INCATA: Linked Farms and Enterprises for Inclusive Agricultural Transformation in Africa and Asia

LSMS-ISA Analyses Progress Report

October, 2024

RIMISP

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Research questions and about this report

- **INCATA's Objective** is to study the relationship between commercial small-scale producers (cSSPs) and micro, small, and medium enterprises (MSME) in the hidden middle of agrifood value chains to explain how it underpins and contributes to an inclusive agricultural transformation.
- INCATA Project aims to answer:
  - 1) What kickstart the dynamic of commercialization and engagement with MSMEs in the hidden middle?
  - 2) Which, how, and why do some cSSPs and some MSMEs move along in the transformation process while others don't?
  - 3) To what degree does increasing commercialization and development of MSMEs translate into poverty reduction and women's economic empowerment (WEE)?
  - 4) What investments and policies have the potential to accelerate the symbiotic co-development of cSSPs and MSMEs, and what are the inclusion effects of that dynamic?
- Through two workstreams:
  - LSMS-ISA data analyses for six countries
  - Horticulture and aquaculture value chain analyses in two countries (Kenya and Odisha in India).

This report presents the initial descriptive analyses of the characteristics and trends of cSSPs and its outcomes for six African countries.

The report is organized around five topics

I. SSPs: Major Contributors to Food Production

- SSPs produce 2/3 of total crops
- SSPs hold over 50% of cultivated land.

II. SSPs: A Key Player in Commercial Agriculture

- Over 70% of all SSPs sell some of their output.
- Over 50% of SSPs participate in input and output markets concurrently.

III. SSP Households own MSMEs

- In all higher and middle-income countries, at least 30% of crop-producer households owned an MSME.

IV. SSPs have diversified production strategies

- Highly diversified SSPs present, on average, a higher percentage of producers who plant any fruit and/or vegetable when compared to specialized SSPs.

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- cSSPs present higher resilience and better food security scores.
- A 10% increase in the share of output sold is associated with a 2.2% reduction in poverty in Malawi.

General findings

In a nutshell, the descriptive analyses that follow present insights that support three key messages relevant to our study (and to understanding African agriculture):

1. **Small-scale producers, even the smaller-scale ones, are highly commercial**. They sell significant portions of their (diverse crops) to traders (most of them) and retailers (some of them), buy inputs and are involved in MSMEs that provide services (upstream or downstream) to the agrifood value chain.

2. **Small-scale producers, and within them, commercial small-scale producers, are responsible for a significant portion of cropland and food production in Africa**. Small-scale producers' crop output represents a larger share of total crop production in middle- and low-income countries.

3. **There is a strong positive correlation between commercial small–scale producers and well-being**. Commercial small-scale producers exhibit more resilience to shocks, better food security, and lower poverty rates than non-seller small-scale producers. Also, households with higher women's economic empowerment correlate with higher commercialization shares.

General findings

I. SSPs: major contributors to food production

- SSPs control 53% of cultivated land in the upper-income countries and +66% in the lower-income countries.
- SSPs contribute at least 2/3 of total crop production across all six countries.
- Between analyzed surveys, the cultivated area increased by ≈3% and 12% for the upper-income countries (Ghana and Nigeria, respectively) but decreased for the other countries.

II. SSPs: A key player in commercial agriculture

- At least half of all crop output captured in LSMS-ISA surveys is produced by cSSPs
- Almost 70% of SSPs sell some of their crop output.
- cSSPs sold 60% or more of their output in the ‘upper- and middle-income strata’ countries and about half of the production in the ‘lower income strata’ countries.
- Output markets – Market traders were the primary buyers of crop output from cSSPs in all countries.
- In high- and middle-income countries, +50% of SSPs concurrently participate in both input and output markets.

General findings

III. SSP households own MSMEs

- We identified crop-producer households who operated MSMEs and classified them into three types: non-agrifood, agrifood downstream (including wholesalers, retailers, and manufacturers of raw or processed agricultural products), and agrifood upstream (including suppliers of agricultural inputs, credit, or logistics) enterprises.
- In all higher and middle-income countries, at least 30% of crop-producer households owned an MSME.
- Despite women owning more downstream MSMEs than men, women-owned MSMEs hired less labor.
- Upstream MSMEs women owners have more education than downstream MSMEs women owners.
- Only a tiny share of MSMSs used credit, even informal credit, to start firms. Downstream MSMEs mainly used their savings to start the firms.

IV. SSPs have diversified production strategies

- The lower category of commercial SSPs has the highest diversification. The most commercialized have lower diversification.
- In the lower-stratum countries, non-sellers have lower diversification than all commercialized categories.
- Highly diversified SSPs present, on average, a higher percentage of producers who plant any fruit and/or vegetable when compared to specialized SSPs.

General findings

V. Commercial SSPs exhibit more resilience, women's economic empowerment (WEE), and food security, and lower poverty rates

- cSSP households exhibit, on average, nearly double women's empowerment compared to non-selling SSP households in low-income countries.
- In the lower and middle strata, all commercialized categories have more women's empowerment than non-selling SSPs
- In most countries, cSSPs have, on average, higher resilience levels than non-commercial SSPs.
- cSSPs are more resilient than non-selling SSPs based on the resilience index.
- In the upper- and middle strata, cSSPs have higher Food Consumption Scores than non-sellers.
- A 10% increase in the share of output sold is associated with a 2.2% reduction in poverty in Malawi.
- Fruits and vegetables production is related to poverty reduction, particularly in the upper- and middle-income strata.

I. SSPs: Major contributors to food production

- **SSPs are the dominant producers of food in all countries**
  - Using country-specific definitions of small-scale producers (in most cases, crop farmers cultivating <2 ha of land), SSPs comprise 60-90% of crop producers.
  - The share of SSPs in crop producers has been stable or grown over time in lower and middle-income strata countries but fell in upper-income stratum countries.

	Period	t1	t2	t3	t4	t5	Stratum name
Ghana	(1992-2017)	70%	69%	62%	61%	65%	Upper
Nigeria	(2011-2019)	85%	88%	84%	76%		Upper
Tanzania	(2009-2020)	84%	81%	80%	81%	84%	Middle
Uganda	(2010-2020)	73%	77%	81%	83%	83%	Middle
Ethiopia	(2012-2019)	74%	72%	73%	85%		Lower
Malawi	(2011-2019)	96%	96%	96%	96%		Lower

Table 1: Percentage of SSPs of all crop producers over time using country-specific cultivated area thresholds

I. SSPs: Major contributors to food production

- **The cultivated area by SSPs increased in upper-income countries and fell in all others.**
  - Over the years, the cultivated area by SSPs grew by ≈3% and 12% for upper-income stratum countries (Ghana and Nigeria) but fell by ≈3- 6% for lower and middle-income strata.
  - Kernel density plots of the distribution of cultivated area for each survey year are shown in Figure 1 in the Appendix, Excel “Slide 10”.

	Avg. survey-to-survey change (%)	F-test of change over time (p-val)
Ghana	2.7	0.000
Nigeria	12.0	0.000
Tanzania	-5.7	0.000
Uganda	-4.1	0.000
Ethiopia	-5.5	0.000
Malawi	-2.9	0.007

Table 3: Change in SSP cultivated area over time

	Period	t1	t2	t3	t4	t5	Stratum name
Ghana	(1992-2017)	1.3	1.3	1.3	1.4	1.3	Upper
Nigeria	(2011-2019)	0.6	0.6	0.6	0.7		Upper
Tanzania	(2009-2020)	1.3	1.3	1.3	1.1	1.0	Middle
Uganda	(2010-2020)	0.8	0.8	0.7	0.7	0.7	Middle
Ethiopia	(2012-2019)	0.8	0.9	0.8	0.7		Lower
Malawi	(2011-2019)	0.6	0.6	0.6	0.6		Lower

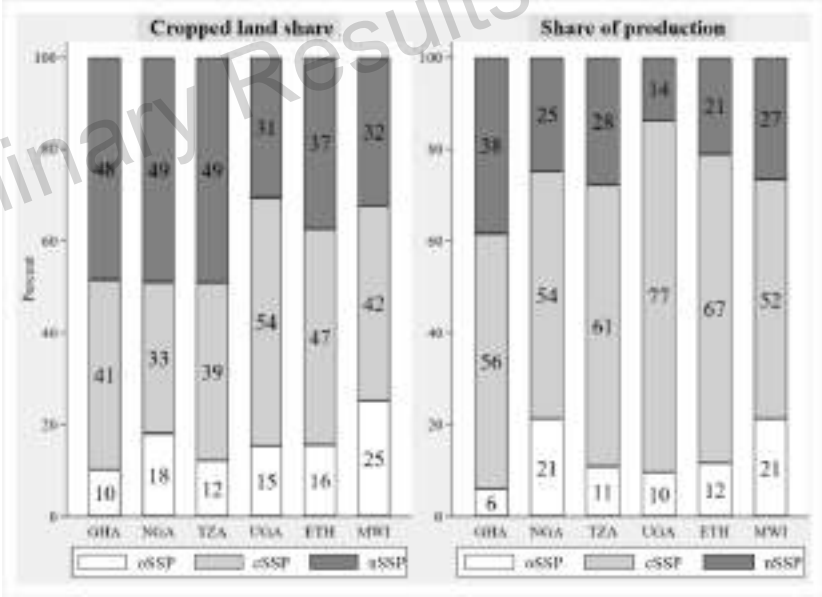
Table 2: Mean SSP cultivated over time

I. SSPs: Major contributors to food production

- **SSPs grow 2/3 of crop production, both in value and quantity.**

  - SSPs control 53% of cultivated land in the upper-income countries and +66% in the lower-income countries.
  - SSPs share of land is higher in the lower than upper-income stratum countries (Appendix Figures 2-4, Excel “Slide 11”).
  - The contribution of SSPs to crop production decreased slightly in the ‘upper-income stratum’ countries (Ghana and Nigeria). Still, it remained stable or increasing in the ‘middle’ (Tanzania and Uganda) and ‘lower income’ (Ethiopia and Malawi) stratum countries (Appendix Figures 2-4, Excel “Slide 11”).
  - Over the years, the share of SSPs in crop output dropped slightly in the upper stratum (Appendix Figures 2-4, Excel “Slide 11”).
  - 3/4 of SSPs crop production is grown by commercial SSPs. In middle-income countries, cSSPs’ share of crop production is around 85% of SSPs crop output.

Fig 1: SSP cropped land & production shares



Note: nSSP is non-SSP; cSSP is commercialized-SSP; oSSP is non-selling SSP.

