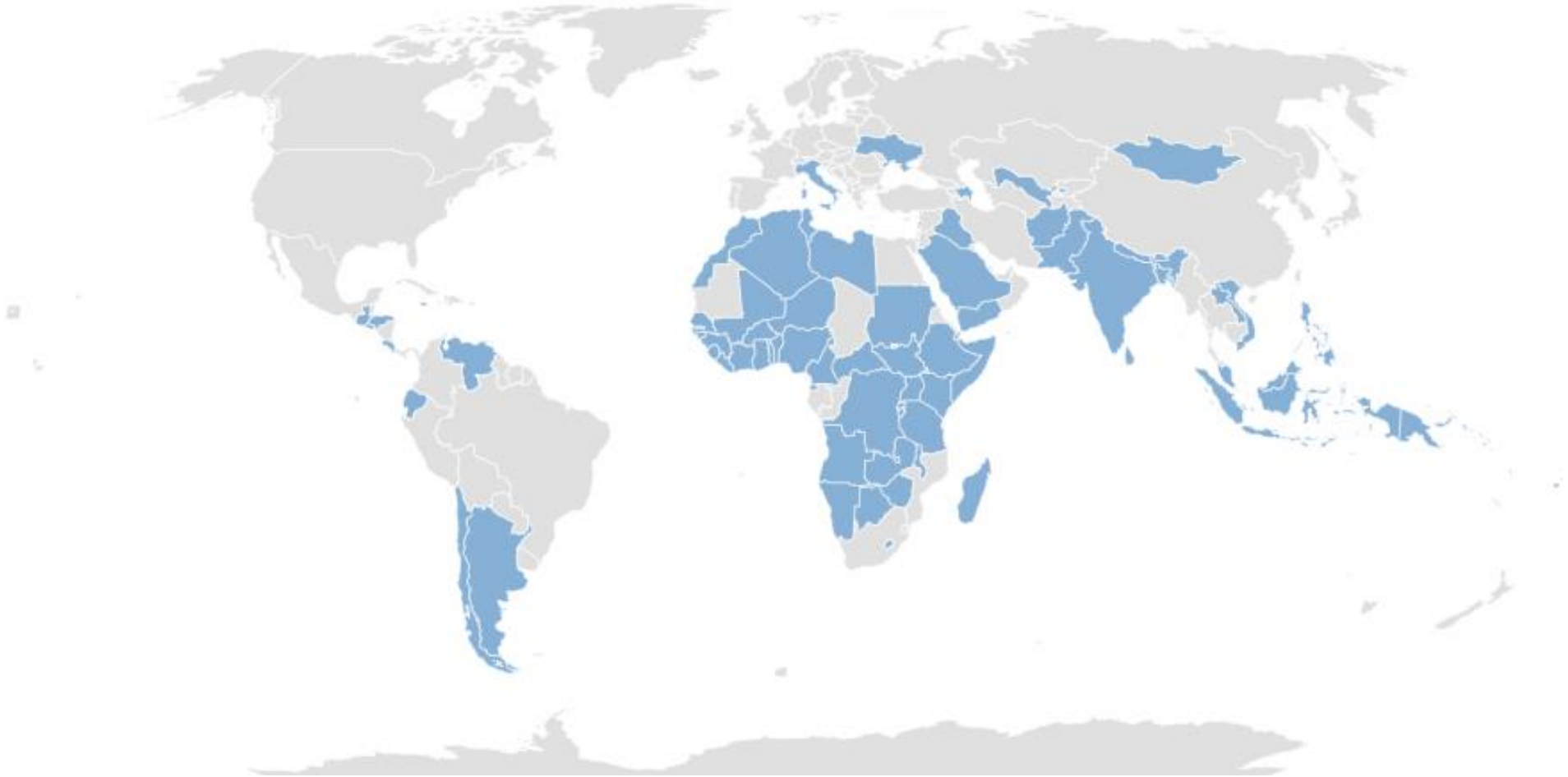
78 countries supported over 2019-2024



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B. Key Features of Our Surveys

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Key Features

1. **Multi-topic and multi-level**
2. Nationally-**representative** probability sample
3. Panel
4. **Multi-purpose**
5. **Geo-referenced** and **interoperable** with geospatial, admin and census/survey data
6. Food and Non-Food **Consumption** and **Expenditures**
7. **Individual** Disaggregation
8. Computer-Assisted Personal Interviewing
9. **Objective measurement**
10. **Public Access**

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Key Features

1 Multi-topic and multi-level

- Goes beyond measuring money metric welfare measures
- Captures correlates and multidimensionality of wellbeing
- Analytical tool to study behavior, understand phenomena, analyze linkages

2. Nationally-**representative** probability sample
3. Panel
4. **Multi-purpose**
5. **Geo-referenced** and **interoperable** with geospatial, admin and census/survey data
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1 Multi-topic and multi-level

Household

- Dwelling GPS Coordinates
- Demographics
- Education
- Health
- Housing and Utilities
- Food and Non-Food Consumption
- Off-Farm Earnings
- Asset Ownership
- Anthropometry
- Food Security
- Safety Nets
- Shocks
- Migration

Agriculture

- Plot GPS Coordinates & GPS-Based Area Measurement
- **Parcels**: Tenure, Ownership
- **Plots**: Physical Attributes, Labor & Non-Labor Input Use
- **Crops**: Cultivation, Production (Plot-Crop-Level), & Disposition (Crop-Level)
- Ag Asset Ownership & Use
- Extension Services
- Livestock Ownership & Production

Community

- Demographics
- Infrastructure
- Facilities
- Access to Services
- Facilities
- Collective Action
- Natural Resource Management
- Community Organizations
- Prices

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Key Features

1. Multi-topic and multi-level
2. **Nationally-representative probability sample**
   - » Mindful of non-sampling errors and sustainability (Low capacity of data-deprived countries)
   - » Representative: national, urban/rural, other urban, main regions
   - » Sample size usually anchored in available data on consumption expenditures
   - » Smallish sample, higher resolution estimates pursued through data integration, SAE
3. Panel
4. **Multi-purpose**
5. **Geo-referenced** and **interoperable** with geospatial, admin and census/survey data
6. Food and Non-Food **Consumption** and **Expenditures**
7. **Individual** Disaggregation
8. Computer-Assisted Personal Interviewing
9. **Objective measurement**
10. **Public Access**

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Key Features

1. Multi-topic and multi-level
2. Nationally-representative probability sample
3. **Panel**
   - » Unique system of longitudinal surveys designed to improve the understanding of household and individual welfare and living standards.
4. **Multi-purpose**
5. **Geo-referenced** and **interoperable** with geospatial, admin and census/survey data
6. Food and Non-Food **Consumption** and **Expenditures**
7. **Individual** Disaggregation
8. Computer-Assisted Personal Interviewing
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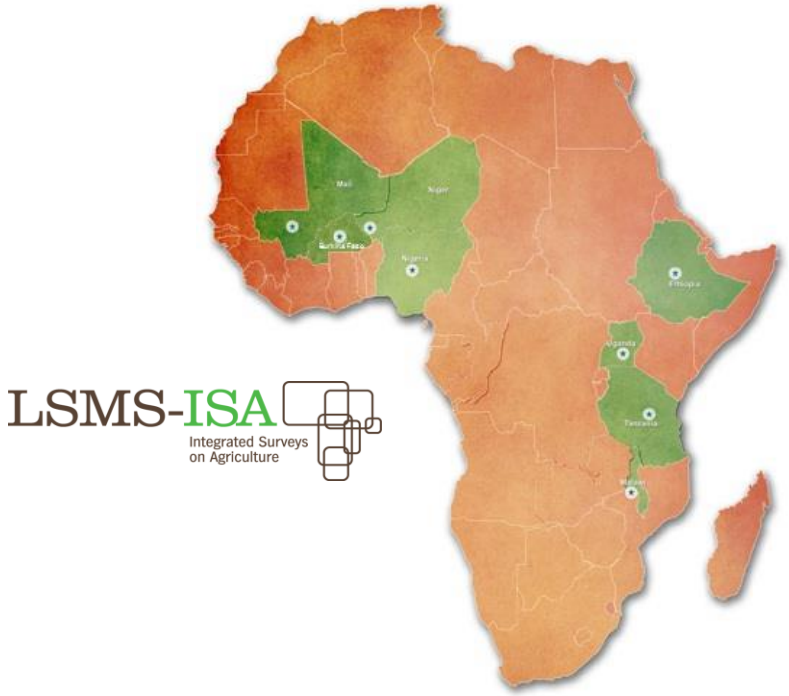
LSMS-ISA (2008-2024)

LSMS-Integrated Surveys on Agriculture (LSMS-ISA)-supported surveys have emerged as the benchmark for nationally-representative panel data collection in Sub-Saharan Africa.

Since 2008:

- » **8** countries
- » **33** face-to-face panel survey rounds
- » **360,000+** interviews
- » **6,400+** publications



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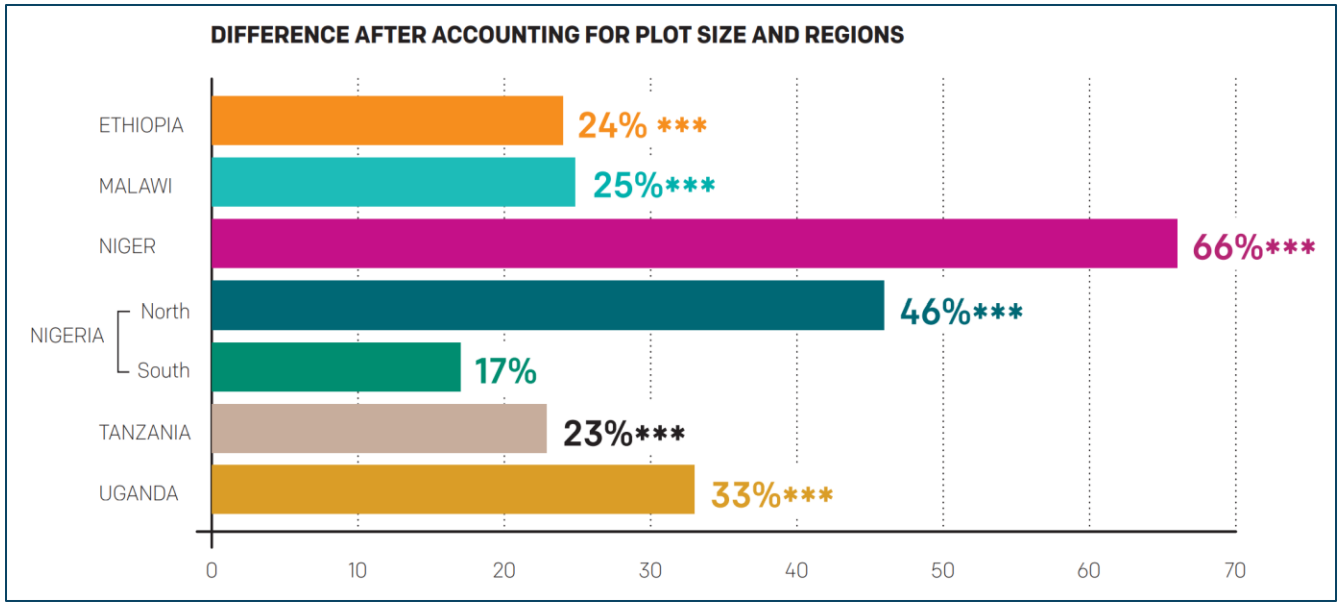
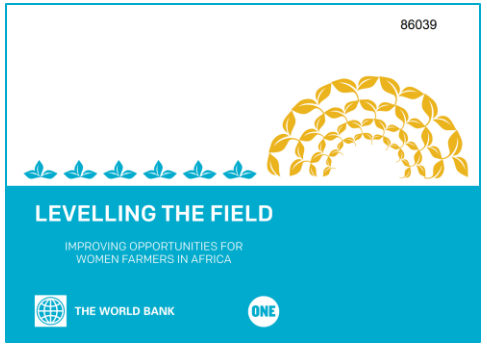
Gender differences in agricultural productivity

- Nationally-representative, plot-level survey data from LSMS-ISA revealed that on average, **female-managed plots are 24 to 66% less productive** – with significant within- and cross-country variation.
- **Gender gap in productivity driven by lower levels of fertilizer, labor**, and high-value crop cultivation on female-managed plots but also lower returns to these inputs on female-managed plots.





Ten policy recommendations in Levelling the Field report and *Agricultural Economics* SI on Gender and Agriculture

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Key Features

1. Multi-topic and multi-level
2. Nationally-**representative** probability sample
3. Panel
4. **Multi-purpose**
   - » Measure and monitor poverty and other SDGs
   - » Analytical tool
   - » Use for IE
5. **Geo-referenced** and **interoperable** with geospatial, admin and census/survey data
6. Food and Non-Food **Consumption** and **Expenditures**
7. **Individual** Disaggregation
8. Computer-Assisted Personal Interviewing
9. **Objective measurement**
10. **Public Access**

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IE activities piggybacked onto LSMS-ISA

USAID Feed-the-Future Population Based Surveys

- Operating in USAID priority countries
- Geographically focused in USAID Zone of Influence
- Focused on monitoring poverty, nutrition, food security and women's empowerment

LSMS-ISA operating in some of those priority countries but ..

- Small sample size in ZoI
- Missing some thematic content

Built on infrastructure in Nigeria and Tanzania of LSMS-ISA panels

- Oversampling in ZoI
- Adjusting questionnaires

Key Features

1. Multi-topic and multi-level
2. Nationally-**representative** probability sample
3. Panel
4. **Multi-purpose**
5. **Geo-referenced and interoperable with geospatial, admin and census/survey data**
   - Geo-referencing → integration with third-party geospatial data (LSMS-ISA example)
   - Use of common administrative frame → integration with administrative/census data
   - Common questions, sampling frames across censuses, surveys
6. Food and Non-Food **Consumption** and **Expenditures**
7. **Individual** Disaggregation
8. Computer-Assisted Personal Interviewing
9. **Objective measurement**
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LSMS-ISA geospatial variables

Provide **Random Off-Set**, EA-Level Coordinates

- Average household-level coordinates in an EA
- Apply a random offset of 0-2 km in urban, 2-5km in rural areas

ELSEVIER

Journal of Development Economics

Available online 1 July 2022, 102927

In Press, Journal Pre-proof

Regular article

Privacy protection, measurement error, and the integration of remote sensing and socioeconomic survey data ☆

Jeffrey D. Michler [a], Anna Josephson [a], Talip Kilic [b], Siobhan Murray [b]

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https://doi.org/10.1016/j.jdeveco.2022.102927

Highlights

- Statistical disclosure limitation distorts public use data to preserve privacy.
- Matching public use data with remote sensing weather data may generate distortion.
- We explore how spatial anonymization methods introduce measurement error.
- Spatial anonymization methods have limited to no impact on estimates.
- Estimates do vary by choice of remote sensing product.

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LSMS-ISA geospatial variables

Distance

- Plot distance to household
- Household to nearest main road
- Household to major agricultural market
- Household to headquarters of district of residence
- Household to nearest city or town with +20,000
- Household to nearest border post

Climatology

- Annual mean temperature
- Mean temperature of wettest quarter
- Mean annual precipitation
- Precipitation of wettest quarter
- Precipitation of wettest month

LSMS-ISA geospatial variables

Landscape

- Land cover class
- Density of agriculture
- Population density
- Agro-ecological zone

Rainfall (TS)

- Survey year annual rainfall
- Survey year wettest quarter rainfall
- Survey year timing of start of wettest quarter

LSMS-ISA geospatial variables

Soil & Terrain

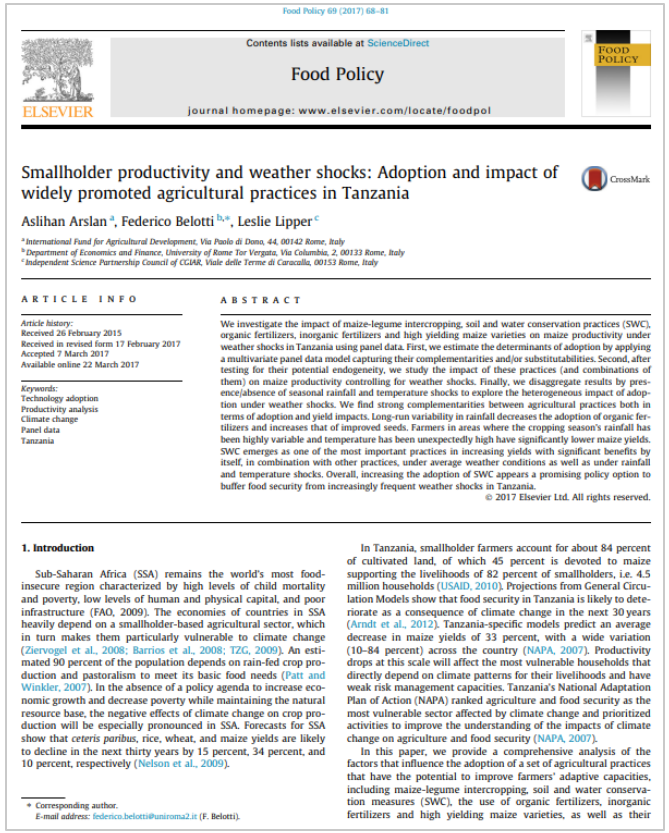
- Elevation
- Slope
- Terrain roughness
- Topographic wetness index
- Landscape-level soil characteristics

Phenology

- Average total change in greenness within primary ag season
- Average timing of onset of greenness increase
- Average timing of onset of greenness decrease
- Average EVI value at peak of greenness
- Total change in greenness in survey year
- Timing of onset of greenness increase in survey year
- Timing of onset of greenness decrease in survey year
- Maximum EVI value in survey year
- Specific crop season NDVI crop season aggregates

5 Geo-referenced and interoperable

Research on extreme weather impacts made possible by integration with geospatial and admin data



Food Policy 69 (2017) 68–81

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

Smallholder productivity and weather shocks: Adoption and impact of widely promoted agricultural practices in Tanzania

Aslihan Arslan [a], Federico Belotti [b,*], Leslie Lipper [c]

[a] International Fund for Agricultural Development, Via Paolo di Dono, 44, 00142 Rome, Italy
[b] Department of Economics and Finance, University of Rome Tor Vergata, Via Columbia, 2, 00133 Rome, Italy
[c] Independent Science Partnership Council of CGIAR, Viale delle Terme di Caracalla, 00153 Rome, Italy

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Keywords:
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ABSTRACT

We investigate the impact of maize-legume intercropping, soil and water conservation practices (SWC), organic fertilizers, inorganic fertilizers and high yielding maize varieties on maize productivity under weather shocks in Tanzania using panel data. First, we estimate the determinants of adoption by applying a multivariate panel data model capturing their complementarities and/or substitutabilities. Second, after testing for their potential endogeneity, we study the impact of these practices (and combinations of them) on maize productivity controlling for weather shocks. Finally, we disaggregate results by presence/absence of seasonal rainfall and temperature shocks to explore the heterogeneous impact of adoption under weather shocks. We find strong complementarities between agricultural practices both in terms of adoption and yield impacts. Long-run variability in rainfall decreases the adoption of organic fertilizers and increases that of improved seeds. Farmers in areas where the cropping season's rainfall has been highly variable and temperature has been unexpectedly high have significantly lower maize yields. SWC emerges as one of the most important practices in increasing yields with significant benefits by itself, in combination with other practices, under average weather conditions as well as under rainfall and temperature shocks. Overall, increasing the adoption of SWC appears a promising policy option to buffer food security from increasingly frequent weather shocks in Tanzania.

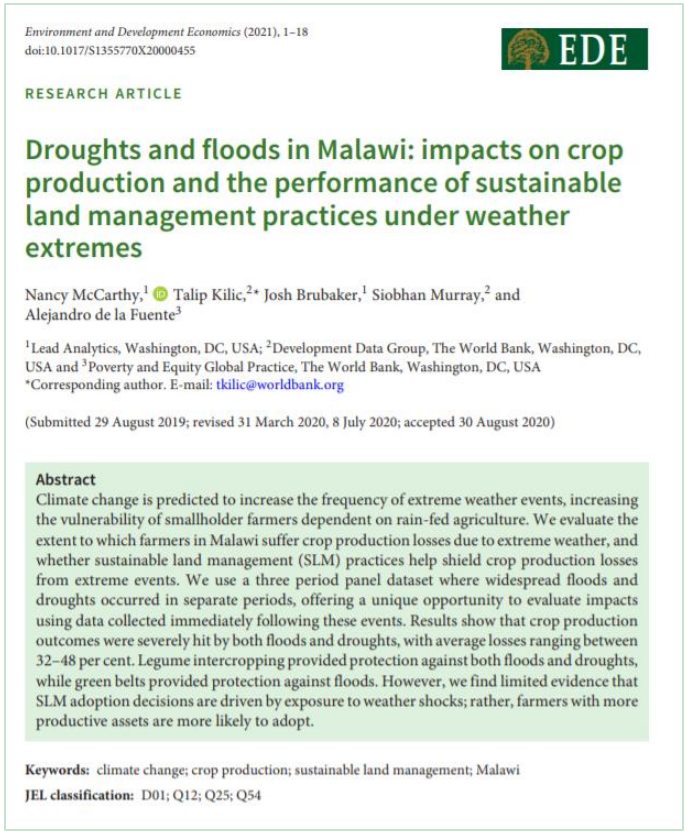
1. Introduction

Sub-Saharan Africa (SSA) remains the world's most food-insecure region characterized by high levels of child mortality and poverty, low levels of human and physical capital, and poor infrastructure (FAO, 2009). The economies of countries in SSA heavily depend on a smallholder-based agricultural sector, which in turn makes them particularly vulnerable to climate change (Ziervogel et al., 2008; Barrios et al., 2008; TZG, 2009). An estimated 90 percent of the population depends on rain-fed crop production and pastoralism to meet its basic food needs (Patt and Winkler, 2007). In the absence of a policy agenda to increase economic growth and decrease poverty while maintaining the natural resource base, the negative effects of climate change on crop production will be especially pronounced in SSA. Forecasts for SSA show that *ceteris paribus*, rice, wheat, and maize yields are likely to decline in the next thirty years by 15 percent, 34 percent, and 10 percent, respectively (Nelson et al., 2009).

In Tanzania, smallholder farmers account for about 84 percent of cultivated land, of which 45 percent is devoted to maize supporting the livelihoods of 82 percent of smallholders, i.e. 4.5 million households (USAID, 2010). Projections from General Circulation Models show that food security in Tanzania is likely to deteriorate as a consequence of climate change in the next 30 years (Arndt et al., 2012). Tanzania-specific models predict an average decrease in maize yields of 33 percent, with a wide variation (10–84 percent) across the country (NAPA, 2007). Productivity drops at this scale will affect the most vulnerable households that directly depend on climate patterns for their livelihoods and have weak risk management capacities. Tanzania's National Adaptation Plan of Action (NAPA) ranked agriculture and food security as the most vulnerable sector affected by climate change and prioritized activities to improve the understanding of the impacts of climate change on agriculture and food security (NAPA, 2007).

In this paper, we provide a comprehensive analysis of the factors that influence the adoption of a set of agricultural practices that have the potential to improve farmers' adaptive capacities, including maize-legume intercropping, soil and water conservation measures (SWC), the use of organic fertilizers, inorganic fertilizers and high yielding maize varieties, as well as their

* Corresponding author.
E-mail address: federico.belotti@uniroma2.it (F. Belotti).



Environment and Development Economics (2021), 1–18
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RESEARCH ARTICLE

Droughts and floods in Malawi: impacts on crop production and the performance of sustainable land management practices under weather extremes

Nancy McCarthy,[1] Talip Kilic,[2]* Josh Brubaker,[1] Siobhan Murray,[2] and Alejandro de la Fuente[3]

[1]Lead Analytics, Washington, DC, USA; [2]Development Data Group, The World Bank, Washington, DC, USA and [3]Poverty and Equity Global Practice, The World Bank, Washington, DC, USA
*Corresponding author. E-mail: tkilic@worldbank.org

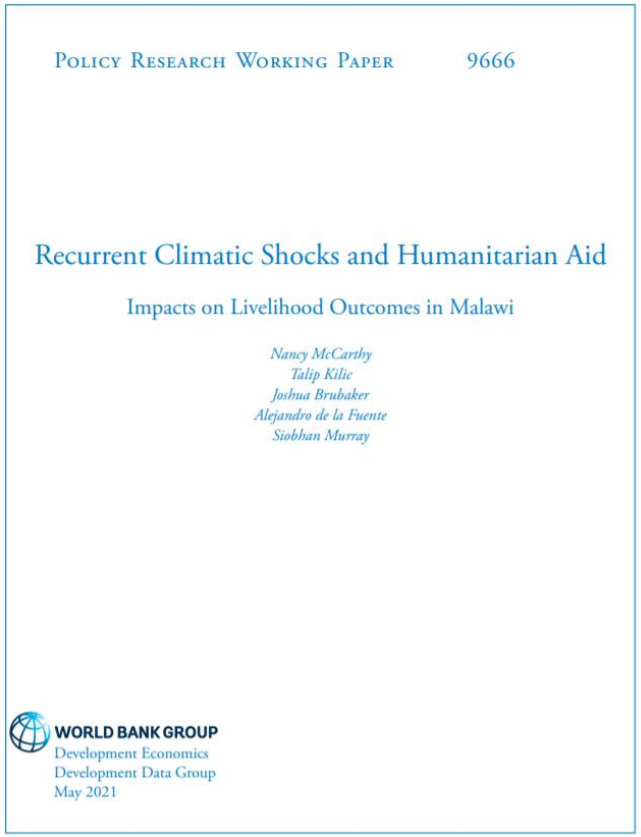
(Submitted 29 August 2019; revised 31 March 2020, 8 July 2020; accepted 30 August 2020)

Abstract

Climate change is predicted to increase the frequency of extreme weather events, increasing the vulnerability of smallholder farmers dependent on rain-fed agriculture. We evaluate the extent to which farmers in Malawi suffer crop production losses due to extreme weather, and whether sustainable land management (SLM) practices help shield crop production losses from extreme events. We use a three period panel dataset where widespread floods and droughts occurred in separate periods, offering a unique opportunity to evaluate impacts using data collected immediately following these events. Results show that crop production outcomes were severely hit by both floods and droughts, with average losses ranging between 32–48 per cent. Legume intercropping provided protection against both floods and droughts, while green belts provided protection against floods. However, we find limited evidence that SLM adoption decisions are driven by exposure to weather shocks; rather, farmers with more productive assets are more likely to adopt.

Keywords: climate change; crop production; sustainable land management; Malawi

JEL classification: D01; Q12; Q25; Q54



POLICY RESEARCH WORKING PAPER 9666

Recurrent Climatic Shocks and Humanitarian Aid

Impacts on Livelihood Outcomes in Malawi

Nancy McCarthy
Talip Kilic
Joshua Brubaker
Alejandro de la Fuente
Siobhan Murray

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May 2021

Linking **Georeferenced LSMS-ISA Household and Plot Locations** with Geospatial Data on Climate and WFP Aid Data

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Research on integration of large-scale surveys and satellites for high-res agricultural monitoring

- Azzari et al. (2021) address operationally-relevant research questions on the integration of survey and satellite data in the context of **maize area mapping in Malawi and Ethiopia**

- 10-m resolution crop area and maize area maps for Malawi and Ethiopia for each agricultural season from 2016 to 2019 on **World Bank Development Data Hub**

remote sensing

MDPI

Article

Understanding the Requirements for Surveys to Support Satellite-Based Crop Type Mapping: Evidence from Sub-Saharan Africa

George Azzari [1], Shruti Jain [1], Graham Jeffries [2], Talip Kilic [3,*] and Siobhan Murray [3]

[1] Atlas AI, Palo Alto, CA 94301, USA; george@atlasai.us (G.A.); shruti@atlasai.us (S.J.)
[2] Farmers Business Network, Rockland, ME 04841, USA; gjeffries@farmersbusinessnetwork.com
[3] Development Data Group, World Bank, Washington, DC 20433, USA; smurray@worldbank.org
* Correspondence: tkilic@worldbank.org

Abstract: This paper provides recommendations on how large-scale household surveys should be conducted to generate the data needed to train models for satellite-based crop type mapping in smallholder farming systems. The analysis focuses on maize cultivation in Malawi and Ethiopia, and leverages rich, georeferenced plot-level data from national household surveys that were conducted in 2018–20 and integrated with Sentinel-2 satellite imagery and complementary geospatial data. To identify the approach to survey data collection that yields optimal data for training remote sensing models, 26,250 in silico experiments are simulated within a machine learning framework. The best model is then applied to map seasonal maize cultivation from 2016 to 2019 at 10-m resolution in both countries. The analysis reveals that smallholder plots with maize cultivation can be identified with up to 75% accuracy. Collecting full plot boundaries or complete plot corner points provides the best quality of information for model training. Classification performance peaks with slightly less than 60% of the training data. Seemingly little erosion in accuracy under less preferable approaches to georeferencing plots results in the total area under maize cultivation being overestimated by 0.16–0.47 million hectares (8–24%) in Malawi.

Keywords: agriculture; maize; crop type mapping; Sentinel-2; household surveys; training data; Malawi; Ethiopia

check for updates

Citation: Azzari, G.; Jain, S.; Jeffries, G.; Kilic, T.; Murray, S. Understanding the Requirements for Surveys to Support Satellite-Based Crop Type Mapping: Evidence from Sub-Saharan Africa. *Remote Sens.* **2021**, *13*, 4749. https://doi.org/10.3390/rs13234749

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1. Introduction

Agriculture is an integral part of livelihoods in sub-Saharan Africa, where it can contribute up to 69% of household income in rural areas [1]. As such, improving the productivity of smallholder farmers has been a long-standing goal in many African countries aiming to eliminate poverty and food insecurity.

To monitor progress towards national and international development goals related to agricultural productivity, countries need accurate, crop-specific measures of area under cultivation, production and yields, not only at the national level but with sufficient within-country disaggregation to guide the targeting and evaluation of policies and programs intended to promote agricultural and rural development, and resilience against disasters and extreme weather events.

With the commencement of the European Space Agency's Sentinel-2 mission in 2015 and the subsequent surge in the public availability of high-resolution satellite imagery, research has shown the feasibility of satellite-based monitoring of agricultural outcomes in smallholder farming systems [2–8]. Recent advances in satellite imagery and remote sensing techniques have the potential to provide timely insights into conditions on the ground and can fill gaps in agricultural monitoring and statistics [9].

Satellite-based approaches to mapping agricultural outcomes, such as crop-specific estimates of cultivated areas and yields, require data for training and validating the underlying remote sensing models. The quality and spatial resolution of satellite-based estimates

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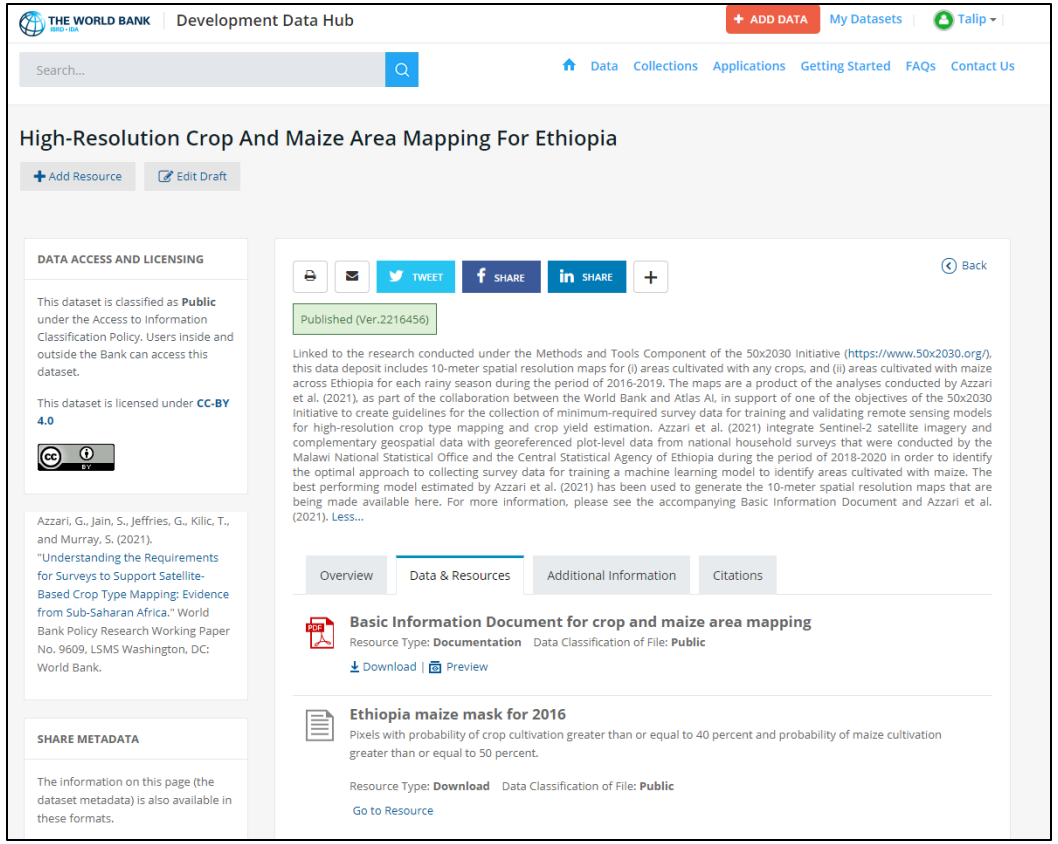
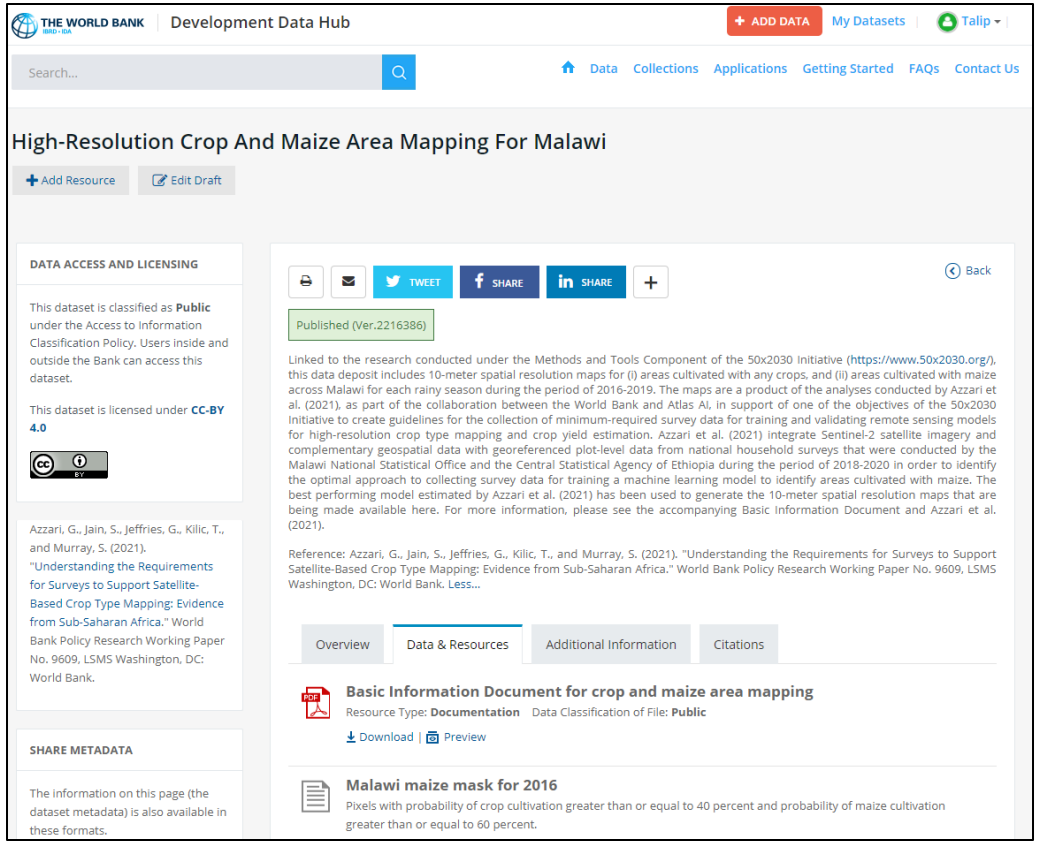
Headline findings

- Collecting a **complete plot boundary** is preferable to competing approaches to georeferencing plot locations in large-scale household surveys.
- Seemingly-small erosion in maize classification accuracy under less preferable approaches to georeferencing plot locations **consistently results in total area under maize cultivation to be overestimated** - in the range of **0.16 to 0.47 million hectares** (8 to 24 percent).
- **Georeferencing the complete set of plot corners is a second-best strategy**, can approximate full plot boundaries and can in turn train models with comparable performance.
- Classification performance peaks with **~60% of the training data** under preferred and second-best approaches to georeferencing plot locations.
- **If only a single GPS point** can be collected, that location should be **near the plot centroid** rather than at the plot corner. With large datasets, the performance could be comparable to that of complete plot boundaries.
- **No plot observations should be excluded** from model training based on a minimum plot area threshold. And **optical features alone** can provide sufficient signal to maximize prediction quality.