I. SSPs: Major contributors to food production

- **SSPs grow the majority of both grains and non-grains.**
  - In the upper stratum, the share of SSPs in grains is slightly higher than in non-grain output.
  - In countries such as Tanzania & Ethiopia, SSPs' share of non-grains (primarily vegetables) is more prominent than their share of grains.
  - Recall that the SSP share in all crop production fell over time in the upper-income stratum due more to a fall in their share in grains than in non-grains (Appendix Figures 5, Excel “Slide 12”).
  - In low and middle-income countries, the share of SSPs does not change much over time in grains and non-grains (Appendix Figures 6 & 7, Excel “Slide 12”).

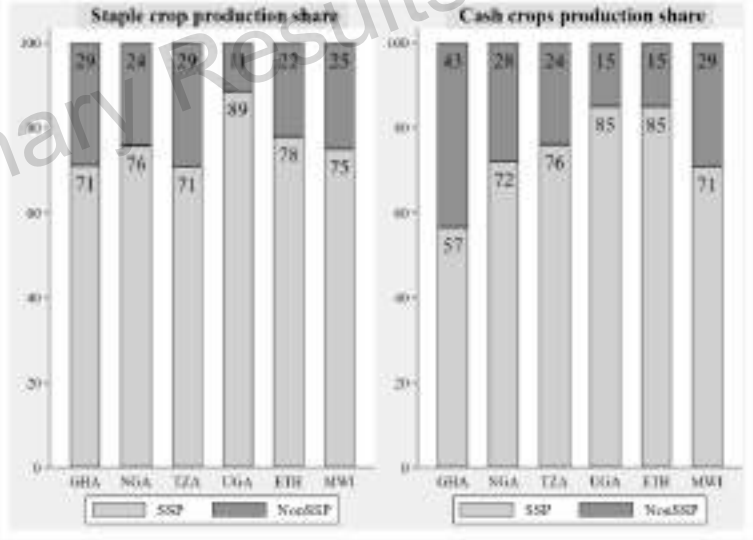


Fig 2: SSP contribution to staples and non-staples production

I. SSPs: Major contributors to food production

- **SSPs and non-SSPs have similar shares of fruit and vegetable production**
  - Trends in SSP and non-SSP shares in fruit and vegetable production over time are similar across countries (Appendix Figures 8-10, Excel “Slide 13”).
  - Non-sellers have the lowest share in fruit and vegetable production; see Appendix Fig. 11 (Excel, “Slide 13”).

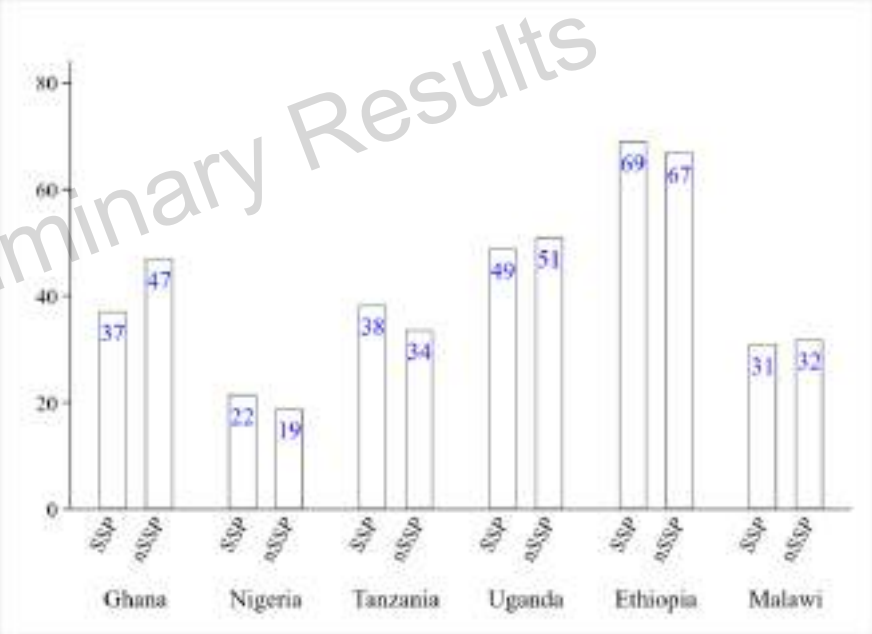


Fig 3: SSP contribution to fruits and vegetables production

II. SSPs: A key player in commercial agriculture

- **A large share of SSPs (>70% in some countries) sell some of their crops.**
  - On average, over the survey periods, the percentage of SSPs that sell any harvest ranged from 53% in lower-income countries (such as Malawi) to 72% in upper-income countries (like Ghana).
  - Over time, the share of output sold by commercial SSPs rose (Table 5).

	Period	Survey 1	Survey 2	Survey 3	Survey 4	Survey 5
Ghana	(1992-2017)	71%	70%	74%	73%	70%
Nigeria	(2011-2019)	57%	54%	63%	63%	
Tanzania	(2009-2020)	58%	71%	73%	73%	68%
Uganda	(2010-2020)	70%	71%	67%	74%	71%
Ethiopia	(2012-2019)	67%	76%	71%	69%	
Malawi	(2011-2019)	57%	61%	39%	58%	

Table 4: Share of SSPs selling any output

	Avg. survey-to-survey change (%)	F-test of change over time (p-val)
Ghana	-0.3	0.062
Nigeria	3.5	0.000
Tanzania	4.7	0.000
Uganda	0.4	0.020
Ethiopia	1.4	0.007
Malawi	6.1	0.000

Table 5: Change in SSP output market participation over time

II. SSPs: A key player in commercial agriculture

- **Nearly all SSPs who grow permanent tree crops & industrial crops are sellers:**
  - Permanent tree crops increase the probability of SSP market participation. In Tanzania and Malawi, industrial crops (cotton, tobacco, sugarcane, etc.) are the crops whose presence increases (the most) the probability of being commercial (Table 7).
  - Over time, there is high heterogeneity in commercialization behavior among SSPs by crop (Appendix Table A1, Excel "Slide 15").
  - Fruits and vegetable commercialization increased in Nigeria and Ethiopia but decreased significantly in Tanzania and Malawi (Appendix Table A2, Excel "Slide 15").

	Ghana	Nigeria	Tanzania	Uganda	Ethiopia	Malawi
Cereal	43%	31%	36%	34%	22%	18%
Roots & tubers	25%	44%	24%	22%	16%	33%
Grain legumes	44%	35%	39%	26%	23%	41%
Oil seeds	66%	47%	31%	40%	39%	46%
Fruits & veges	19%	39%	37%	38%	29%	17%
Perm tree crop	63%	88%	29%	89%	66%	15%
Other indst crop	53%	76%	46%	82%	36%	77%

Table 6: Time average of any sales, by crop category

	Ghana	Nigeria	Tanzania	Uganda	Ethiopia	Malawi
Cereals	14	12	14	8	9	-5
Roots & tubers	14	14	1	5	7	11
Grain legumes	4	-3	9	10	7	21
Oil seeds	14	8	16	13	11	21
Fruits & veges	7	16	8	11	15	3
Perm tree crops	29	35	4	29	26	6
Oth Indust crops	11	27	18	18	7	40

Table 7: Crop type and average probability market participation (%)

II. SSPs: A key player in commercial agriculture

- **cSSPs sold 60% or more of their output in the 'upper and middle-income strata' countries and about half of the output in the 'lower-income stratum' countries:**
  - For all countries, the share of sales in total output of cSSPs increased over the years (Table 8).
  - The increase over time was inversely correlated with stratum level, with the poorest stratum having the fastest marketed surplus rate increases; this suggests a "catching up" phenomenon.

	Avg. survey-to-survey change (%)	F-test of change over time (p-val)
Ghana	0.3	0.000
Nigeria	4.7	0.000
Tanzania	2.0	0.000
Uganda	5.3	0.000
Ethiopia	9.4	0.000
Malawi	4.1	0.000

Table 8: Change in cSSPs' marketed surplus rate (share of sales in farm's output).

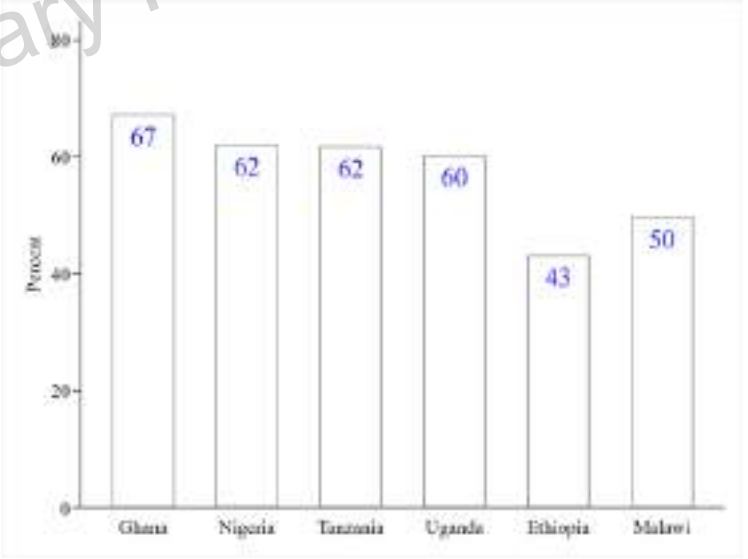


Fig 4: Average over years of share of sales in cSSP output.

II. SSPs: A key player in commercial agriculture

- **In all countries, except for Ethiopia, the highest share of cSSP sales are registered for permanent tree crops and other industrial crops:**
  - In Ethiopia, the highest share of cSSP sales came from oil seeds (mainly sesame)
  - On average, permanent tree crops and industrial crops significantly increase commercialization intensity; the others reduce it (Table 10, next slide)
  - There are temporal variations in SSP commercialization across countries and commodities (Appendix Table A3, Excel “Slide 17”).