Open access datasets

10-m resolution crop area and maize area maps for Malawi and Ethiopia for each agricultural season from 2016 to 2019 on **World Bank Development Data Hub**





http://bit.ly/ethiopiamaps

http://bit.ly/malawimaps

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Key Features

1. Multi-topic and multi-level
2. Nationally-**representative** probability sample
3. Panel
4. **Multi-purpose**
5. **Geo-referenced and interoperable** with geospatial, admin and census/survey data

6 Food and Non-Food Consumption and Expenditures

- Comprehensive modules to create total household consumption aggregates
- Survey design does matter for food consumption measurement
- Using non-standard units for food consumption measurement
- On-going methodological research on intra-household and non-food consumption measurement

6. Food and Non-Food **Consumption** and **Expenditures**
8. Computer-Assisted Personal Interviewing
9. **Objective measurement**
10. **Public Access**

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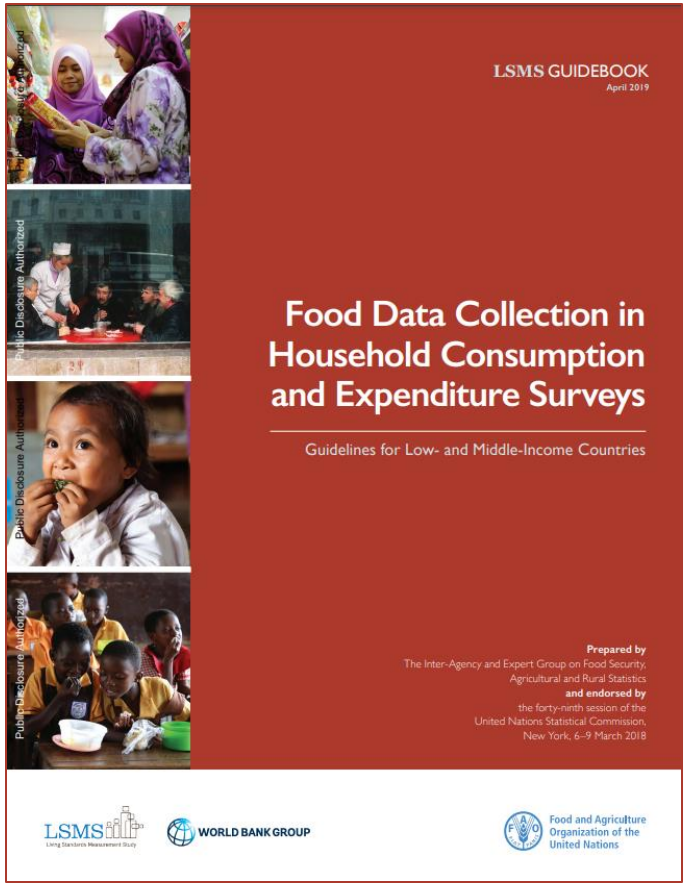
Best practices for food consumption data collection in LMICs

- Main issues: Diary = fatigue; Recall = telescoping & omission
- Research broadly points to equivalence of recall and diary in terms of accuracy of poverty estimates, but recall comes at a much lower cost
    - Beegle et al (2012), Gibson et al. (2015), Backiny-Yetna et al. (2017), Brzozowskia et al. (2017), Sharp et al. (2022) + Recent work in Tanzania, Zimbabwe, Saudi Arabia
- Official World Bank/LSMS recommendation: Use 7-recall period food consumption measurement in LMICs

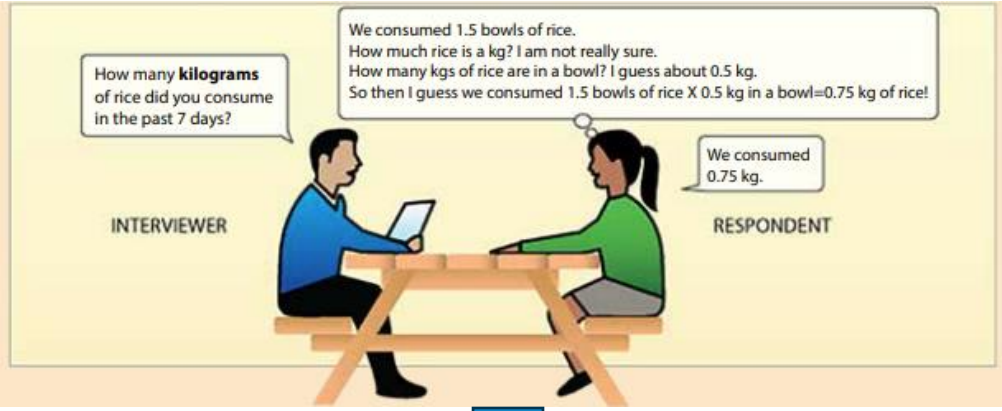


LSMS Living Standards Measurement Study

Using non-standard units for food consumption measurement

FORCING STANDAR UNITS

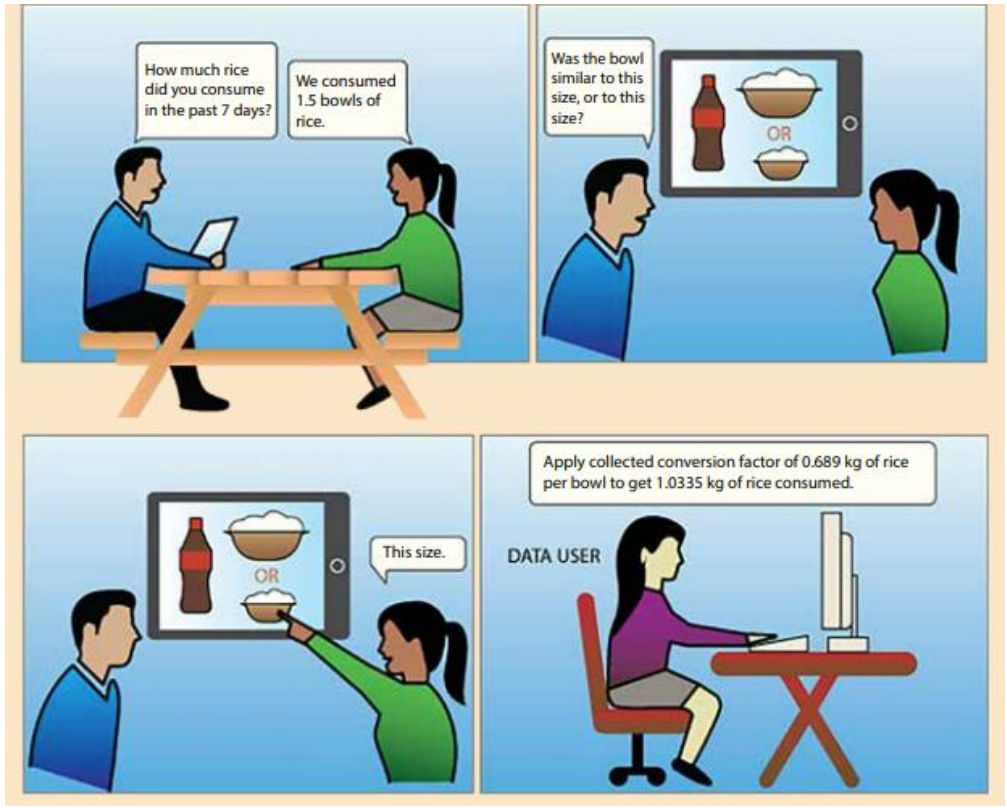
More burden on the respondent, less consistency in conversion factors



Practical guidance on non-standard units and conversion factors to minimize measurement error in food consumption.

ALLOWING NON- STANDARD UNITS

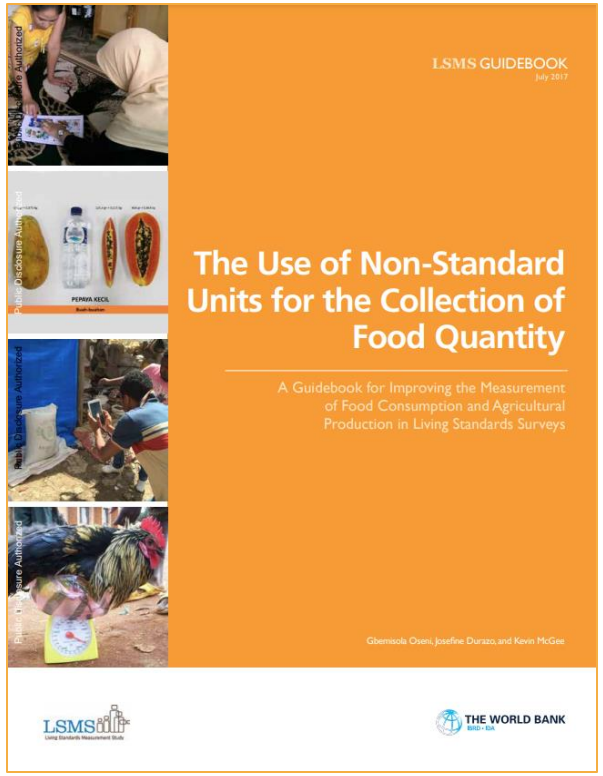
Simplifies respondent's role, conversion factors are consistent

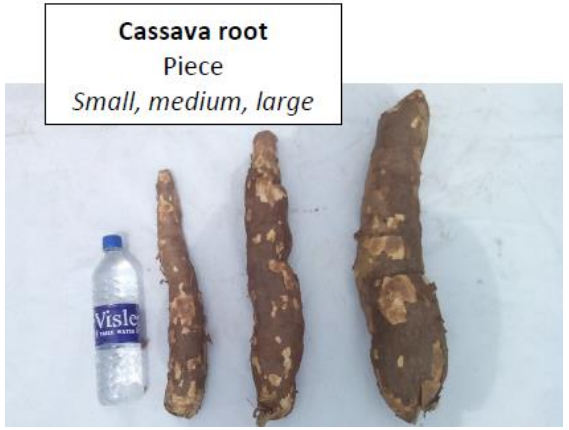


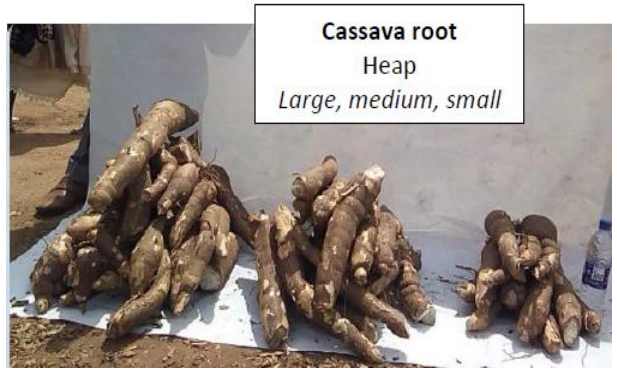
LSMS Living Standards Measurement Study

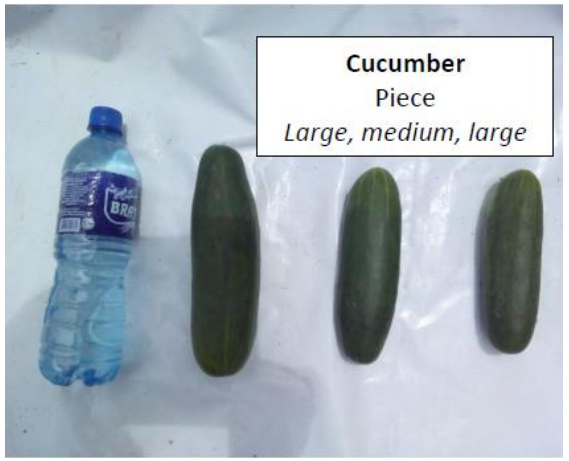
Using non-standard units for food consumption measurement

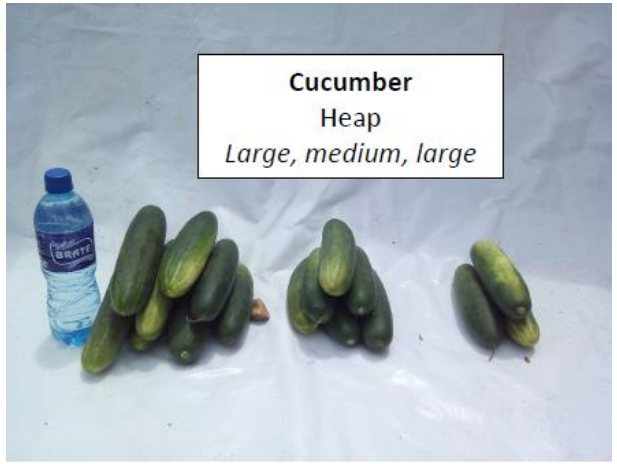
Practical guidance on non-standard units and conversion factors to measure food consumption











LSMS
Living Standards Measurement Study

Key Features

1. Multi-topic and multi-level
2. Nationally-**representative** probability sample
3. Panel
4. **Multi-purpose**
5. **Geo-referenced and interoperable** with geospatial, admin and census/survey data
6. Food and Non-Food **Consumption** and **Expenditures**
7. **Individual disaggregation**
   - » Traditionally done for education, health, labor, anthropometrics (0-59 months)
   - » Expanded focus in the recent past on **individual-specific interviews**, limiting the reliance on **proxy respondents**
8. Computer-Assisted Personal Interviewing
9. **Objective measurement**
10. **Public Access**

LSMS
Living Standards Measurement Study

LSMS Living Standards Measurement Study Plus

Project Overview (2016-2023)

- Operationalized best practices on individual-disaggregated survey data collection on **asset ownership** and **employment**
  - Integrated into national surveys in 6 IDA countries through an individual-level questionnaire
  - Aimed to interview all adult household members in private, with enumerator-respondent gender match and simultaneous intra-household interviews (80%+ response rate)

- Informed **Strengthening Gender Statistics Project (2021-present)** to scale up recommendations as part of Statistical Capacity Projects in 12 IDA countries

National surveys supported by LSMS+

	Malawi*	Tanzania*	Ethiopia*	Cambodia*	Nepal	Sudan
Survey	2016 Malawi Integrated Household Panel Survey	2019/20 Tanzania National Panel Survey	2018/19 Ethiopia Socioeconomic Survey	2019/20 Cambodia Socioeconomic Survey	2022 Nepal Phone Survey	2022 Sudan Labor Market Panel Survey
Implementing Agency	National Statistical Office	National Bureau of Statistics	Central Statistics Agency	National Institute of Statistics	Central Bureau of Statistics	Central Bureau of Statistics
Fieldwork Period	April '16 – Dec '17	Feb '19 – Jan '20	June – August '19	Oct – Dec '19	May – June '22	Sep – Nov '22
LSMS+ Sample Size	2,508	900	7,200	1,512	756	5,000
Asset Classes Included in Data Collection	Agricultural and dwelling land, financial accounts, mobile phones	Agricultural and dwelling land, financial accounts, mobile phones	Agricultural and dwelling land, financial accounts, mobile phones, livestock	Agricultural and dwelling land, financial accounts, mobile phones, apartments/condos, consumer durables	Agricultural and dwelling land, financial accounts, mobile phones	Agricultural and dwelling land, financial accounts, mobile phones, livestock, consumer durables
Other Topics of Individual-Disaggregated Data Collection	Employment, non-farm enterprises, education, health, food insecurity	Employment, non-farm enterprises, education, health	Employment, non-farm enterprises, education, health	Employment, non-farm enterprises, education, health, time use, internal and international migration	Employment, non-farm enterprises, education, health, time use, internal and international migration	Employment, non-farm enterprises, education, health, time use, internal and international migration

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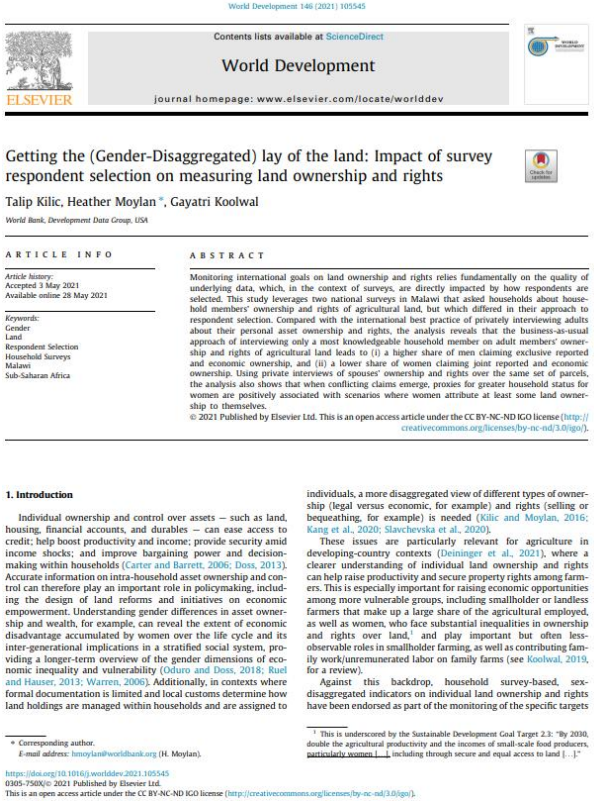
7 Individual Disaggregation

Gender gaps and importance of self-reported data



World Development 146 (2021) 105545

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journal homepage: www.elsevier.com/locate/worlddev

Getting the (Gender-Disaggregated) lay of the land: Impact of survey respondent selection on measuring land ownership and rights

Talip Kilic, Heather Moylan *, Gayatri Koolwal

World Bank, Development Data Group, USA

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ABSTRACT

Monitoring international goals on land ownership and rights relies fundamentally on the quality of underlying data, which, in the context of surveys, are directly impacted by how respondents are selected. This study leverages two national surveys in Malawi that asked households about household members' ownership and rights of agricultural land, but which differed in their approach to respondent selection. Compared with the international best practice of privately interviewing adults about their personal asset ownership and rights, the analysis reveals that the business-as-usual approach of interviewing only a most knowledgeable household member on adult members' ownership and rights of agricultural land leads to (i) a higher share of men claiming exclusive reported and economic ownership, and (ii) a lower share of women claiming joint reported and economic ownership. Using private interviews of spouses' ownership and rights over the same set of parcels, the analysis also shows that when conflicting claims emerge, proxies for greater household status for women are positively associated with scenarios where women attribute at least some land ownership to themselves.

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1. Introduction

Individual ownership and control over assets – such as land, housing, financial accounts, and durables – can ease access to credit; help boost productivity and income; provide security amid income shocks; and improve bargaining power and decision-making within households (Carter and Barrett, 2006; Doss, 2013). Accurate information on intra-household asset ownership and control can therefore play an important role in policymaking, including the design of land reforms and initiatives on economic empowerment. Understanding gender differences in asset ownership and wealth, for example, can reveal the extent of economic disadvantage accumulated by women over the life cycle and its inter-generational implications in a stratified social system, providing a longer-term overview of the gender dimensions of economic inequality and vulnerability (Oduro and Doss, 2018; Ruel and Hauser, 2013; Warren, 2006). Additionally, in contexts where formal documentation is limited and local customs determine how land holdings are managed within households and are assigned to individuals, a more disaggregated view of different types of ownership (legal versus economic, for example) and rights (selling or bequeathing, for example) is needed (Kilic and Moylan, 2016; Kang et al., 2020; Slavchevska et al., 2020).

These issues are particularly relevant for agriculture in developing-country contexts (Deininger et al., 2021), where a clearer understanding of individual land ownership and rights can help raise productivity and secure property rights among farmers. This is especially important for raising economic opportunities among more vulnerable groups, including smallholder or landless farmers that make up a large share of the agricultural employed, as well as women, who face substantial inequalities in ownership and rights over land,[1] and play important but often less-observable roles in smallholder farming, as well as contributing family work/unremunerated labor on family farms (see Koolwal, 2019, for a review).