	Ghana	Nigeria	Tanzania	Uganda	Ethiopia	Malawi
Cereal	58%	53%	45%	64%	27%	23%
Roots & tubers	63%	56%	56%	50%	32%	56%
Grain legumes	59%	59%	57%	58%	40%	50%
Oil seeds	63%	68%	72%	63%	57%	46%
Fruits & veges	74%	73%	61%	64%	44%	68%
Perm tree crop	87%	92%	78%	96%	54%	46%
Other indst crop	73%	89%	88%	85%	49%	78%

Table 9: Time average share of crop harvest sold conditional on any sales

II. SSPs: A key player in commercial agriculture

- **In all countries except Ethiopia, the highest share of cSSP sales are from permanent tree crops and other industrial crops:**
  - On average, permanent tree crops and industrial crops significantly increase commercialization intensity; the others reduce it (Table 10)

Table 10: Crop type and share of output sold by cSSPs (%)

	Ghana	Nigeria	Tanzania	Uganda	Ethiopia	Malawi
Cereals	-7.7	-4.9	-17.5	-3.2	-12.9	-30.8
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Roots & tubers	-12.0	-13.1	-5.3	-11.0	-4.6	0.0
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.98)
Grain legumes	-5.4	-5.8	-7.5	-7.1	-3.3	-2.1
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.08)
Oil seeds	1.5	-1.3	-1.2	-3.6	0.8	-3.3
	(0.32)	(0.22)	(0.14)	(0.00)	(0.46)	(0.00)
Fruits & veges	-3.0	1.1	-0.8	-8.9	-6.1	-0.4
	(0.00)	(0.25)	(0.36)	(0.00)	(0.00)	(0.70)
Perm tree crops	9.2	10.5	-3.9	-0.9	5.3	-1.2
	(0.00)	(0.00)	(0.00)	(0.32)	(0.00)	(0.32)
Oth Indust crops	-3.3	8.9	7.5	6.9	-0.8	11.0
	(0.02)	(0.00)	(0.00)	(0.00)	(0.40)	(0.00)

***Note*:** Pooled fractional probit regression estimates of average marginal effects of each crop category on share of all crops sold by cSSPs. The values in parentheses are p-values.

II. SSPs: A key player in commercial agriculture

- **Over time, cSSP commercialization intensity increased for some crops but dipped for others:**
  - Cereal commercialization intensity increased in all countries except Ghana.
  - Oil seed commercialization intensity increased significantly in all countries, with the most significant rise in Ethiopia (sesame).
  - Fruits and vegetables commercialization intensity increased in Nigeria and Ethiopia and dipped in Tanzania and Malawi.

Table 11: Year-on-year percent change in cSSP share of output sold

	Ghana	Nigeria	Tanzania	Uganda	Ethiopia	Malawi
Cereals	-2.2	5.3	3.7	6.2	8.9	13.2
	0.001	0.002	0.001	0.000	0.000	0.000
Roots & tubers	0.2	8.9	-0.6	9.0	8.4	-1.5
	0.000	0.000	0.421	0.000	0.000	0.968
Grain legumes	-3	2.8	2.7	7.8	5.4	11.9
	0.102	0.000	0.123	0.000	0.091	0.000
Oil seeds	4.9	2.5	2.8	4.9	23.1	10.6
	0.004	0.015	0.019	0.001	0.000	0.000
Fruits & veges	1.5	3.3	-7.6	-0.5	12.3	-3.9
	0.192	0.001	0.000	0.496	0.000	0.047
Perm tree crops	0.3	-0.7	23.1	0.7	18.0	-5.6
	0.020	0.711	0.000	0.049	0.000	0.012
Oth indust crops	-0.1	1.5	-2.7	0.7	5.2	-0.1
	0.064	0.006	0.011	0.063	0.000	0.000

Note: p-values from Joint F-test for time differences are under each percentage change

II. SSPs: A key player in commercial agriculture

- **The less commercial SSPs (lowest 3rd cSSPs) sold 10–23% of total crop output, and the more commercial (highest 3rd cSSPs) sold 49-84%:**
  - Within the bottom 3rd cSSPs the total output sold is between 5% (Malawi) and 19% (Ghana) of all harvested output while the highest 3rd cSSPs sold between 51% (Malawi) and 84% (Ghana) of their harvests (Fig. 5).
  - The commercialization gap among cSSPs is most comprehensive in the lower income stratum countries where the bottom 3rd sold only 10% of what the top 3rd sold.
  - Appendix Figures 15-17 (Appendix, Excel “Slide 20”) provide country-specific temporal variations that show that cSSPs commercialization intensity has remained stable over time

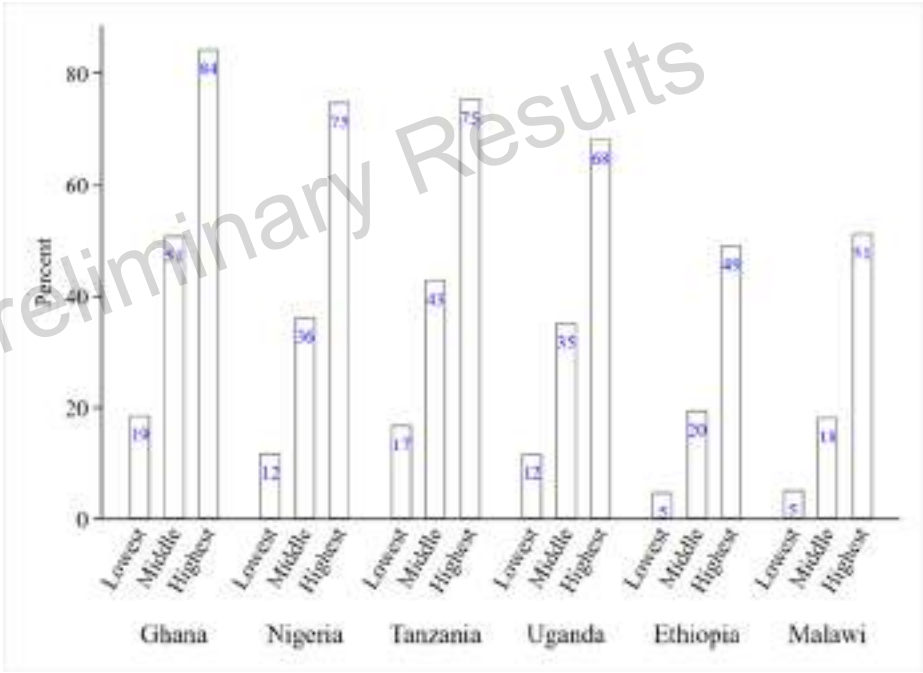


Fig 5: Tercile average share of crops sold by cSSPs

II. SSPs: A key player in commercial agriculture

- **Staple crops make a non-trivial contribution to commercialization in all countries:**
  - In 4 out of 6 analyzed countries, staples contribute more than half of the value or volume of cSSP sales.
  - The contribution of staples to sales remained relatively the same in the upper-income stratum. Still, it reduced substantially in the middle-income stratum and increased in the lower-income countries stratum (Table 12).

	Avg. survey-to-survey change (%)	F-test of change over time (p-val)
Ghana	-1.6	0.074
Nigeria	-2.4	0.241
Tanzania	-2.7	0.000
Uganda	-6.2	0.000
Ethiopia	24.9	0.000
Malawi	7.9	0.000

Table 12: Change in the contribution of staple crops to cSSP sales

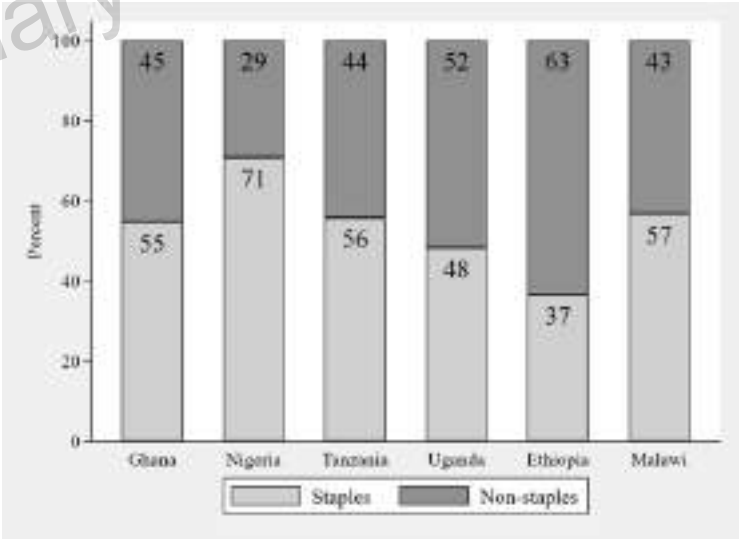


Fig 6: The contribution of staples and non-staples to crop sales

II. SSPs: A key player in commercial agriculture

- **Relative to non-staples, staple crops' contribution to commercialization decreases with the level of commercialization**
  - Staple crop sales make non-trivial (25–48%) contributions to commercialization even among cSSPs at the top of the commercialization tercile.
  - Except for Malawi, staple crops are most important for commercialization among cSSPs in the middle tercile.

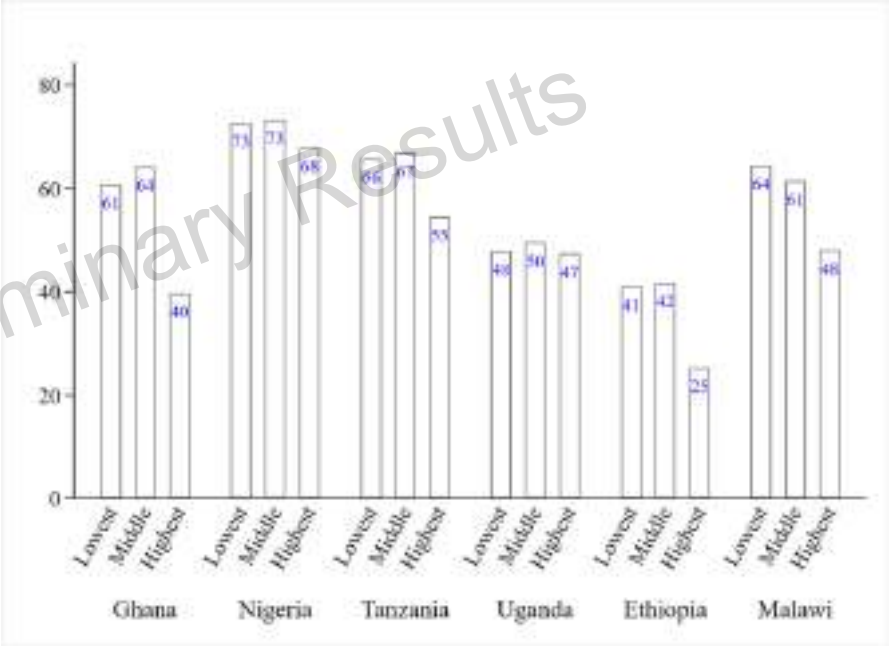


Fig 7: The contribution of staples to crop sales at terciles of the commercialization index

II. SSPs: A key player in commercial agriculture

- **Producing non-staple crops is associated with an increase in the probability of market participation relative to producing staples-only**
  - The most significant correlation between non-staple crop production and the probability of selling any harvest is observed in the lower-income stratum countries (Table 13).
  - Non-staples are not significantly correlated with commercialization intensity in the lower-income stratum countries (Table 14).
  - Non-staples are associated with a ≈3–6% increase in commercialization intensity in the upper-income stratum countries.
  - Staples (rather than non-staples) production is Uganda's key driver of commercialization intensity (Table 14).