Against this backdrop, household survey-based, sex-disaggregated indicators on individual land ownership and rights have been endorsed as part of the monitoring of the specific targets

* Corresponding author.
E-mail address: hmoylan@worldbank.org (H. Moylan).

[1] This is underscored by the Sustainable Development Goal Target 2.3: "By 2030, double the agricultural productivity and the incomes of small-scale food producers, particularly women [...], including through secure and equal access to land [...]."

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journal homepage: www.elsevier.com/locate/worlddev

Investment impacts of gendered land rights in customary tenure systems: Substantive and methodological insights from Malawi

Klaus Deininger [a], Fang Xia [b,*], Talip Kilic [c], Heather Moylan [d]

[a] Development Research Group, World Bank, Washington, DC, USA
[b] Research Institute for Global Value Chains, University of International Business and Economics, Beijing, China
[c] Development Data Group, World Bank, Washington, DC, USA
[d] Development Data Group, World Bank, Rome, Italy

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Q15

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Gender
Agricultural growth
Survey methodology
Malawi

ABSTRACT

Although most of the world's agricultural land is cultivated under customary tenure regimes that tend to change over time in response to exogenous factors, the impact of customary rights on productivity and investment remains under-researched. Using unique data from an experiment in Malawi, we show that (i) parcel-level bequest and sale rights affect investment and cash crop adoption; (ii) impacts are gender-differentiated -women's rights affect investment and men's cash crop adoption- and vary by inheritance regime; and (iii) measurement error associated with traditional approaches to survey data collection easily obscures these effects. Beyond reinforcing the need for careful empirical research, this suggests that gradual erosion of women's customary rights may reduce land related investment and that measures other than titling (e.g. changes in family law or legal support) may enhance it.

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1. Introduction

While a large literature has discussed investment and productivity effects of land rights formalization, the impact of individuals' tenure security under traditional regimes received much less attention. This is a serious knowledge gaps particularly in Africa where most of rural land is managed under customary tenure and rights of vulnerable groups such as women, migrants or herders may be the first to be attenuated with increased competition for land. To help fill these gaps, we use unique survey data from Malawi to show that individuals' bequest and sale rights significantly affect investment and cash crop adoption; that the gender of right holders, together with local institutional arrangements, matters for such outcomes; and that these effects may be obscured by measurement error associated with traditional survey data collection methods.

How individuals can access land or exercise their land rights has far-reaching implications for their well-being and ability to take advantage of economic opportunities. While formally documented rights are the norm in developed countries, across the developing world –especially in rural Africa– formalization remains out of reach for the majority of the population. Instead, land is almost exclusively accessed through customary arrangements that are administered by traditional authorities. Individuals' land rights in such systems depend on societal status (Honig, 2017), the strength of existing social ties (Gachberg, 2021) and relationships with local leaders (Goldstein and Udry, 2008).

The literature has long highlighted that, as long as land is relatively abundant, customary systems' ability to flexibly adjust to changes in external conditions allows use of land as a social safety net (Andolfatto, 2002) and for mutual insurance (Beck et al., 2019). Where risk is high and other mechanisms for insurance are absent, this is a key advantage (Bruce and Migot-Adholla, 1994) that may well lead land owners to prefer traditional arrangements to more formal alternatives (Atwood, 1990).

Yet, once land becomes more scarce, conflicts that are difficult for traditional authorities to resolve in a predictable way may exacerbate insecurity (Eck, 2014) and leaders may act in their own, rather than the group's, best interest (Greiner, 2017). This can lead

* Corresponding author.
E-mail addresses: kdeininger@worldbank.org (K. Deininger), xia.fang.fx@gmail.com (F. Xia), tkilic@worldbank.org (T. Kilic), hmoylan@worldbank.org (H. Moylan).

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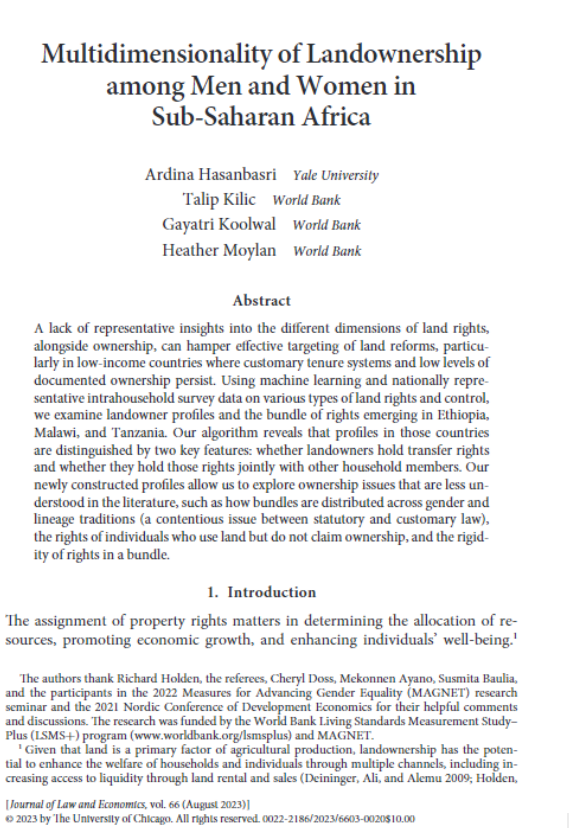

Multidimensionality of Landownership among Men and Women in Sub-Saharan Africa

Ardina Hasanbasri *Yale University*
Talip Kilic *World Bank*
Gayatri Koolwal *World Bank*
Heather Moylan *World Bank*

Abstract

A lack of representative insights into the different dimensions of land rights, alongside ownership, can hamper effective targeting of land reforms, particularly in low-income countries where customary tenure systems and low levels of documented ownership persist. Using machine learning and nationally representative intrahousehold survey data on various types of land rights and control, we examine landowner profiles and the bundle of rights emerging in Ethiopia, Malawi, and Tanzania. Our algorithm reveals that profiles in those countries are distinguished by two key features: whether landowners hold transfer rights and whether they hold those rights jointly with other household members. Our newly constructed profiles allow us to explore ownership issues that are less understood in the literature, such as how bundles are distributed across gender and lineage traditions (a contentious issue between statutory and customary law), the rights of individuals who use land but do not claim ownership, and the rigidity of rights in a bundle.

1. Introduction

The assignment of property rights matters in determining the allocation of resources, promoting economic growth, and enhancing individuals' well-being.[1]

The authors thank Richard Holden, the referees, Cheryl Doss, Mekonnen Ayano, Susmita Baulia, and the participants in the 2022 Measures for Advancing Gender Equality (MAGNET) research seminar and the 2021 Nordic Conference of Development Economics for their helpful comments and discussions. The research was funded by the World Bank Living Standards Measurement Study–Plus (LSMS+) program (www.worldbank.org/lsmsplus) and MAGNET.

[1] Given that land is a primary factor of agricultural production, landownership has the potential to enhance the welfare of households and individuals through multiple channels, including increasing access to liquidity through land rental and sales (Deininger, Ali, and Alemu 2009; Holden,

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Article

OXFORD

Are You Being Asked? Impacts of Respondent Selection on Measuring Employment in Malawi

Talip Kilic[a], Goedele Van den Broeck[b], Gayatri Koolwal[a,*] and Heather Moylan[a]

[a]Development Data Group, World Bank, 1818 H Street, NW Washington, DC 20433, USA
[b]Earth and Life Institute, University of Louvain, Croix du Sud 2, Louvain-la-Neuve, Belgium
*Corresponding author: Gayatri Koolwal. E-mail: koolwalg@devscience.org

Abstract

Accurate estimates of men's and women's employment are necessary for understanding sources of productivity and growth and designing well-targeted, gender-sensitive labour policies. This paper aims to address a key question—how respondent selection in household and labour force surveys affects these estimates—by leveraging two concurrent national surveys in Malawi that relied on the same questionnaire and field teams but differed in their approach to respondent selection. As compared with direct and private interviews with respondents, the 'business-as-usual' approach that allows for proxy reporting when targeted respondents are not available, as well as a mix of other standard survey approaches often used under time and resource constraints, is associated with significantly lower reporting of employment across a range of wage and self-employment activities. Although the effects are seemingly limited in absolute terms, they are quite large in relative terms, vis-à-vis the average participation rates and they tend to be more pronounced for women respondents and concerning questions with longer/12-month recall periods. The analysis also examines how household wealth, proxy reporting and difficulties associated with interpreting questions may be linked to lower reporting in the business-as-usual approach, and which can be examined in future methodological experimentation.

Keywords: Sub-Saharan Africa, Malawi, household surveys, respondent selection, labour, gender
JEL classification: C83, J21, J16

1. Introduction

Accurate estimates of men's and women's employment are at the heart of understanding sources of productivity and economic growth and designing well-targeted, gender-sensitive labour policies. National surveys that provide the required data, including labour force surveys and multi-topic household surveys with labour modules, are usually structured to ask working-age individuals about their participation and time allocation to a range of employment-related activities over the last week or the last 12 months, depending on the question. However, while aimed towards working-age individuals themselves, the common approach in these surveys can often involve a combination of proxy respondents reporting

Highlighting the importance of:

(i) conducting private interviews while collecting individual-specific survey data, and

(ii) collecting survey data on both asset ownership and rights, together with data on other dimensions of individual welfare, such as time use.

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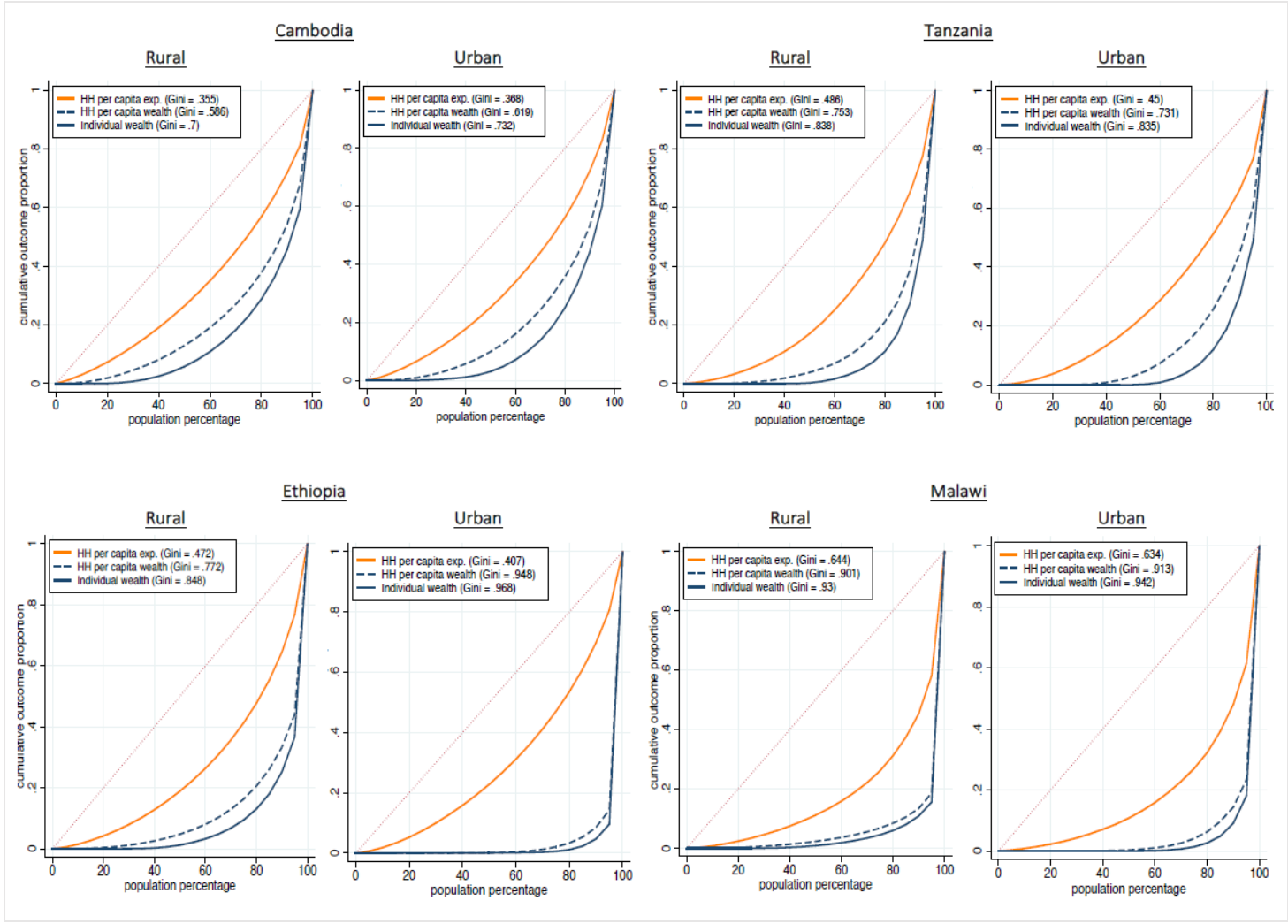
Inequality revisited with LSMS+ data

Self-reported, asset-level data on asset ownership and valuation allow for revisiting inequality analysis in **Cambodia**, **Ethiopia**, **Malawi** and **Tanzania**:



Source: Hasanbasri et al. (2022). "Individual Wealth Inequality: Measurement and Evidence from Low- and Middle-Income Countries." (Forthcoming in *Review of Income and Wealth*)

LSMS
Living Standards Measurement Study

Inequality revisited with LSMS+ data

Self-reported, asset-level data on asset ownership and valuation allow for revisiting inequality analysis in **Cambodia**, **Ethiopia**, **Malawi** and **Tanzania**:

	Within-group component of Theil T (1)	Between-group component of Theil T (2)	Share of overall wealth inequality attributable to within-household inequality [(2) / ((1)+(2))]*100
Cambodia			
Individual wealth specification:[1]			
(A)	0.36	0.92	28.1%
	[0.02]	[0.05]	
(B)	0.33	0.95	25.8%
	[0.02]	[0.06]	
(C)	0.35	0.79	30.7%
	[0.02]	[0.06]	
(D)	0.30	0.82	26.8%
	[0.02]	[0.04]	
Tanzania			
Individual wealth specification:[1]			
(A)	0.66	1.28	34.0%
	[0.03]	[0.05]	
(B)	0.62	1.28	32.6%
	[0.04]	[0.04]	
(C)	0.42	1.14	26.9%
	[0.02]	[0.04]	
(D)	0.37	1.10	25.2%
	[0.02	[0.04]	
Ethiopia			
Individual wealth specification:[1]			
(A)	0.39	3.9	8.9%
	[0.32]	[0.49]	
(B)	0.58	3.6	14.1%
	[0.33]	[0.45]	
(C)	0.40	4.3	8.6%
	[0.11]	[0.51]	
(D)	0.58	3.9	13.0%
	[0.09]	[0.20]	
Malawi			
Individual wealth specification:[1]			
(A)	0.57	3.4	14.4%
	[0.12]	[0.46]	
(B)	0.47	3.3	12.5%
	[0.11]	[0.22]	
(C)	0.55	3.3	14.3%
	[0.12]	[0.46]	
(D)	0.47	3.3	12.5%
	[0.13]	[0.3]	

Notes:
(1) Bootstrapped standard errors (250 repetitions) in brackets.
(2) For individual wealth specification, (A) = No imputation, self-reported values for joint owners; (B) = No imputation, max value for joint owners; (C) = Missing values imputed through multiple imputation, self-reported values for joint owners; (D) = Missing values imputed through multiple imputation, max value for joint owners.

Source: Hasanbasri et al. (2022). "Individual Wealth Inequality: Measurement and Evidence from Low- and Middle-Income Countries." (Forthcoming in *Review of Income and Wealth*)

LSMS Living Standards Measurement Study

Inequality revisited with LSMS+ data

Self-reported, asset-level data on asset ownership and valuation allow for revisiting inequality analysis in **Cambodia**, **Ethiopia**, **Malawi** and **Tanzania**:

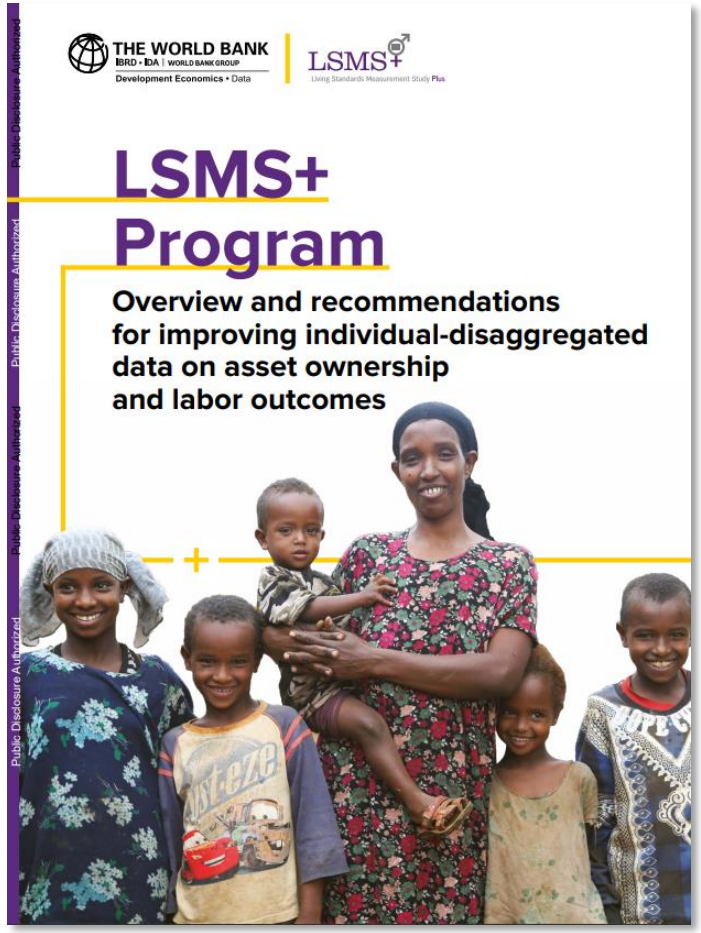
	Factor shares by individual asset class:								
	Non-residential land	Residential land	Financial accounts	Mobile phones	Livestock	Motorcycle	Car	Tractor	Other[1]
Cambodia									
Indiv. wealth specification:[1]									
(A)	0.33	0.54	0.002	0.003	0.015	0.04	0.06	0.02	-
(B)	0.34	0.54	0.002	0.003	0.02	0.03	0.05	0.01	0.005
(C)	0.33	0.55	0.002	0.003	0.02	0.03	0.05	0.01	0.005
(D)	0.33	0.57	0.002	0.003	0.01	0.03	0.04	0.01	0.005
Tanzania									
Indiv. wealth specification:[1]									
(A)	0.22	0.77	0.01	-	-	-	-	-	-
(B)	0.22	0.77	0.01	-	-	-	-	-	-
(C)	0.20	0.78	0.01	-	-	-	-	-	-
(D)	0.21	0.78	0.01	-	-	-	-	-	-
Ethiopia									
Indiv. wealth specification:[1]									
(A)	0.01	0.78	0.05	0.01	0.15	-	-	-	-
(B)	0.01	0.82	0.05	0.01	0.12	-	-	-	-
(C)	0.01	0.89	0.02	0.003	0.08	-	-	-	-
(D)	0.01	0.93	0.01	0.002	0.05	-	-	-	-
Malawi									
Indiv. wealth specification:[1]									
(A)	0.39	0.61	-	-	-	-	-	-	-
(B)	0.41	0.59	-	-	-	-	-	-	-
(C)	0.37	0.63	-	-	-	-	-	-	-
(D)	0.40	0.60	-	-	-	-	-	-	-