Table 13: Non-staples production & the probability of market participation

	Ghana	Nigeria	Tanzania	Uganda	Ethiopia	Malawi
Non-staples vs staples (%)	27	19	21	26	32	27
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	24,689	10,121	10,722	9,947	9,566	6,184
Location FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Staple producer mean (%)	54	51	54	53	45	35

Note: p-values from probit average marginal effects in parenthesis

Table 14: Non-staples production & commercialization intensity among cSSP

	Ghana	Nigeria	Tanzania	Uganda	Ethiopia	Malawi
Non-staples vs staples (%)	5.7	2.8	1.8	-3.4	2.0	1.6
	(0.000)	(0.004)	(0.067)	(0.003)	(0.193)	(0.258)
Observations	16,656	5,799	5,887	7,027	6,199	2,872
Location Fixed effects	YES	YES	YES	YES	YES	YES
Time Fixed effects	YES	YES	YES	YES	YES	YES
Staple producer mean (%)	47	41	43	41	22	22

Note: p-values from fractional probit regression average marginal effects in parenthesis. Dep. Variable: ratio of sales to harvests

II. SSPs: A key player in commercial agriculture

- **Output markets: In all countries, market traders were the primary buyers of crop output from cSSPs**
  - Market traders are the most common buyers of SSP produce in all countries. In upper - and middle-income countries, market traders represent +70% of buyers of cSSPs.
  - Direct sales to consumers are the second most relevant channel for output marketing among cSSPs.
  - State agencies and organizations, marketing contract arrangements, and cooperatives are absent or less common, except for a few cases in Ghana and Tanzania.
  - Appendix Table A4 (Excel, “Slide 24”) shows cross-country and temporal variations in cSSP market relationships.

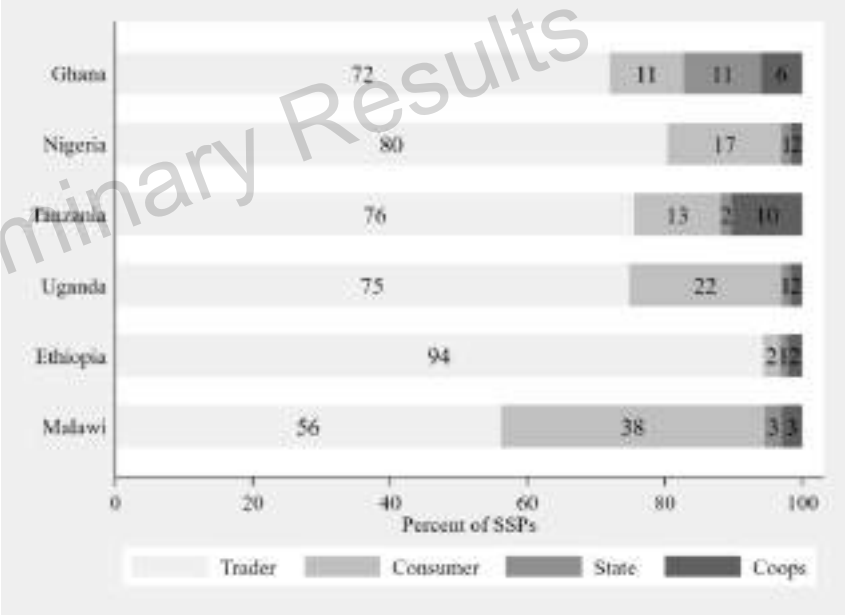


Fig 8: Output marketing channels used by cSSPs

II. SSPs: A key player in commercial agriculture

- **Input markets: hired labor is the most common input transacted; credit market participation is the least**
  - Hired labor market participation is the most common in the upper-income stratum countries.
  - Purchased seeds are most common in the middle-income stratum countries.
  - Both fertilizer and seed markets are used by about half of SSPs in the lower-income stratum countries.
  - Appendix Table A5 (Excel, “Slide 25”) shows details of fertilizer, pesticide, seeds, hired labor, and credit market participation across time and countries.

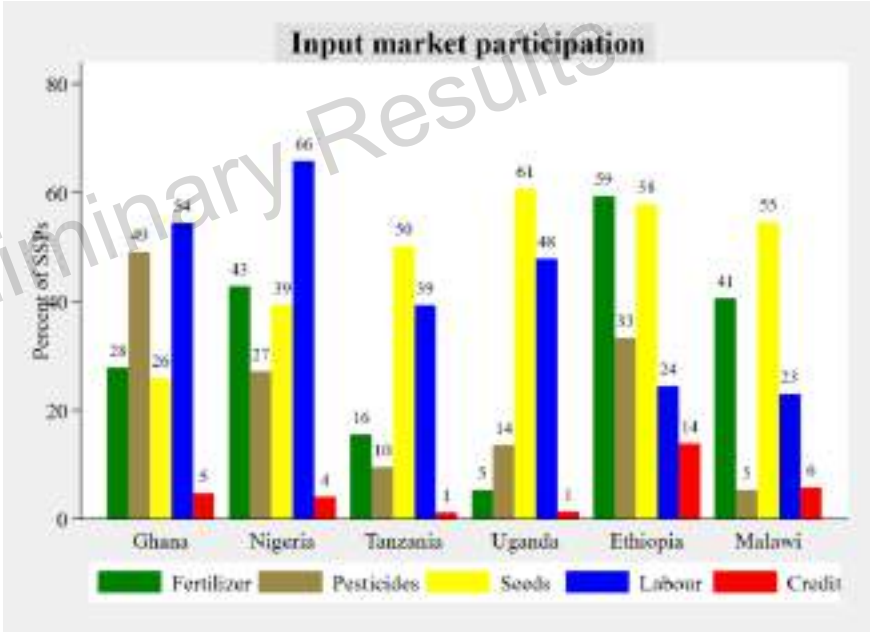


Fig 9: Input market participation in the pooled samples

II. SSPs: A key player in commercial agriculture

- **SSPs participate less in fertilizer and seed markets**
  - SSPs are less likely to purchase chemical fertilizer than non-SSPs, with the widest differences in the lower-income stratum countries (Ethiopia and Malawi).
  - The gap in purchased seed usage between SSPs and non-SSPs is less prominent, with SSPs more likely to buy seeds in Nigeria.
  - Appendix Table A6 (Excel “Slide 26”) displays detailed temporal and cross-country variations, showing that SSP chemical fertilizer market participation growth was higher than the corresponding growth for non-SSPs in all countries.

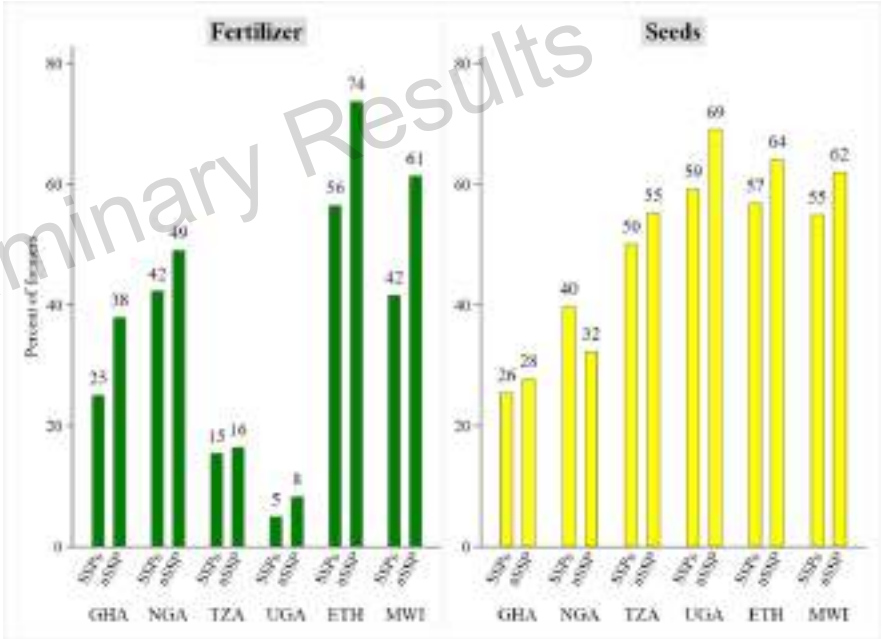


Fig 10: Fertilizer and seed market participation among SSPs and non-SSPs

II. SSPs: A key player in commercial agriculture

- **In all countries, the gaps in pesticides and hired labor market participation between SSPs & non-SSPs is wider than it is for other purchased inputs**
  - Except in the upper-income stratum countries (and for Tanzania concerning hired labor), growth in SSP pesticide and labor market participation was slower than that for non-SSPs.
  - Uganda was the only country where SSPs' participation in seed markets grew faster than non-SSPs.
  - Appendix Table A6 (Excel, “Slide 27”) shows temporal and cross-country variations.

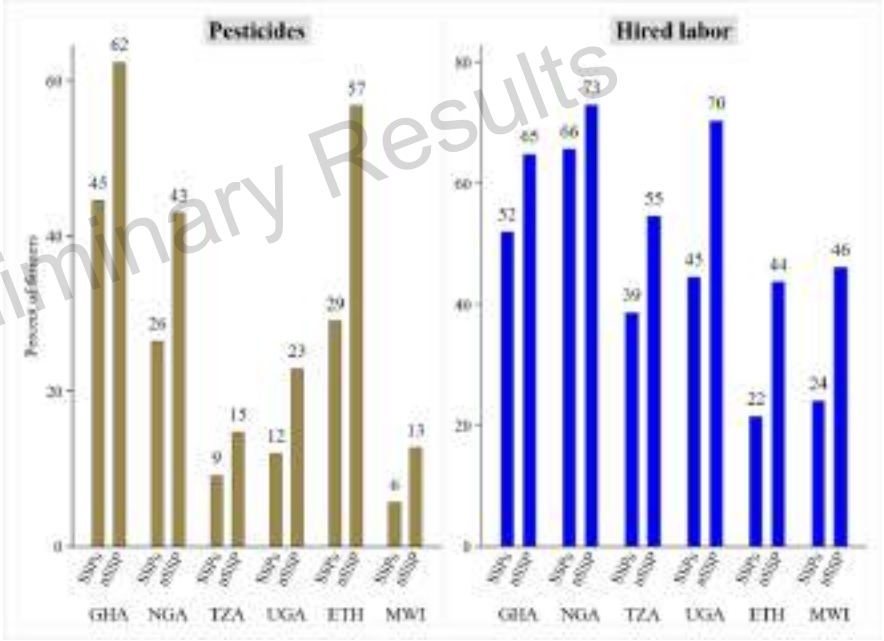


Fig 11: Pesticides and hired labor market participation among SSPs and non-SSPs

II. SSPs: A key player in commercial agriculture

- **In all upper and middle-income countries, +50% of SSPs participate concurrently in both input and output markets.**
  - On average, SSPs' simultaneous participation in input and output markets ranged from 43% of SSPs in Malawi to 61% in Ghana and Ethiopia.
  - In most (4 out of 6) countries, less than 10% of SSPs participated in neither input nor output markets.
  - Autarkic behavior is more common in output than input markets amount SSPs in all countries.
  - Appendix Figs 18-20 (Excel, “Slide 28”) show country-specific, time-varying simultaneous participation in input and output markets, suggesting increases in most countries.