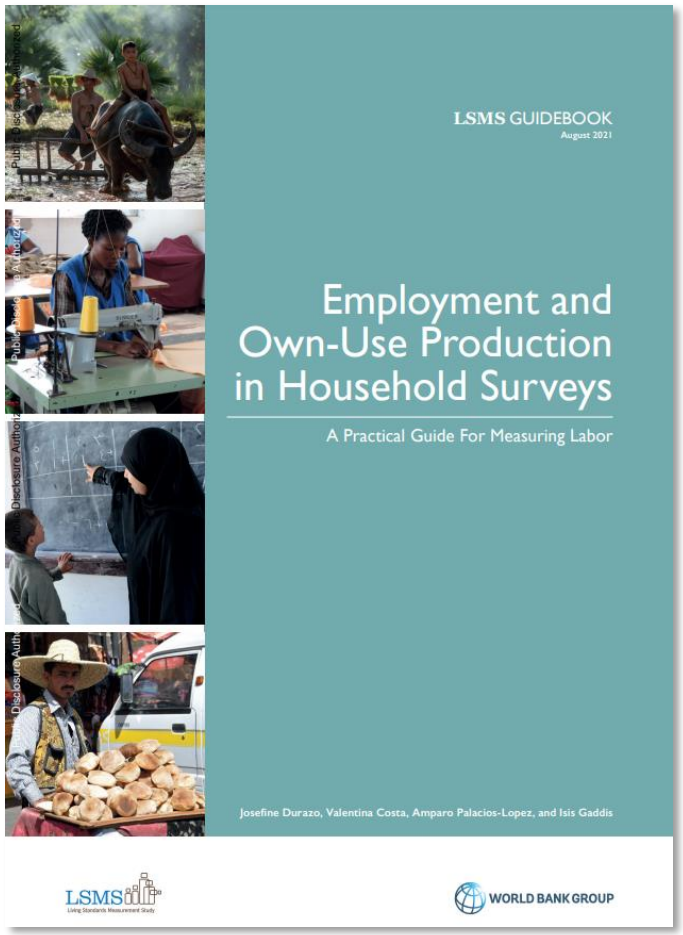
Notes:
(1) "Other" in the case of Cambodia includes computers, tuk tuks, boats and bicycles.
(2) (-) = no valuation data collected for that particular asset class.

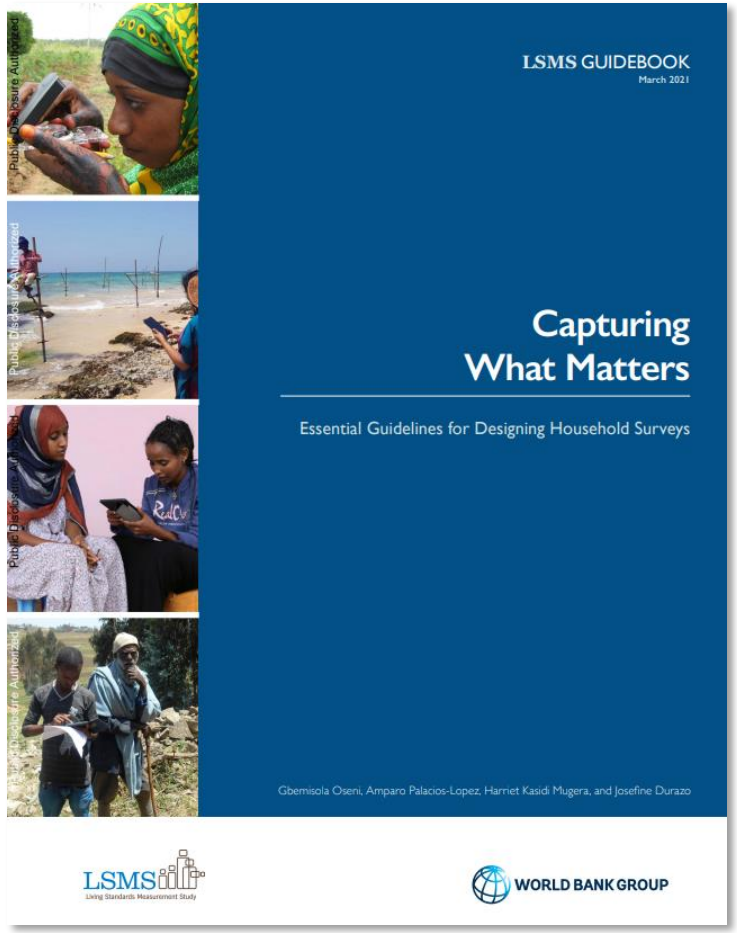
Source: Hasanbasri et al. (2022). "Individual Wealth Inequality: Measurement and Evidence from Low- and Middle-Income Countries." (Forthcoming in *Review of Income and Wealth*)

LSMS Living Standards Measurement Study

Guidance on (individual-level) survey data collection







LSMS
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Key Features

1. Multi-topic and multi-level
2. Nationally-**representative** probability sample
3. Panel
4. **Multi-purpose**
5. **Geo-referenced and interoperable** with geospatial, admin and census/survey data
6. Food and Non-Food **Consumption** and **Expenditures**
7. Individual Disaggregation
8. **Computer-Assisted Personal Interviewing (CAPI)**
   - » **World Bank Survey Solutions CAPI Software:** Automated routing, immediate data validation, platform for survey management, collection and use of paradata.
9. **Objective measurement**
10. **Public Access**

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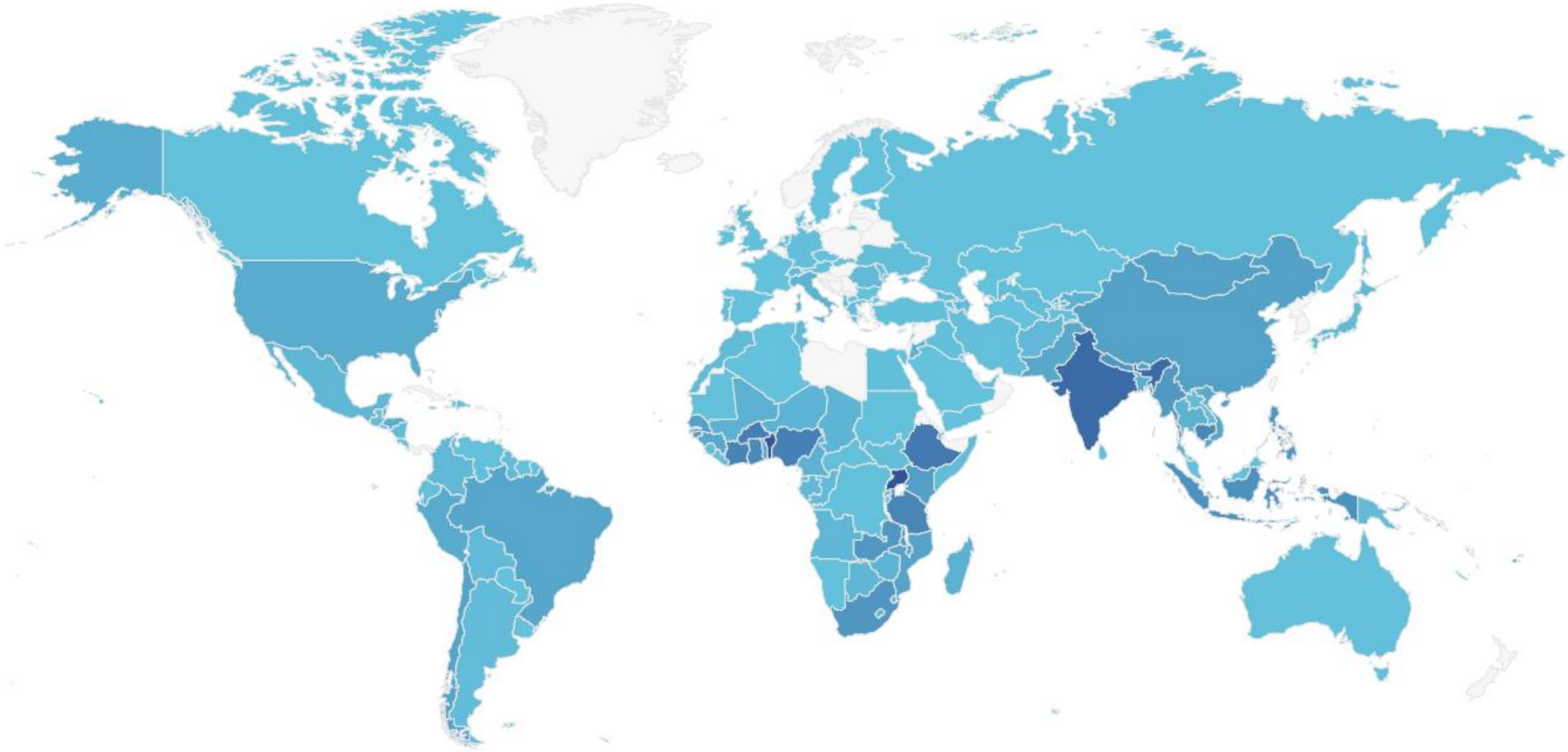
Survey Solutions

Globally trusted platform for data collection



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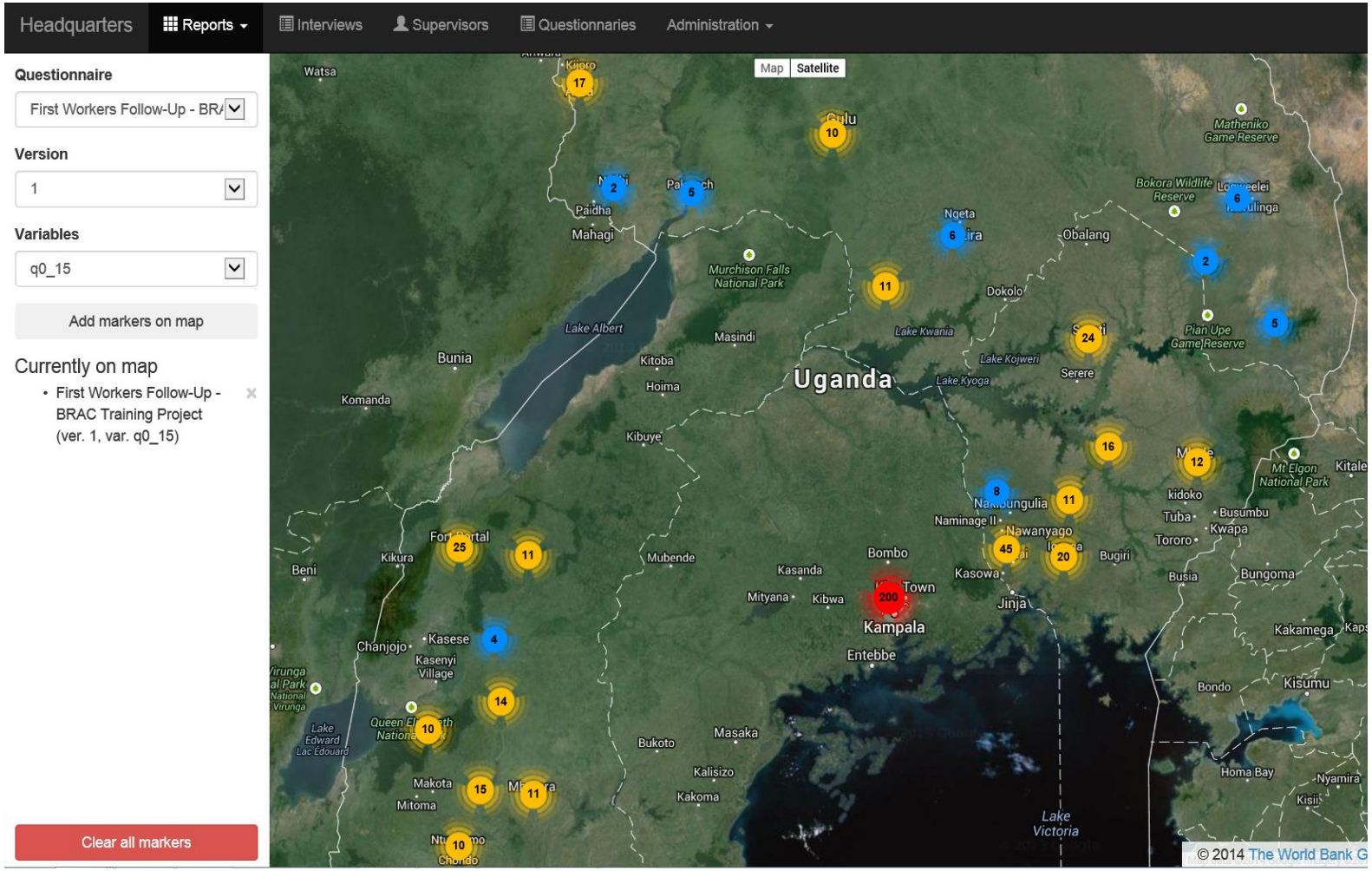
Survey Solutions

Using GIS capabilities for quality assurance



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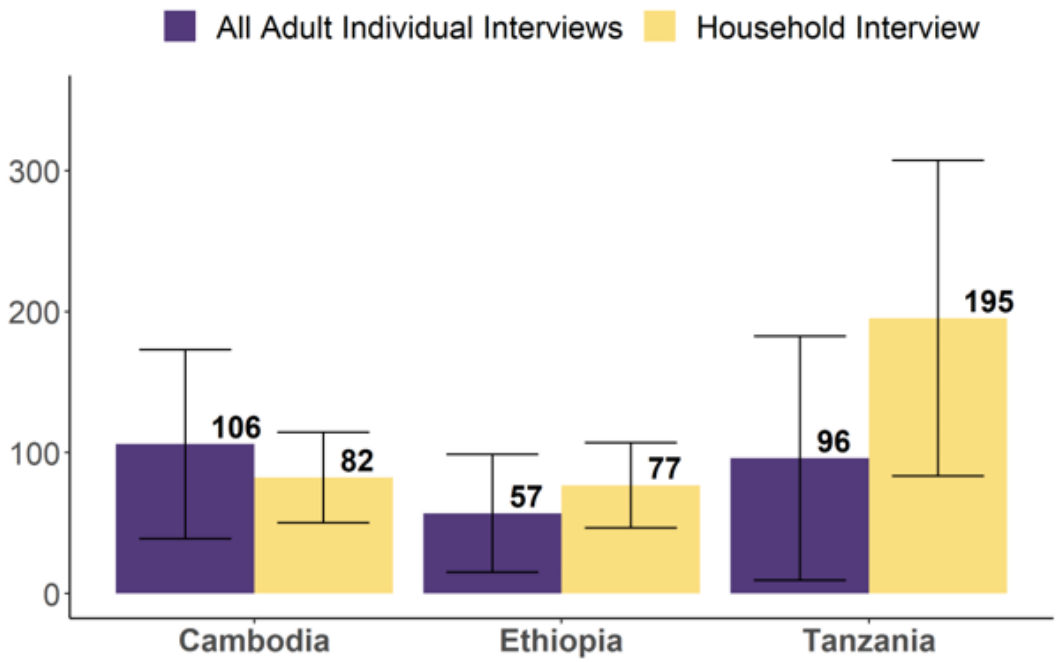
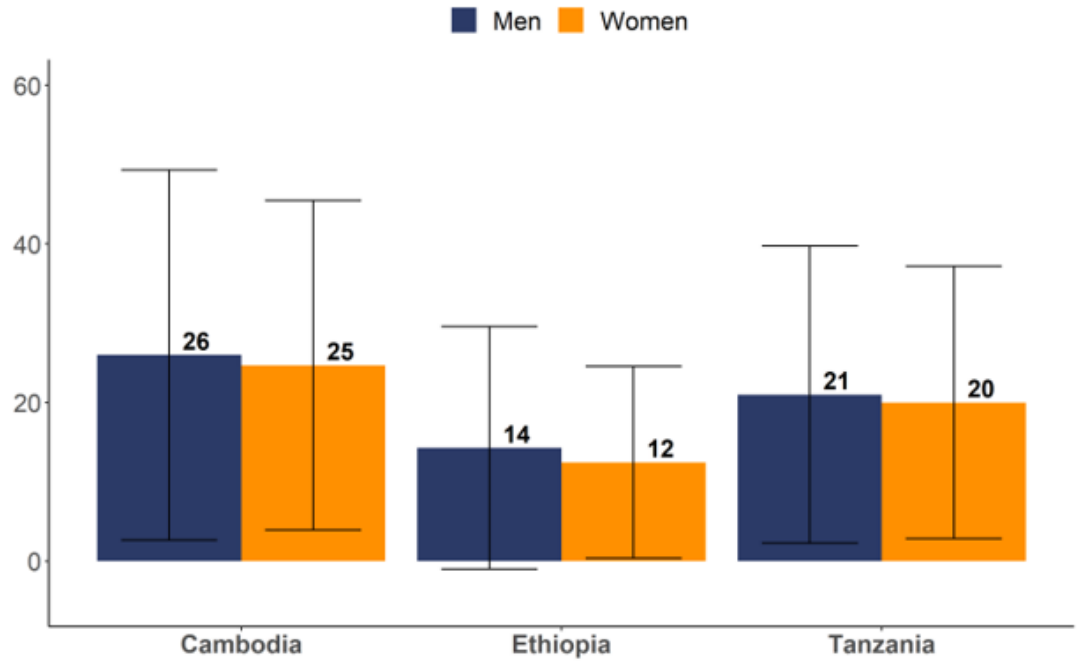
Insights from Survey Solutions paradata

Average Duration (Mins) of Adult Individual Questionnaire Modules: Tanzania NPS 2019/20

1a. Average Time Spent at Household



1b. Average Time per Adult Individual Interview



Source: Hasanbasri, Kilic, Koolwal and Moylan (2023)." Using Paradata to Assess Respondent Burden and Interviewer Effects in Household Surveys Evidence from Low- and Middle-Income Countries" World Bank Policy Research Working Paper No. 10456. Forthcoming in *Statistical Journal of the IAOS.*

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Insights from Survey Solutions paradata