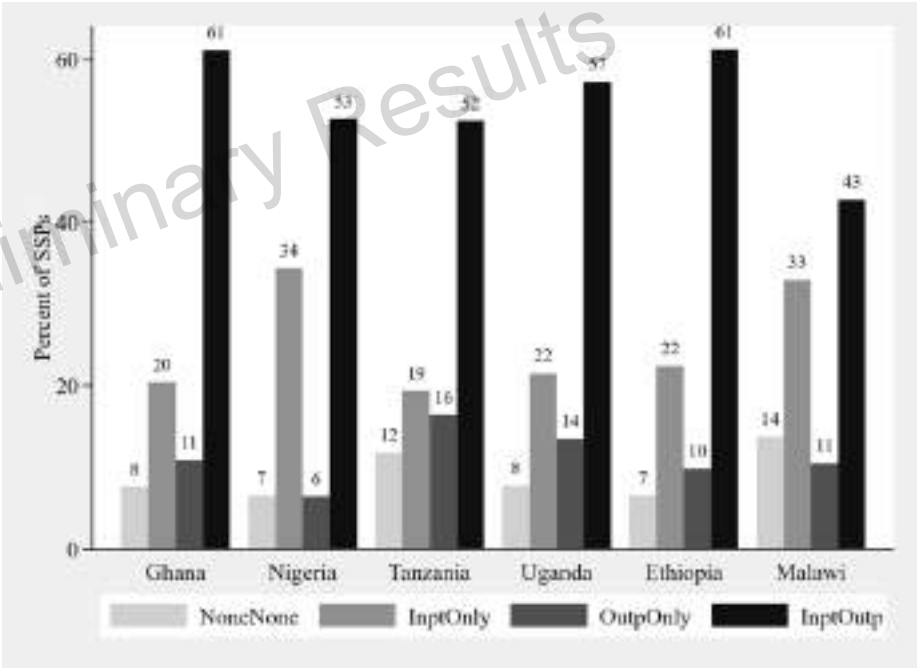


Fig 12: SSPs’ participation in input and output markets

III. SSP households own MSMEs

- **Producer households also own MSMEs**
  - Within the LSMS-ISA datasets, we were able to identify SSP households that also own MSMEs, and categorized these enterprises into non-agro, downstream (wholesalers, retailers, and manufacturers of raw or processed agricultural products), and upstream (suppliers of agricultural inputs, credit, or logistics) MSMEs.
  - Across all countries, 15-57% of SSP households own any MSME.
  - Appendix Figure B1 (Excel, “Slide 29”) contains results for the whole sample and non-SSPs.

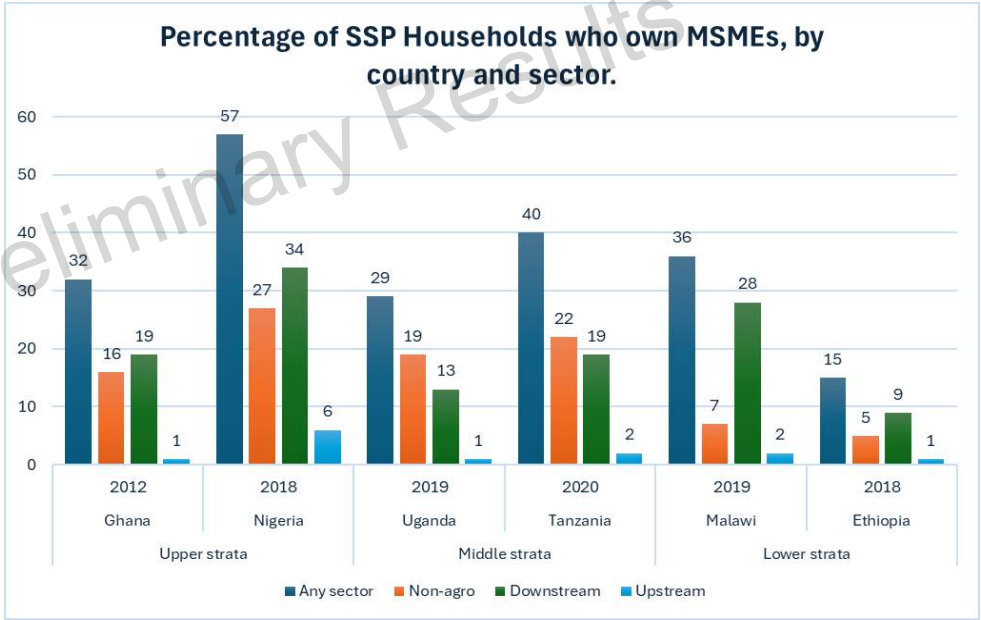
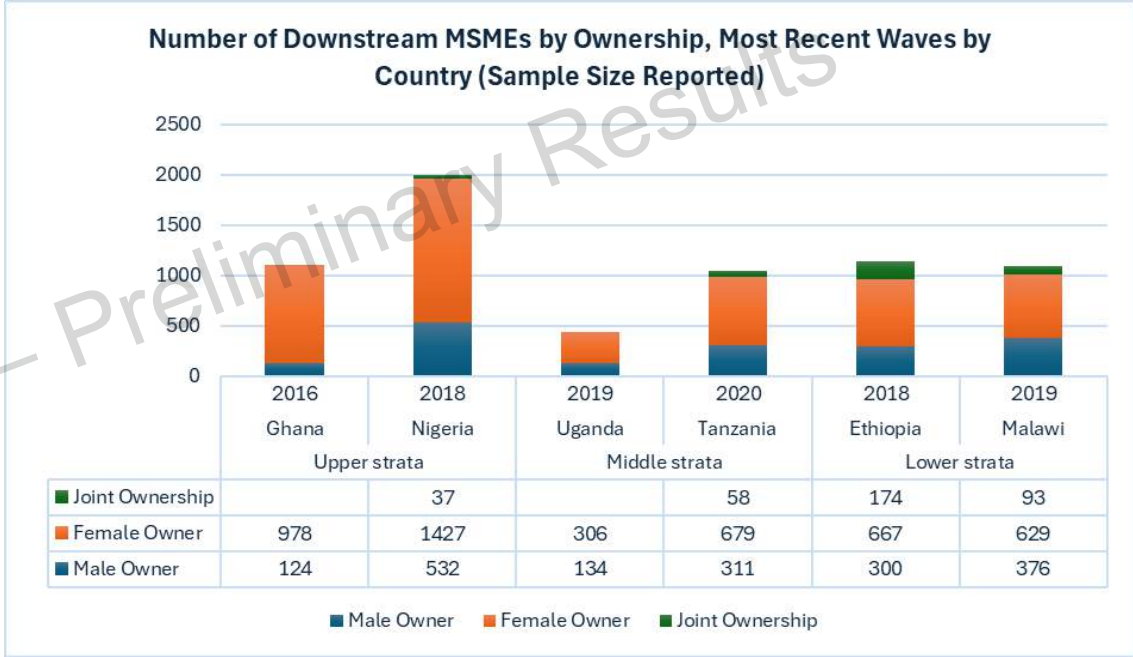


Fig 13: Percentage of Households who own MSMEs, by sector.

III. SSP households own MSMEs

- **Women own the majority of downstream MSMEs**
  - Downstream MSMEs include wholesalers, retailers, and raw or processed agricultural product manufacturers.
  - Women own the majority of downstream MSMEs across all countries.
  - The upper-income stratum countries (Ghana and Nigeria) present the highest percentage of female-owned downstream MSMEs.
  - Despite this, female owners hire less labor than male owners.

Fig 14: Count of Downstream MSMEs by gender of the owner.



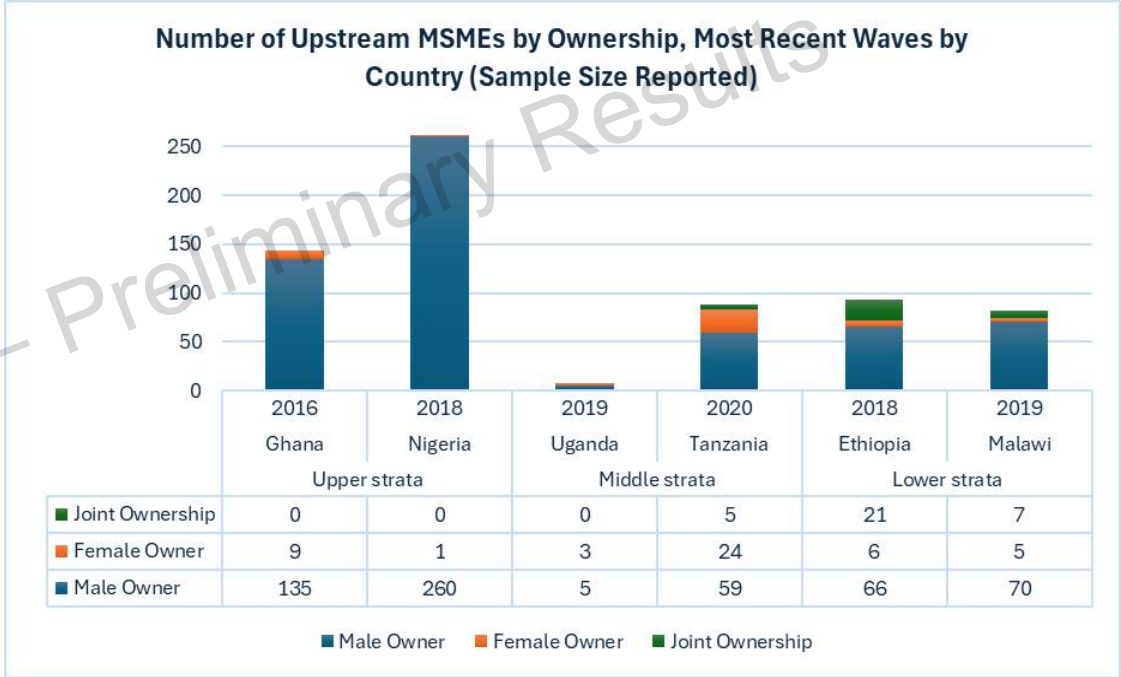
Note: Uganda and Ghana only record one owner, there's no way to identify joint ownership.