Table 3: Average Cost Estimates of Three LSMS+ Surveys

Average Cost (in 2019 USD)	Cambodia LSMS+ 2019/2020	Ethiopia ESS 2018/2019	Tanzania NPS 2019/2020
• Per Minute:	$0.87	$1.71	$3.94
• Average Duration of a Household Interview	82 minutes	77 minutes	120 minutes
• Average Cost of a Household Interview	$71	$131	$472
• Average Duration of an Individual Interview	25 minutes	13 minutes	20 minutes
• Average Cost of an Individual Interview	$22	$23	$80

Source: Hasanbasri, Kilic, Koolwal and Moylan (2023)." Using Paradata to Assess Respondent Burden and Interviewer Effects in Household Surveys Evidence from Low- and Middle-Income Countries" World Bank Policy Research Working Paper No. 10456. Forthcoming in *Statistical Journal of the IAOS.*

LSMS Living Standards Measurement Study

Key Features

1. Multi-topic and multi-level
2. Nationally-**representative** probability sample
3. Panel
4. **Multi-purpose**
5. **Geo-referenced and interoperable** with geospatial, admin and census/survey data
6. Food and Non-Food **Consumption** and **Expenditures**
7. Individual Disaggregation
8. **Computer-Assisted Personal Interviewing**
9. **Objective measurement**
   - » **Use of GPS** for georeferencing households, plots, facilities + land area measurement
   - » On-going work on objective measurement, augmented with imputation
     - Crop cutting for yield estimation
     - Mobile phones for high frequency data capture (e.g., tree and root crop production)
     - Sensors for data collection on soil quality and climate
     - Accelerometers for physical activity tracking
     - DNA fingerprinting for crop variety identification
10. **Public Access**

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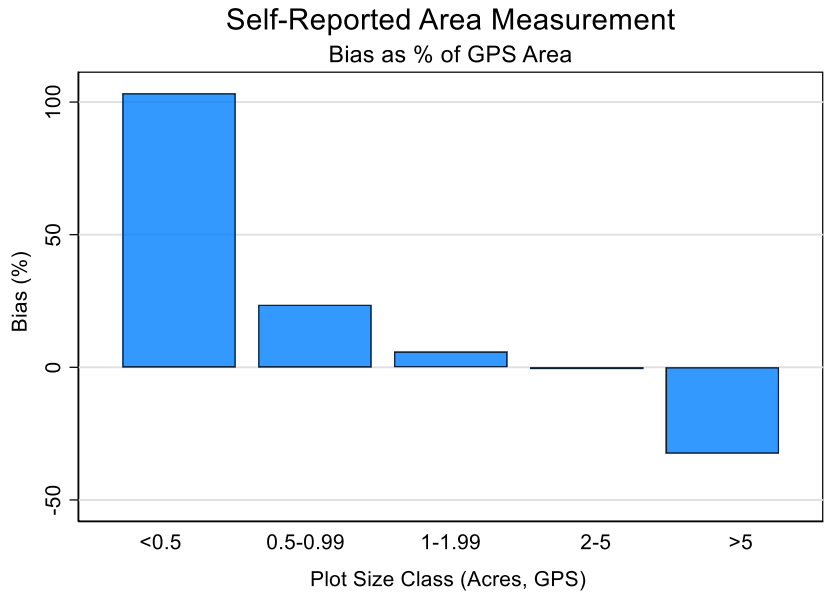
Land Area

- **Self-reported land areas:** Common but potentially error-prone
- Farmers systematically over-estimate small plot areas, while under-estimating areas of larger plots



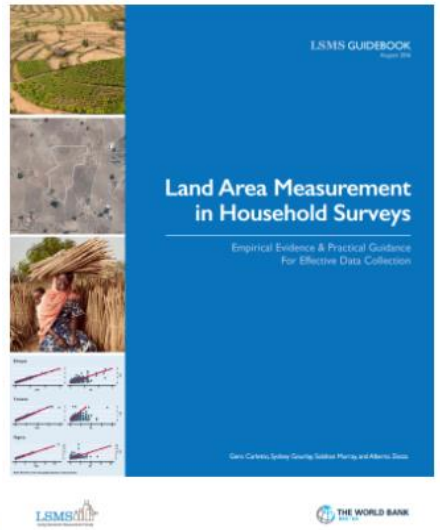
Systematic measurement error in farmer reporting alters the conclusions of research.

Fact or artifact. Calogero Carletto, Sara Savastano, Alberto Zezza. *Journal of Development Economics*, 2013.

From Guesstimates to GPStimates. Calogero Carletto, Sydney Gourlay, Paul Winters; *Journal of African Economies*, 2015.

Cheaper, Faster, and More Than Good Enough. Calogero Carletto, Sydney Gourlay, Siobhan Murray, Alberto Zezza. *Survey Research Methods*, 2017.

Missing(ness) in Action. Talip Kilic, Alberto Zezza, Calogero Carletto, Sara Savastano. *World Development, 2017.*



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Key Features

1. Multi-topic and multi-level
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8. **Computer-Assisted Personal Interviewing**
9. **Objective measurement**
10. **Public Access**

- Target: data release within 6 months
- Deadline: data release within 12 months
- Including geo-variables

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10 Public Access

LSMS DATA CATALOG

Access Our Data

LSMS data are publicly available and open access: explore the full datasets in the World Bank's Microdata Catalog

DATA

High-Frequency Phone Surveys

LSMS is supporting high-frequency phone surveys in Burkina Faso, Ethiopia, Malawi, Mali, Nigeria, Tanzania and Uganda to track responses to and socio-economic impacts of COVID-19 and economic shocks.

VIDEO

LSMS-ISA: 15 years of impact in development

The LSMS-ISA is a unique system of longitudinal surveys designed to improved the understanding of livelihoods, welfare and smallholder agriculture in Africa.

https://www.worldbank.org/en/programs/lsms

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10 Public Access

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Home / Central Data Catalog / Living Standards Measurement Study (LSMS)

Living Standards Measurement Study (LSMS)

about | ← Central Data Catalog

The LSMS is a research project that was initiated in 1980. It is a response to a perceived need for policy relevant data that would allow policy makers to move beyond simply measuring rates of unemployment, poverty and health care use, for example, to understanding the determinants of these observed social sector outcomes.

Keywords... Search

Years

Countries/Economies

License

Showing **1-15** of **338,988** variables

Study view | Variable view

Relevance

Living Standards Measurement Study (LSMS) ×

Reset search

http://microdata.worldbank.org

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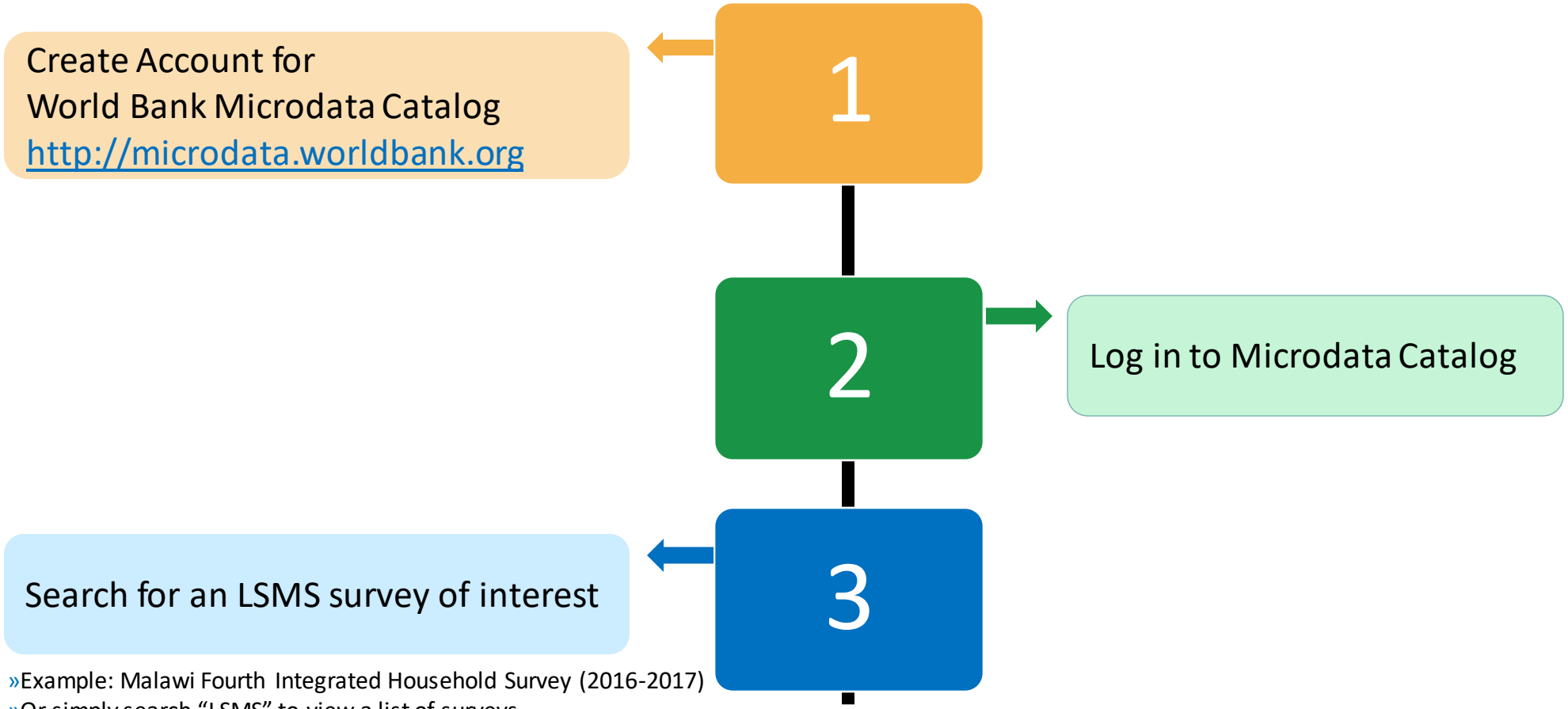
How to Access



- Example: Malawi Fourth Integrated Household Survey (2016-2017)
- Or simply search "LSMS" to view a list of surveys
- File structure corresponds to the questionnaire modules
- Variable names correspond to the question numbering

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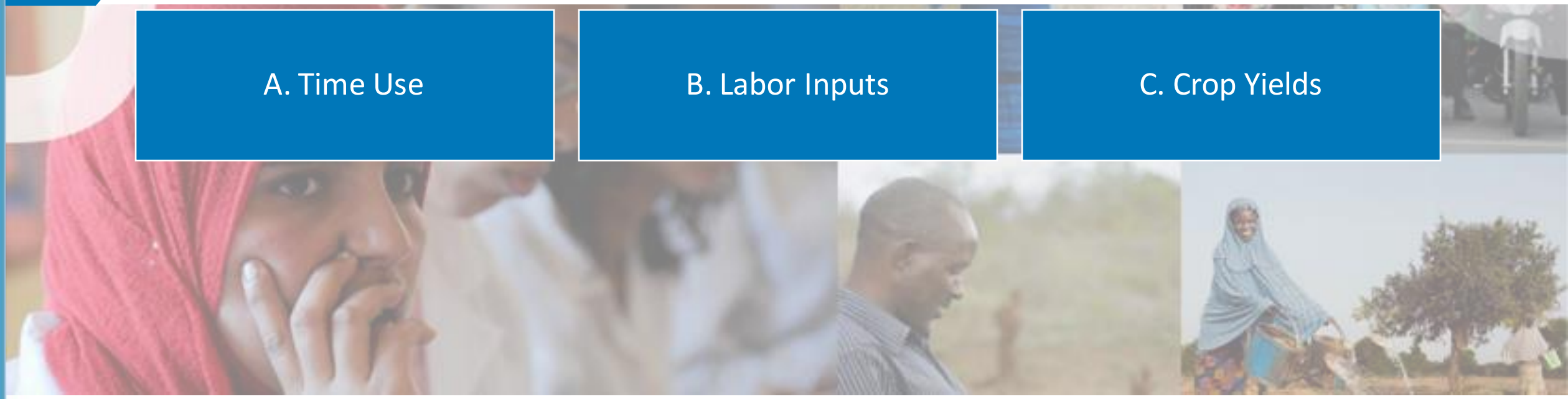
2 Methodological Innovations

A. Time Use

B. Labor Inputs

C. Crop Yields



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A. Time Use

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Time Use

Motivation

- Time use data are key to understanding economic decision-making among men and women, and highlighting inequities within and across households

- Surveys in low- and middle-income countries rely on recall-based interview-based diaries or stylized questions to measure time use

- Dearth of evidence on how recall may affect time use data accuracy, particularly in contexts with low literacy and numeracy

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Time Use

Our Study

Survey experiment in Malawi to examine how innovative techniques could sidestep measurement errors in recall-based time use survey methods

- Households randomly assigned to one of two treatment arms in each community
  - **Traditional time-use diary with a 24-hour recall**
    - » Adapted from IFPRI WEAI Time Use Module
  - **Self-administered smartphone-based pictorial time use diary – TimeTracker**
    - » Revamped the app originally developed for low-literacy settings
- One adult man and one adult woman in each household
- 11-day continuous reporting for *TimeTracker* vs. repeated (3) measures for recall, distributed across the same reporting period in each community
- Both arms received a stylized 7-day recall time use module in the final interview
- **Multi-disciplinary effort:** App development, illustration design and training + Survey design, implementation and analysis

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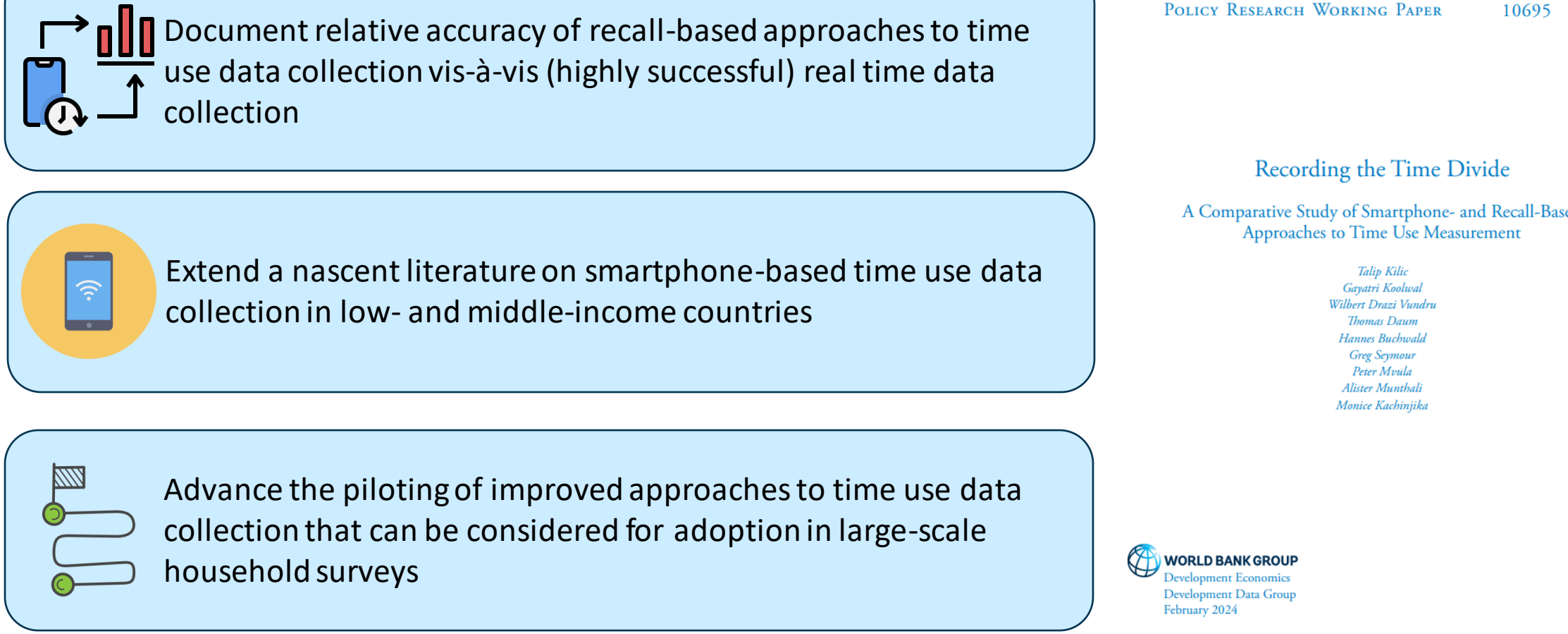
Time Use

Contributions

Document relative accuracy of recall-based approaches to time use data collection vis-à-vis (highly successful) real time data collection

Extend a nascent literature on smartphone-based time use data collection in low- and middle-income countries

Advance the piloting of improved approaches to time use data collection that can be considered for adoption in large-scale household surveys



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Time Use

TimeTracker App

- Android app originally developed by the University of Hohenheim and the Institute for Applied Science at the University of Media, Stuttgart (Daum et al., 2018) and enhanced for this study with LSMS support
- Real-time recording of time use, allowing for simultaneous activities
  - » 84 percent of activities had at least one other activity conducted simultaneously
- Smartphones received by respondents only have the app installed; one-to-one match in activity categories with recall treatment arm
- Separate sets of images for men and women respondents + scrolling captions in Chichewa

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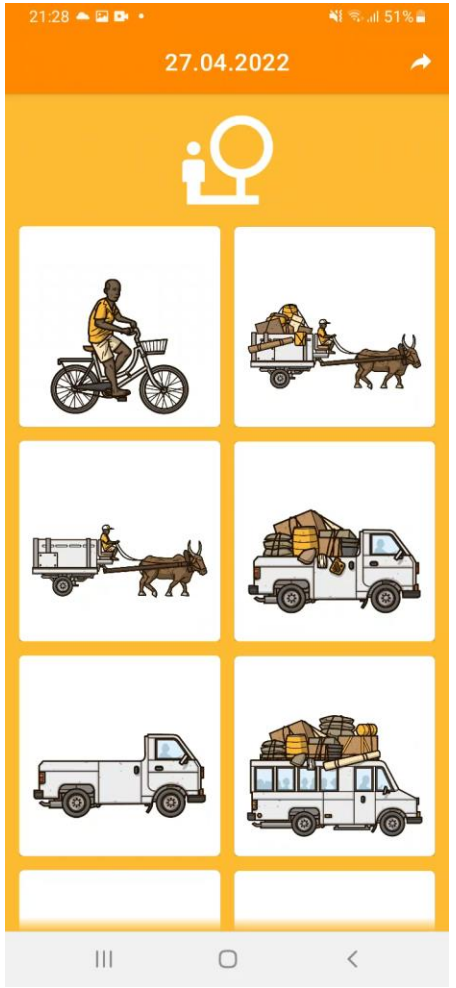
Time Use

TimeTracker App (2)

- Data are downloaded as excel files, transferred from the application to a laptop via local Wi-Fi network
- Allows enumerators/ researchers to cross-check data in the field
- Ease of adding/removing activities/illustrations- adaptable to other contexts

Main screen



Calendar view

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Time Use

Key takeaways

- Participation rates in smartphone arm are greater across several categories of employment, unpaid work, while reported time estimates are higher in 24-hour diary – due to the minimum 15-minute increments in which activities can be reported
- Gender gaps in unpaid work remain large in smartphone sample, but narrower somewhat in household resource collection and care
- Smartphone arm captures more time in evening hours, and multitasking, esp. for women
- 7-day recall overreports relative to both 24-hour recall and smartphone – implications for interpreting standard stylized instrument commonly used in labor force modules

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B. Labor Inputs

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Labor Inputs

Improving labor measurement for vulnerable groups

- Contreras et al. (2024) conducted a randomized survey experiment in El Salvador that compares two alternative survey methods—a List of Activities survey module (LOA) and enforced self-responses (ESR)—against a traditional household survey, which consists of proxy responses without a LOA module.

Group	Type of Labor Module	Type of Respondent
Control Group	Standard labor module (following 19th ICLS)	Proxy respondents permitted for unavailable household members. If available, each household member (15-64 years old) responds on his/her own.
List of Activities (LOA)	Standard + LOA	Proxy respondents allowed.
Enforced self-responses (ESR)	Standard labor module (following 19th ICLS)	Self-reporting is enforced for eligible household members (15-64 years old).

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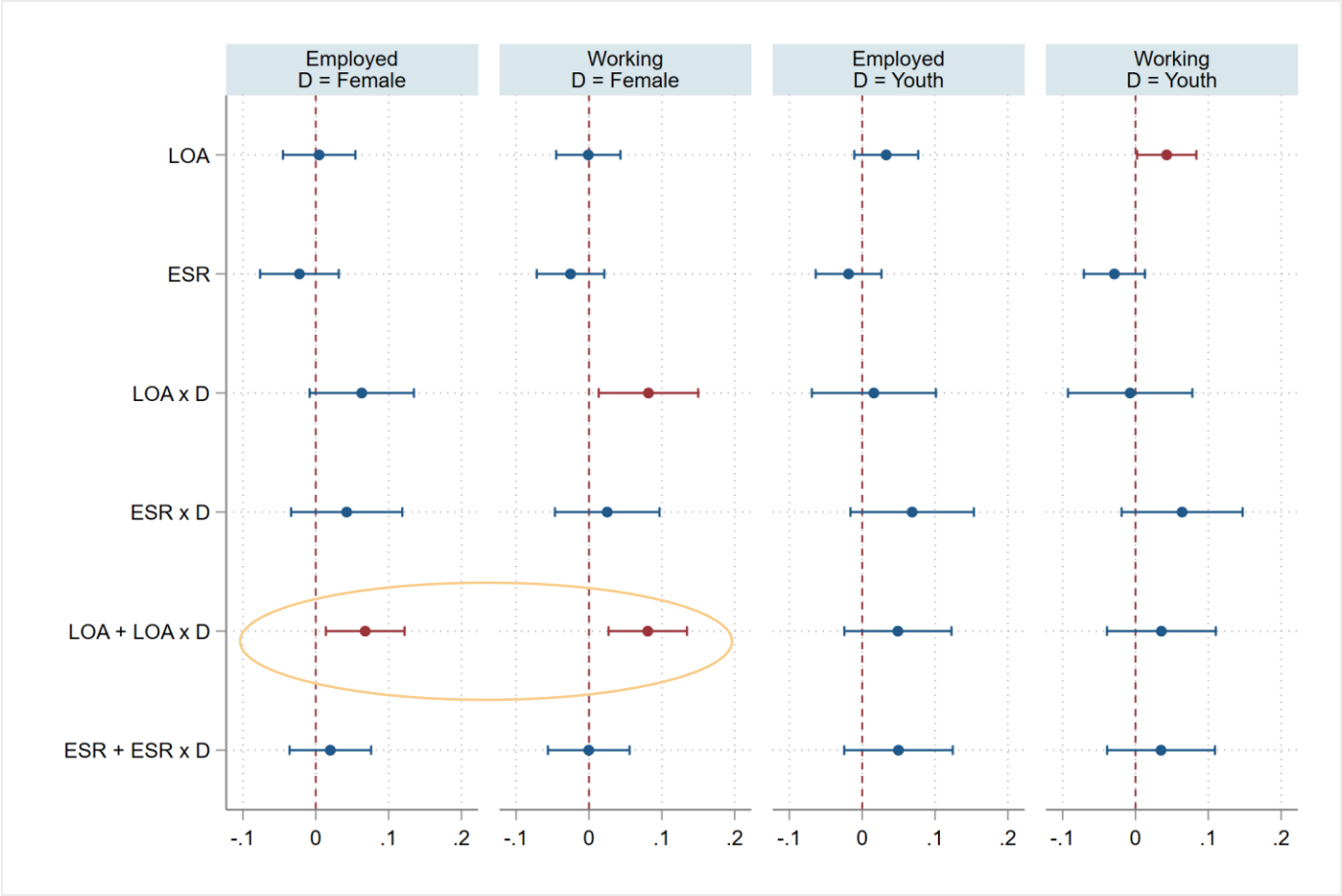
Labor Inputs

Improving labor measurement for vulnerable groups

Women's employment rate is higher when they are given examples of work activities (LOA) that contribute to their own identification as part of the working population



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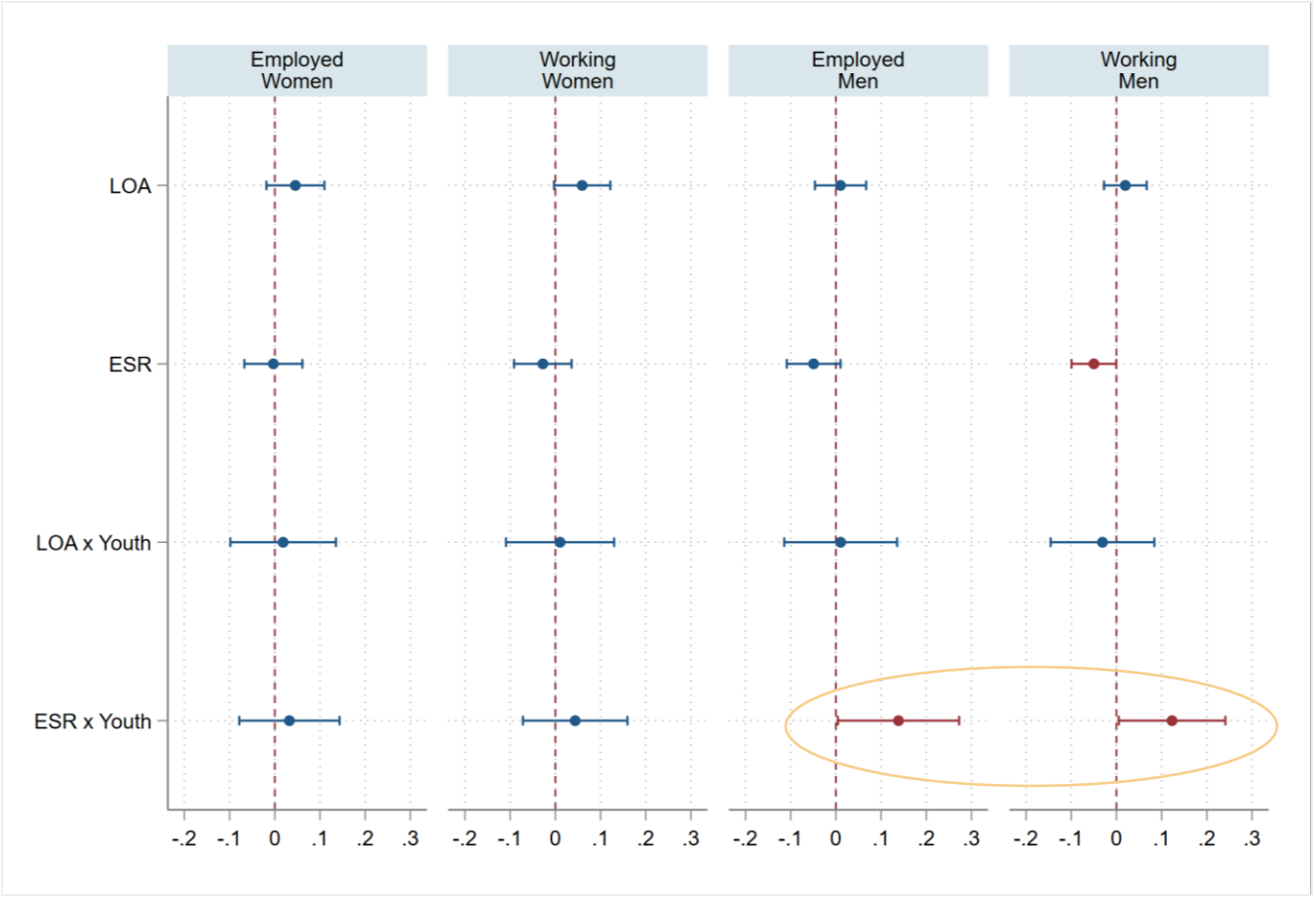
Labor Inputs

Improving labor measurement for vulnerable groups

Enforcing self-reporting increases the share of young males reporting to be employed (compared to older males).



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C. Crop Yields

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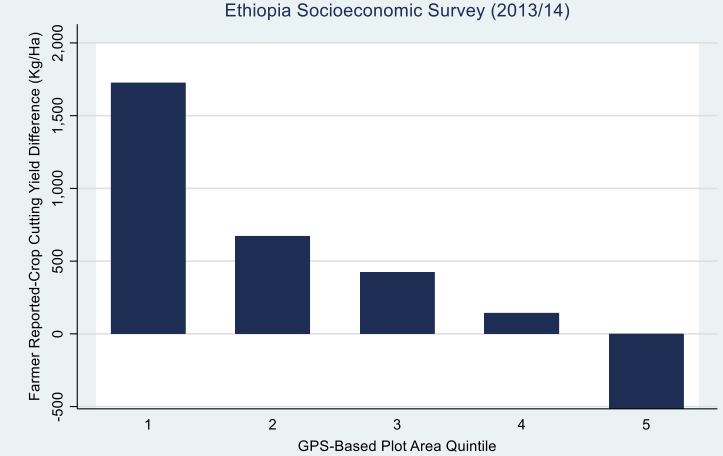
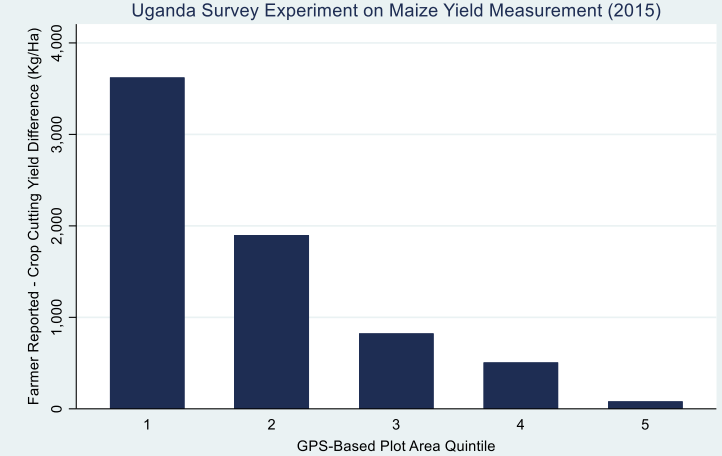
Crop Yields

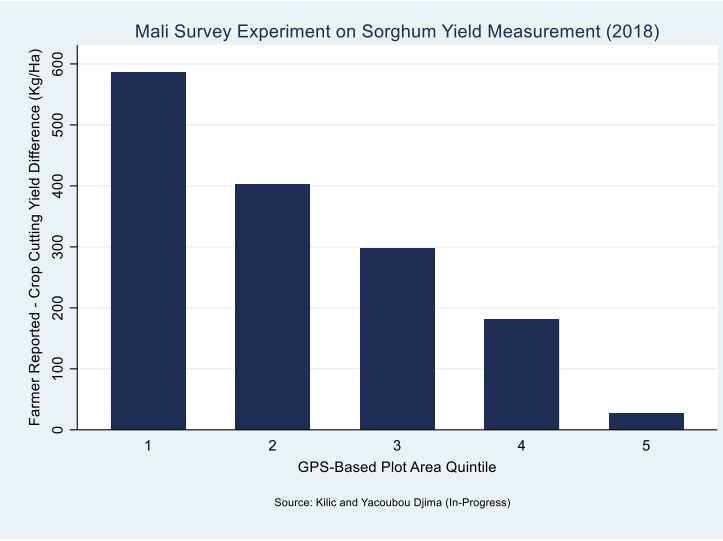
Seasonal Crop Yields



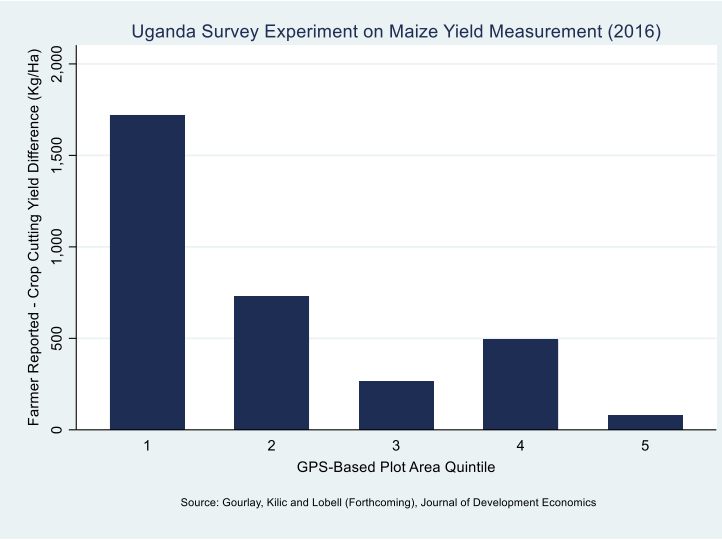
Source: Desiere and Jolliffe (2018), Journal of Development Economics



Source: Gourlay, Kilic and Lobell (Forthcoming), Journal of Development Economics



Source: Kilic and Yacoubou Djima (In-Progress)



Source: Gourlay, Kilic and Lobell (Forthcoming), Journal of Development Economics

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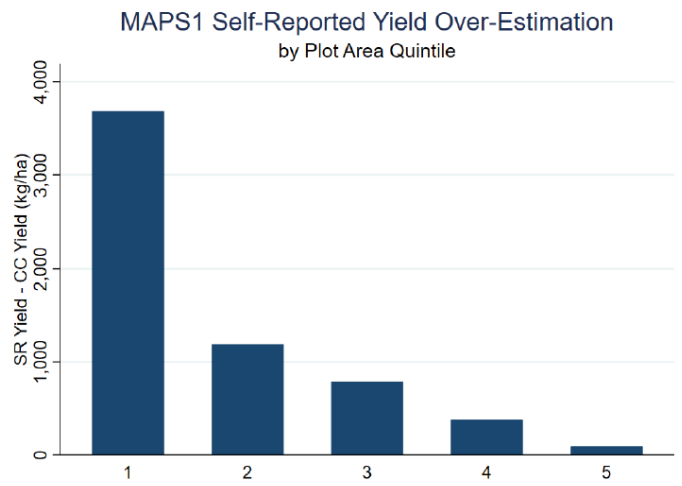
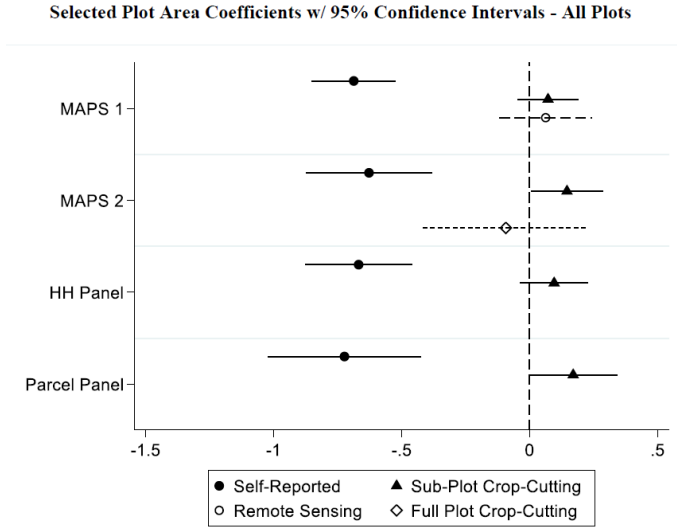
Crop Yields

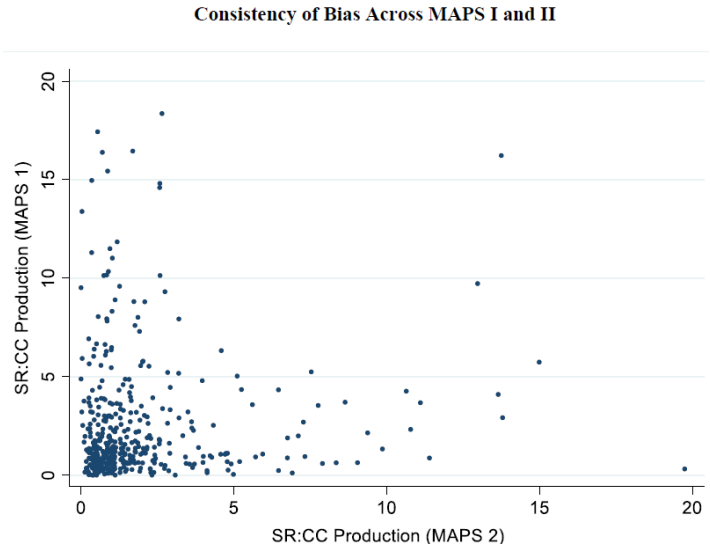
Measurement errors & implications for inference

A New Spin on an Old Debate? Errors in Farmer-Reported Production and Their Implications for the Inverse Scale-Productivity Relationship in Uganda

Journal of Development Economics, 141, 2019. (Open-Access)







Motivation: The observation that smaller plots/farms are more productive than their larger counterparts has puzzled researchers for nearly a century. This relationship, if not merely an artifact of measurement error or market failures, has direct implications for the design of poverty reduction and land distribution policies in smallholder systems.

Research: Using data from a methodological experiment conducted in Eastern Uganda, in which maize production, maize variety, plot area, and soil quality were measured both objectively and subjectively, we propose that this inverse relationship between area and productivity is due to errors in farmer-reported crop production.

Findings: Systematic measurement error in farmer-reported production generates the inverse relationship, primarily due to significant farmer over-estimation of production on small plots. Robust to a range of sensitivity analyses. On average, actual yields may be nearly 1,400 kg/ha lower than previously believed.