III. SSP households own MSMEs

- **Men own the majority of upstream MSMEs**

  - Upstream MSMEs include suppliers of agricultural inputs, credit, or logistics.
  - Across the six countries, upstream MSMEs are male-owned. Men own 63-100% of upstream MSMEs, with Nigeria having the highest value.
  - The upper-income stratum (Ghana and Nigeria) presents the highest proportion of male owners.
  - Given the low sample size of female owners in the upstream, results for this group should be taken with caution.

Fig 15: Count of Upstream MSMEs by gender of the owner.



Note: Uganda and Ghana only record one owner, there's no way to identify joint ownership.

III. SSP households own MSMEs

- **Gender-Based Educational Disparities in upstream and downstream MSMEs**
  - In Malawi, we find that a significant proportion of female owners in the upstream sector achieved any educational level and completed high school than female owners in the downstream sector.
  - However, the sample size for female owners in the upstream sector is relatively tiny (N = 9).

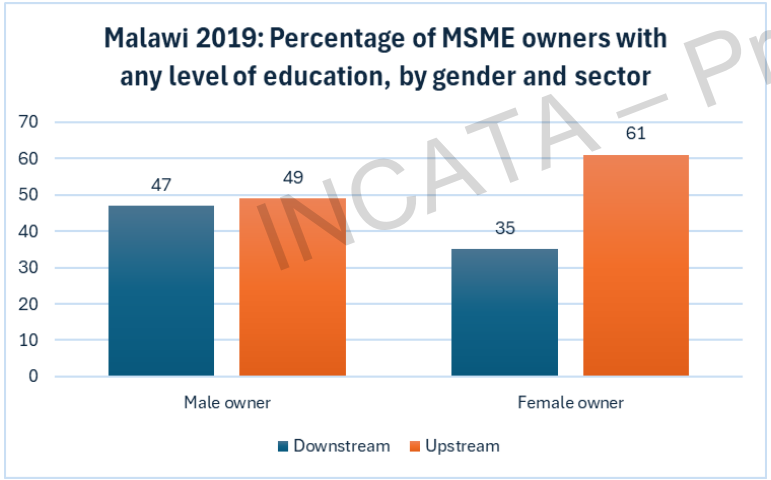


Fig 16: Percentage who achieved any level of education by gender of the owner and sector

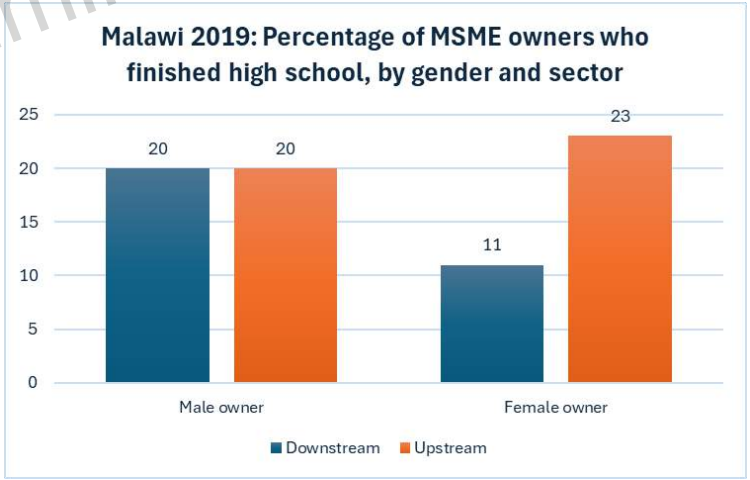


Fig 17: Percentage of owners who finished high school, by gender and sector

III. SSP households own MSMEs

- **Only a tiny share of MSMSs used credit, even informal credit, to start firms. Downstream MSMEs mainly used their savings to start the firms**
  - Own savings are the most common source of start-up capital for MSME owners in the downstream sector, with 72% of male owners and 53% of female owners relying on this source of capital.
  - Additionally, 21% of female owners in the downstream sector received start-up capital through gifts or inheritances from friends, family, or relatives, compared to only 8% of male owners.

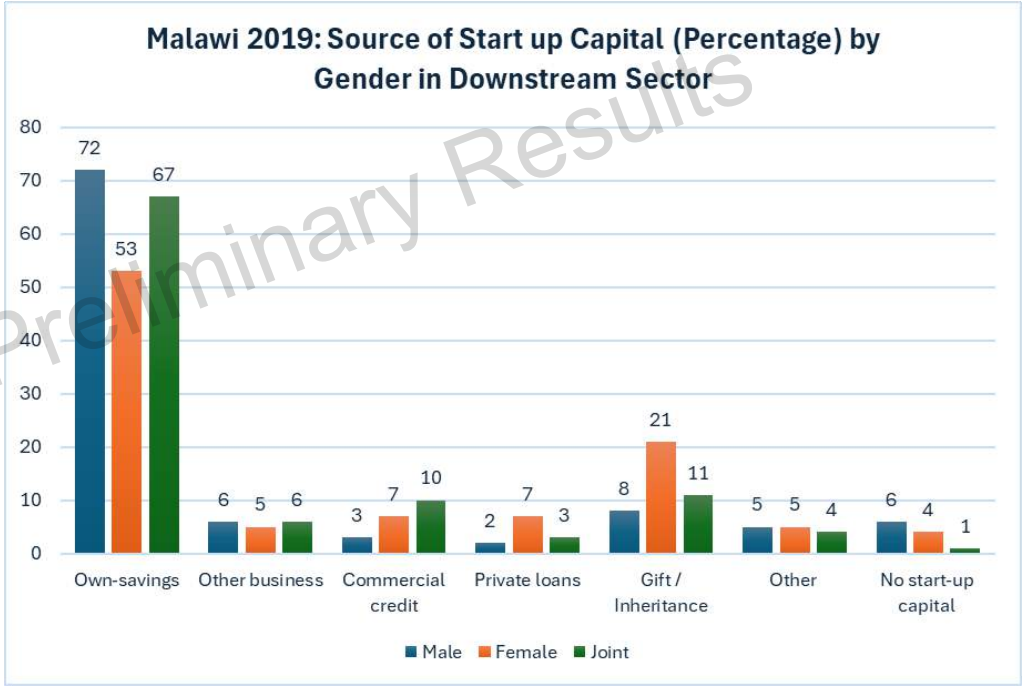


Fig 18: Sources of start up capital by gender in the downstream (percentage).

III. SSP households own MSMEs

- **A higher percentage of male-owned MSMEs hire paid labor**
  - A higher percentage of male-owned MSMEs hire paid labor compared to female-owned and jointly-owned enterprises.
  - Uganda and Ghana's datasets have no way to identify joint ownership.

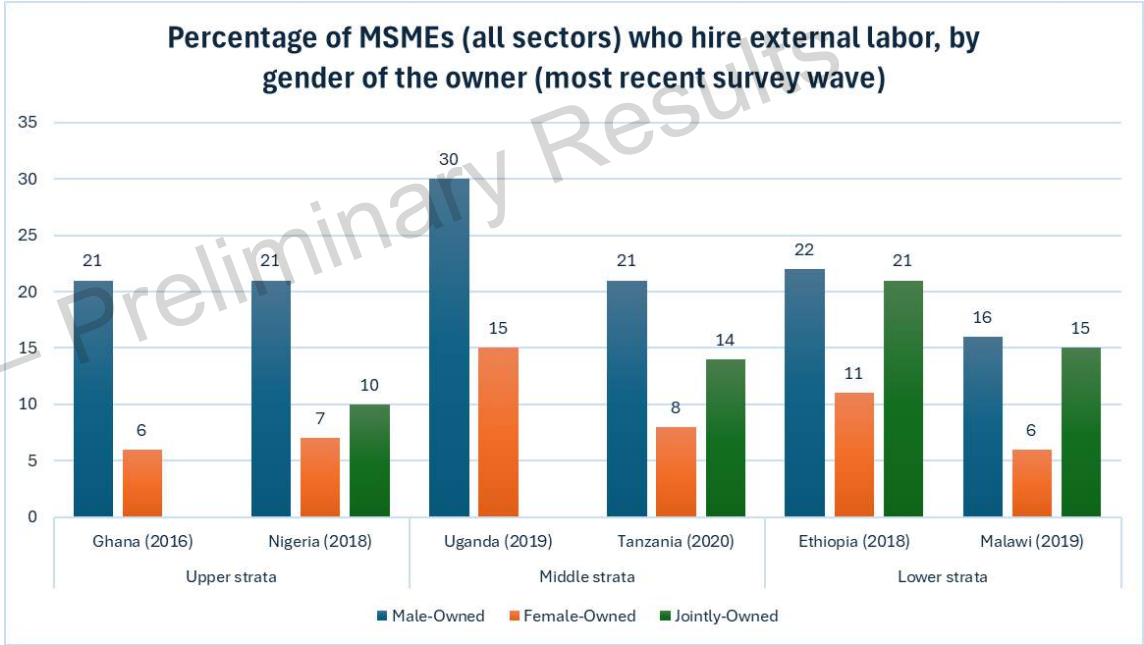


Fig 19: Percentage of Enterprises who hire external labor, by gender.

III. SSP households own MSMEs

- **Female-owned MSMEs employ less hired labor overall**
  - Women own the majority of MSMEs across all six countries. Despite this, their contribution to total MSME hired labor is more minor than male-owned MSMEs hires.
  - In Ethiopia and Nigeria in 2018, 35% and 18% of all hired labor in MSMEs were employed in female-owned MSMEs, respectively (Fig. 20).

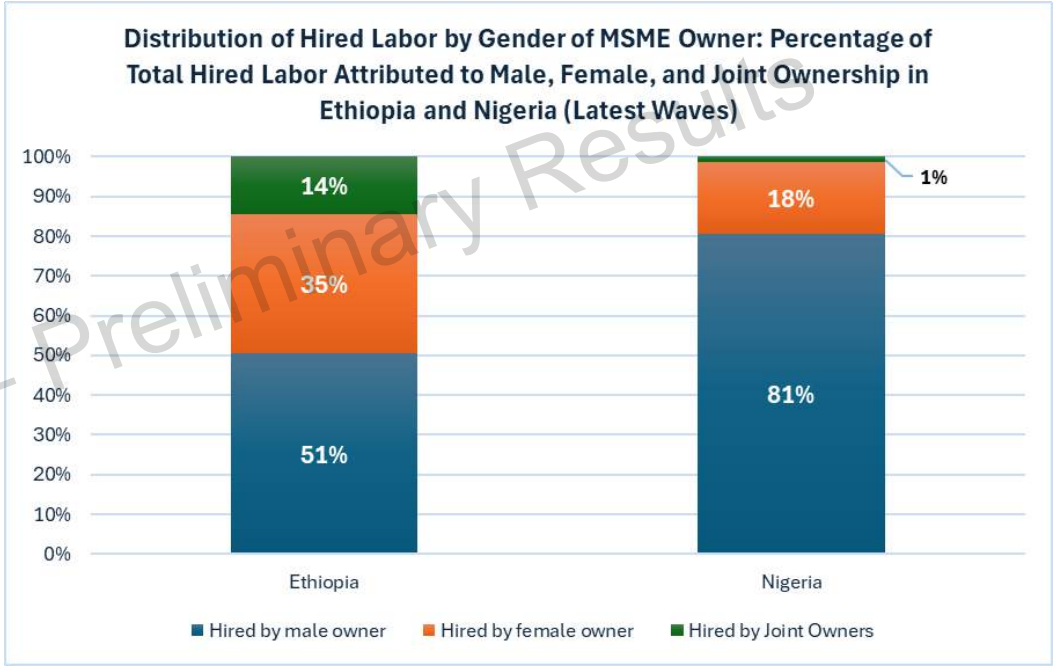


Fig 20: Share of external hired labor by gender of the owner.