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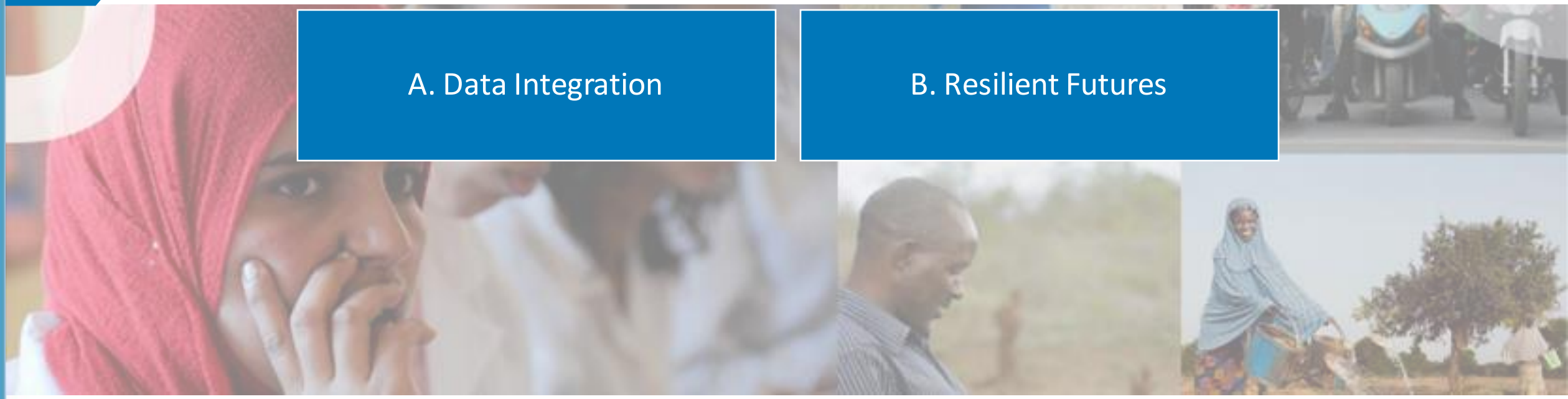
3 Looking Forward

A. Data Integration

B. Resilient Futures



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A. Data Integration

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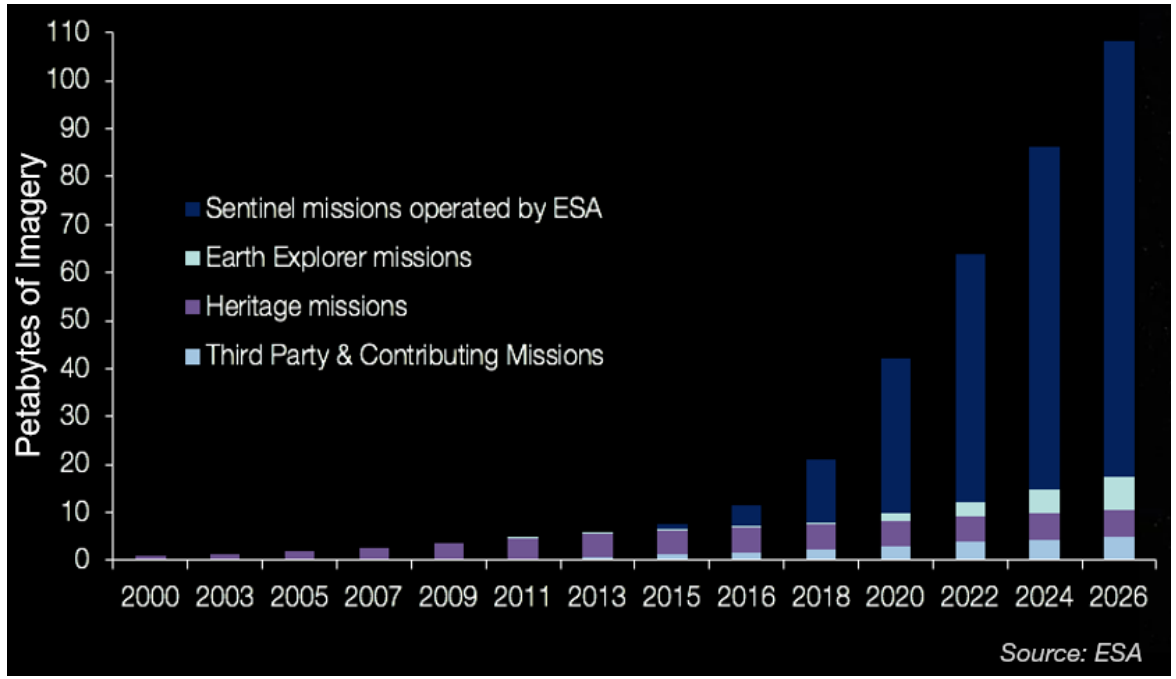
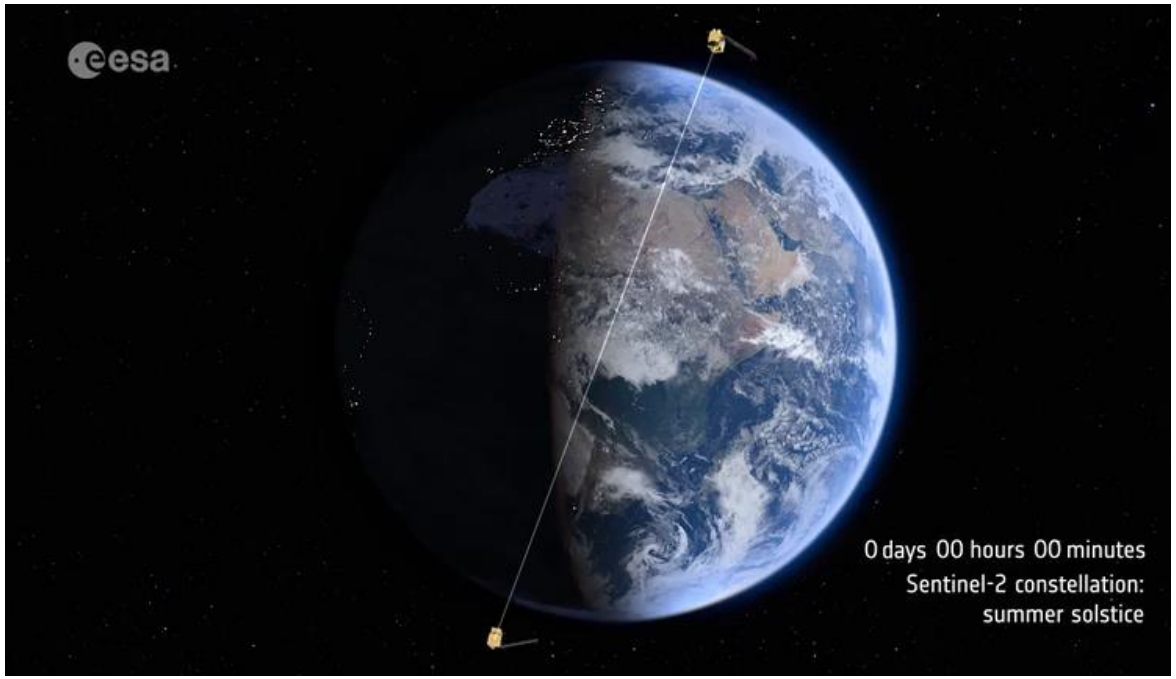
Data Integration

Why integrate surveys with alternative data sources? (1)

Increased availability of satellite imagery and adoption of ICT innovations - including cell phones, social media platforms digital transactions, and mobile money - particularly in low- and middle-income settings.





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Why integrate surveys with alternative data sources? (2)

- **Result:** Wealth of alternative data sources that are increasingly available and suited to a wide range of secondary uses, though with unique accompanying challenges
- **Alternative data sources are attractive for several reasons:**
  - ***"Big data".*** Wide reach and scope. Growing use of cell phones and social media platforms.
  - **"Always on".** Typically collected at much higher frequency vis-a-vis public intent data.
  - **"Zoomed in".** Disaggregated information specific to individuals and localities.
  - **"Potentially less biased".** May be less prone to social desirability bias than personal interviews.

Data Integration

Why integrate surveys with alternative data sources? (3)

Integrating surveys with alternative data sources can deliver on several fronts:

1) Enhance **analytical value** and **cost-effectiveness** of surveys

2) **Calibrate** and **validate** AI-powered insights to serve humanity as a whole

3) Enhance **spatial disaggregation** and **temporal frequency** of specific indicators

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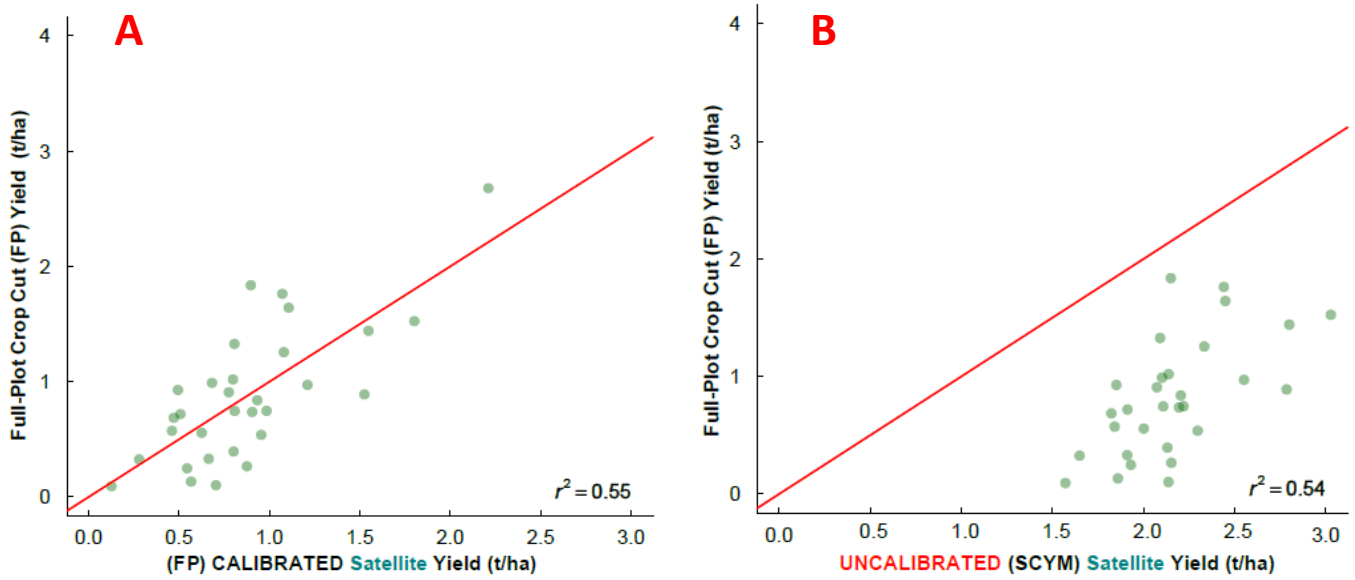
Data Integration

Measuring Agricultural Productivity, with Eyes in the Sky and Boots on the Ground

Can we leverage the latest advances in satellite imagery and remote sensing to generate accurate crop yields in smallholder systems?

Integration of georeferenced LSMS survey data and publicly-available high-resolution Sentinel-2 satellite imagery reveals the importance of calibrating remote sensing models.

Uganda Plot-Level **Ground (Crop Cutting, Survey-Based)** versus **Satellite-Based Maize Yields**



Source: Lobell et al. (2019). "Eyes in the Sky, Boots on the Ground", *AJAE*

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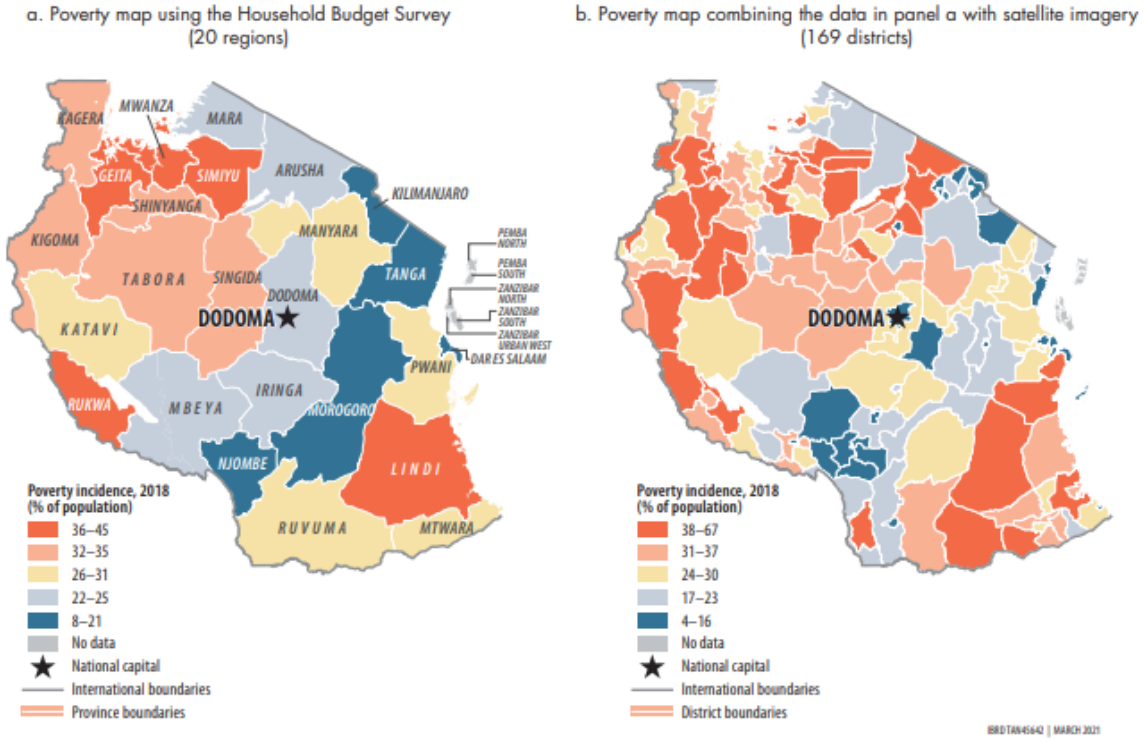
Data Integration

More examples to motivate our future work

Integration of Tanzania Household Budget Survey Data with Publicly Available Satellite Imagery

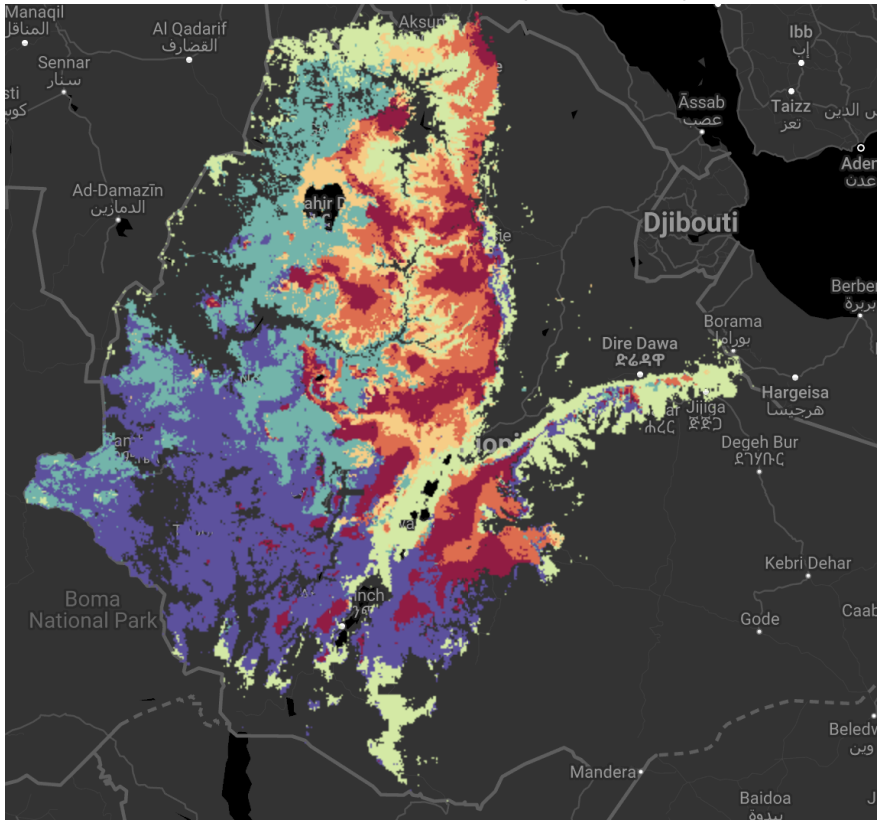
Map O.3 Combining satellite imagery with household survey data increases the resolution of the poverty map of Tanzania



Source: World Bank 2019. Data at http://bit.do/WDR2021-Map-O_3.

Integration of Ethiopia Socioeconomic Survey Data with Publicly Available Satellite Imagery

10-meter Resolution Crop Area Maps



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B. Resilient Futures

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Resilient Futures:
Next Phase of Our Panel Surveys

- Low-income and vulnerable households bear the brunt of the polycrisis era
- Boosting resilience from the bottom-up is critical to support the vulnerable
- To understand resilience, we need to look beyond consumption/income, and also consider consider **health**, **education**, **financial and physical assets**, **social protection**, and access to improved **energy** sources, **WASH** services and **digital** technologies.
- Despite the importance of resilience for weathering recurrent crises, data are often **inadequate** to design well-targeted resilience-building programs
  - Identifying who will be most affected by shocks is inherently difficult
  - Advancements in remote sensing and geospatial data do not resolve the difficulty of identifying at-risk households and understanding how they cope, adapt or when they cannot
  - Large-scale household surveys used for poverty monitoring are not designed to provide representative and **dynamic** insights regarding resilience to and impacts of climate shocks
- Providing timely support that boosts resilience requires agile data systems that are pre-established and can be activated in response to shocks
  - These systems are not the norm, and most countries lack the capacity and resources to develop them

Resilient Futures:
Next Phase of Our Panel Surveys

RESILIENT FUTURES

- Aim to support countries in building **agile data systems** that produce the evidence for designing and monitoring interventions that **strengthen resilience** and **target the most vulnerable**

- Starting in 15 countries with high-levels of socioeconomic and environmental vulnerability, **Resilient Futures** will build state-of-the-art national **longitudinal high-frequency living standards surveys** – conducted both in person and via phone, that
  - Capture levels of and changes in resilience and vulnerability in multiple dimensions
  - Deliver the spatial and temporal granularity to meet the knowledge gaps on localized impacts of shocks
  - Supply ground-truth data to calibrate and validate AI-powered insights
  - Are georeferenced for seamless integration with geospatial climatic and environmental data
  - Provide opportunities for in-situ sensor deployments for highly granular climate data
  - Build on existing longitudinal survey systems supported by the LSMS
- **Target outcomes:**
  - **Increased country and task team capacity** to respond to shocks more quickly and effectively;
  - **Increased financial leverage and development impacts** achieved by countries through the design and implementation of better targeted and proactive interventions

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Microdata for Macro Economists: An Introduction to the **Living Standards Measurement Study**

Talip Kilic
Senior Program Manager
Development Data Group | World Bank
tkilic@worldbank.org

Structural Transformation and Economic Growth (STEG) Virtual Lecture

04/12/2024

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