III. SSP households own MSMEs

- **Female-owned MSMEs employ less hired labor overall**
  - Despite female owners being the majority in downstream MSMEs, the percentage of total hired labor attributed to them is still, on average, less than male-owned downstream MSMEs.
  - In Nigeria in 2018, 71% of downstream MSMEs were owned by women**.** Despite this, only 6% of them use hired labor, and only 34% of the total hired labor in downstream MSMEs is hired by female owners.

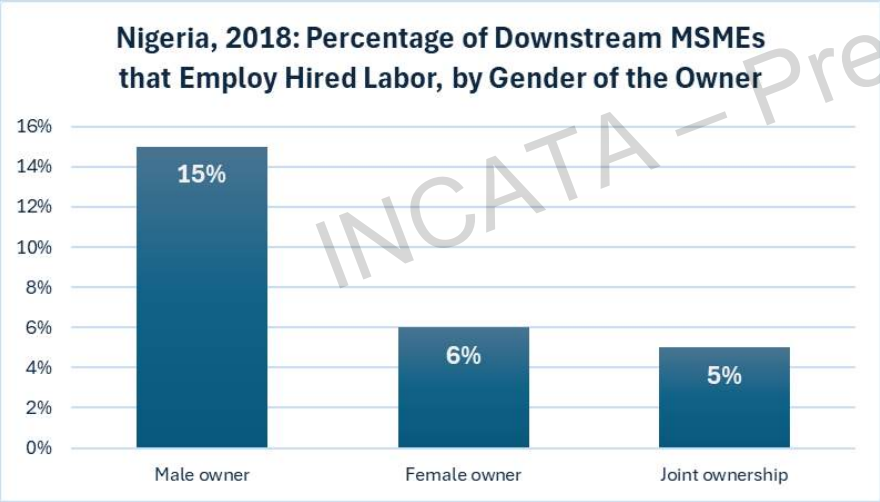


Fig 21: Downstream MSMEs using hired labor by gender of the owner.

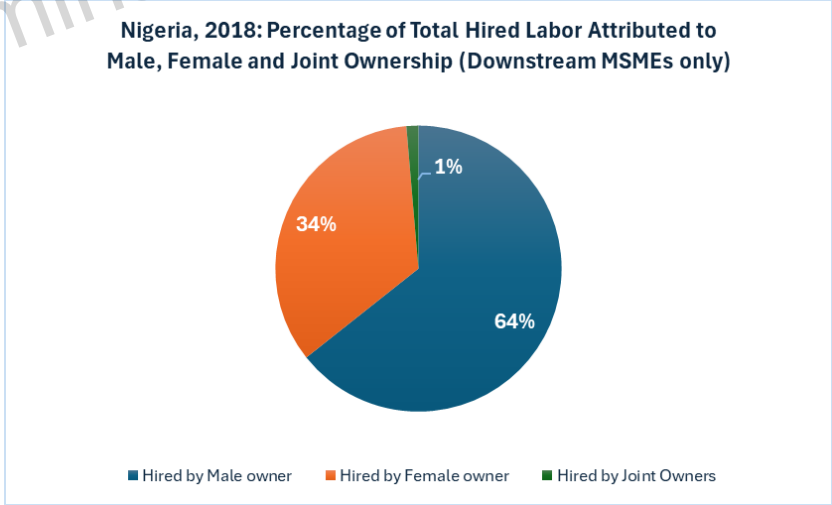


Fig 22: Share of external hired labor by gender of the owner in the downstream.

III. SSP households own MSMEs

- **MSMEs are mostly micro enterprises**
  - Following each country's definition for MSMEs, Micro-enterprises have consistently made up the majority of all MSMEs across countries and over the years except for Ghana and Ethiopia.

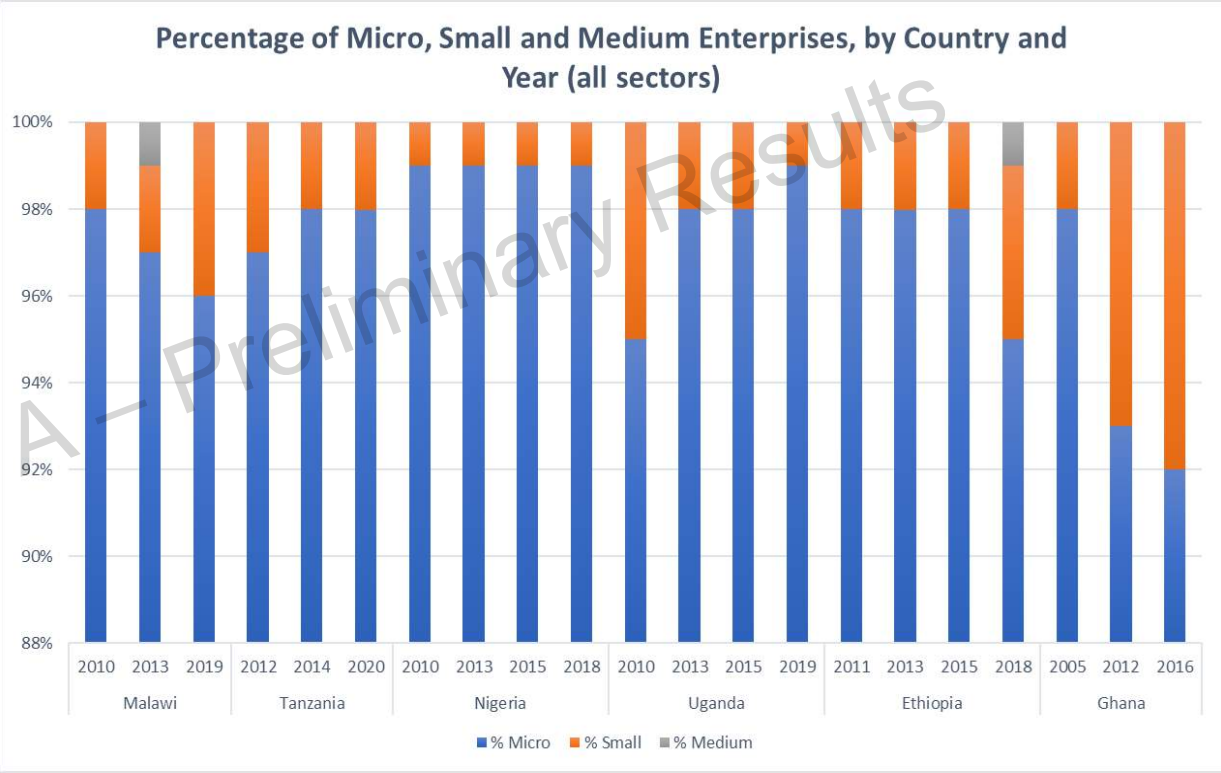


Fig 23: Percentage of type of MSMEs across all sectors by country and year.

IV. SSPs have diversified production strategies

- **Crop diversification varies by degree of commercialization**
  - We focus on four types of SSPs: non-sellers and three tertiles of cSSPs based on the proportion of total production sold.
  - In lower-income countries, the three tertiles of commercialization present a higher crop diversification when compared to non-sellers.
  - In the upper and middle-income stratum, we observe an inverted U-shape, where the non-sellers and the highest commercial SSPs (3rd tertile) are the less diversified.

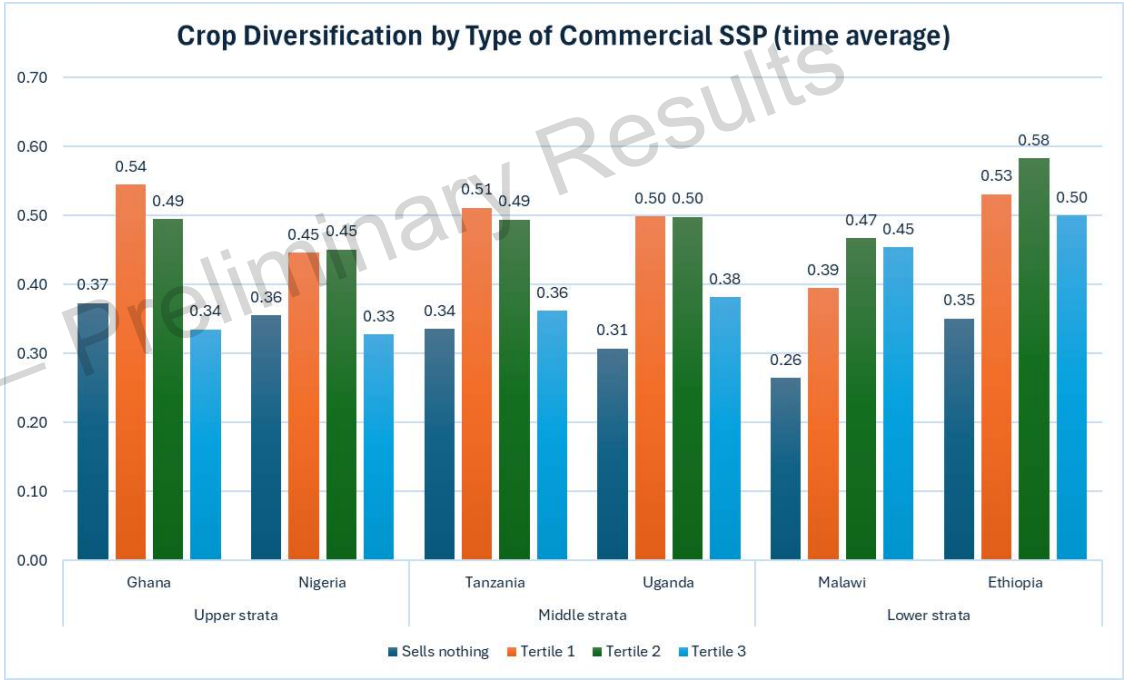


Fig 24: Crop diversification by type of SSP

IV. SSPs have diversified production strategies

- **Commercial SSPs who are highly diversified, sell less on average**
  - cSSPs, on average, sell a smaller proportion of their production the more diversified they are.
  - The quantity produced by crop type is used to build a Herfindahl Index of commercialization (closer to 1 more diversified).

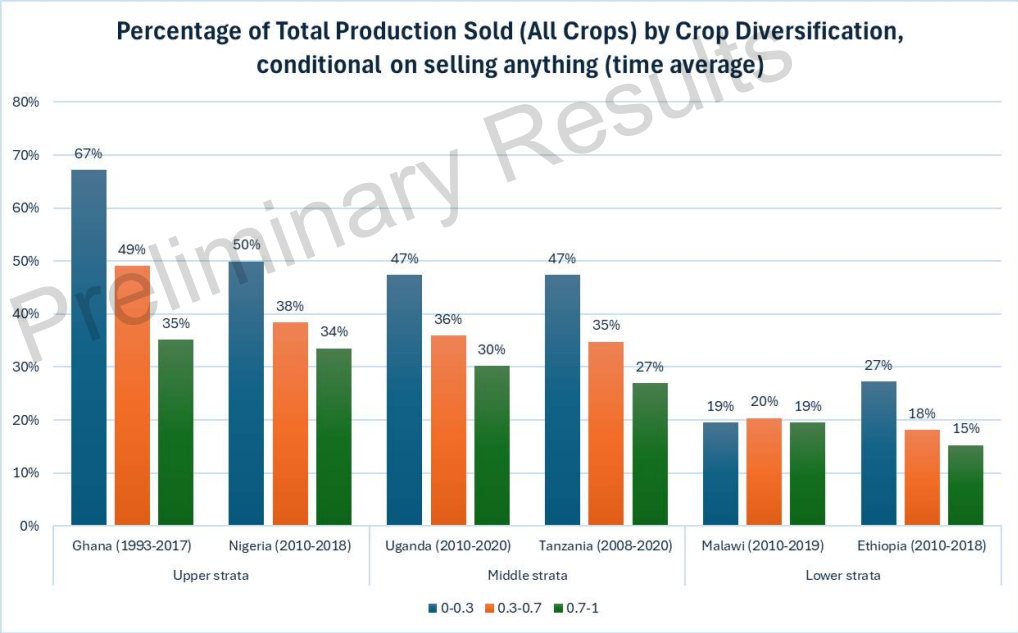


Fig 25: Crop commercialization and diversification.

IV. SSPs have diversified production strategies

- **Commercialization of fruits and vegetables declines as crop diversification grows in middle-income stratum countries**
  - The only distinctive pattern in the proportion of production sold for fruits and vegetables is shown in the middle-income strata, where a higher crop diversification is correlated with a smaller proportion of fruits and vegetables sold.

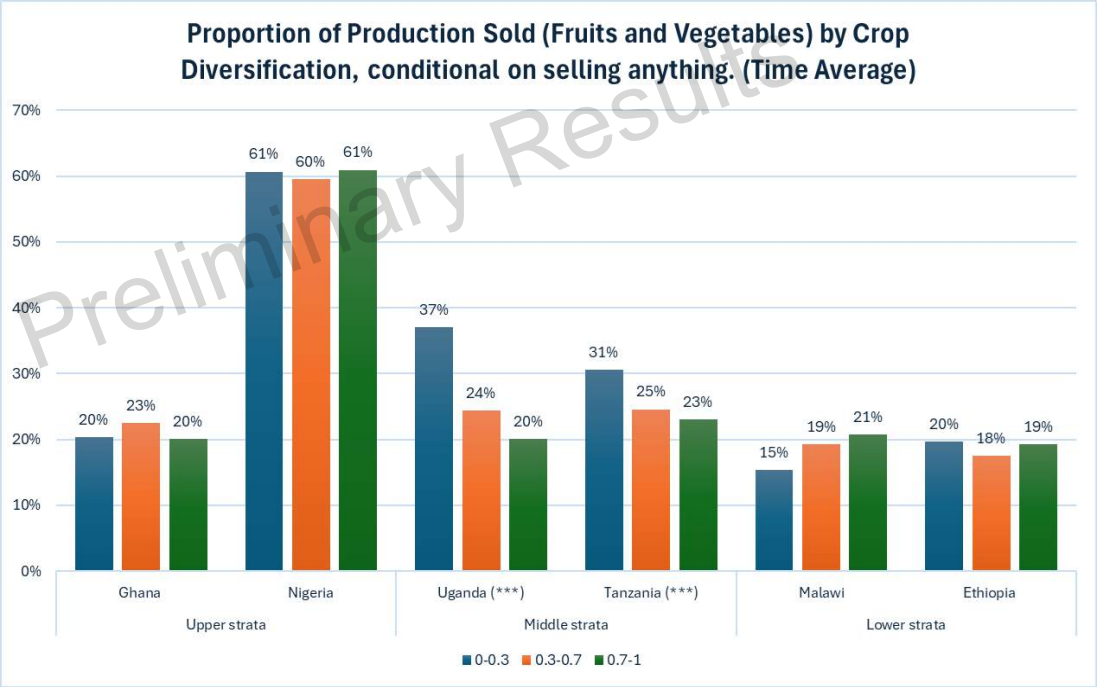


Fig 26: Commercialization of fruits & vegetables by crop diversification.

IV. SSPs have diversified production strategies

- **Commercial SSPs who are highly diversified, sell less cereals on average**
  - On average, higher crop diversification is associated with fewer cereals sold than total output (in kilograms).

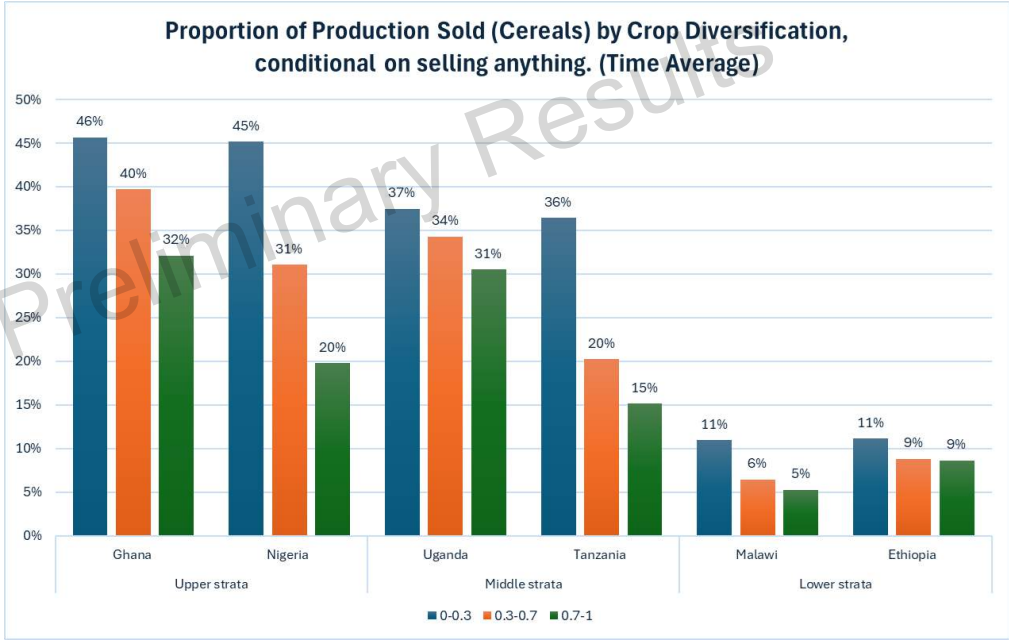


Fig 27: Commercialization of cereals by crop diversification.

IV. SSPs have diversified production strategies

- **Diversified households have a higher presence of planted fruits & vegetables.**
  - Households with high crop diversification are overrepresented in the sample that plants fruit or vegetables in all six countries analyzed.
  - There is a considerable difference in fruits and vegetables planted between specialized and diversified SSPs in middle- and low-income strata.

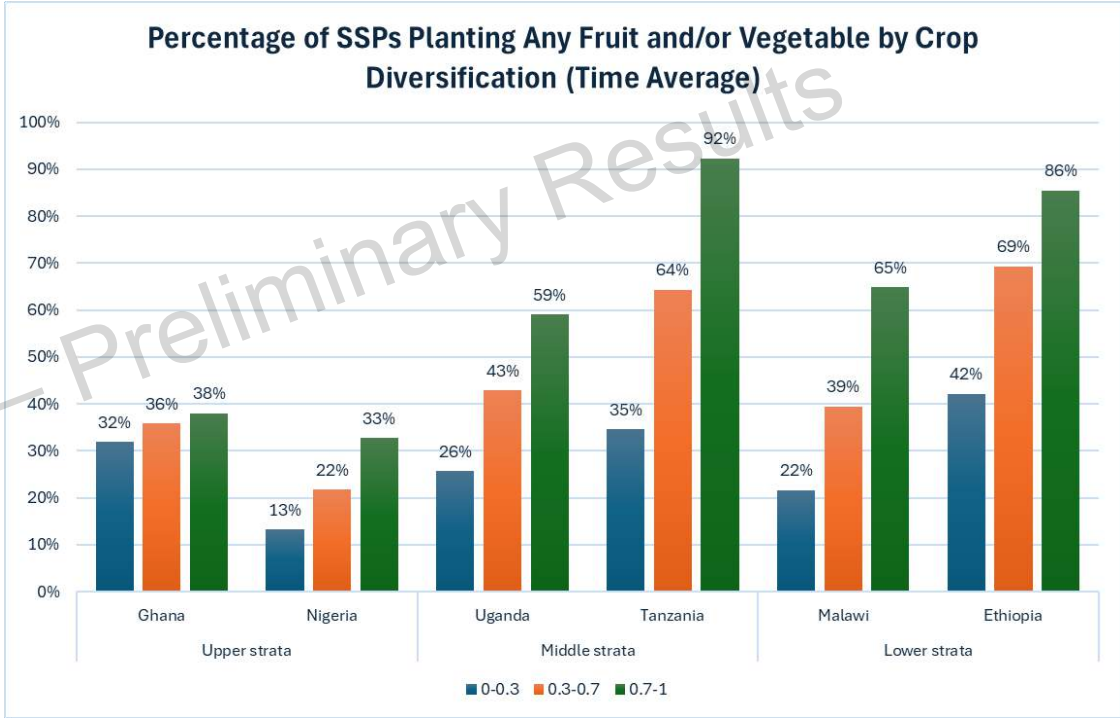


Fig 28: Percentage of SSPs who planted any fruit or vegetable by crop diversification.

IV. SSPs have diversified production strategies

- **Diversified households have a higher presence of planted fruits & vegetables**

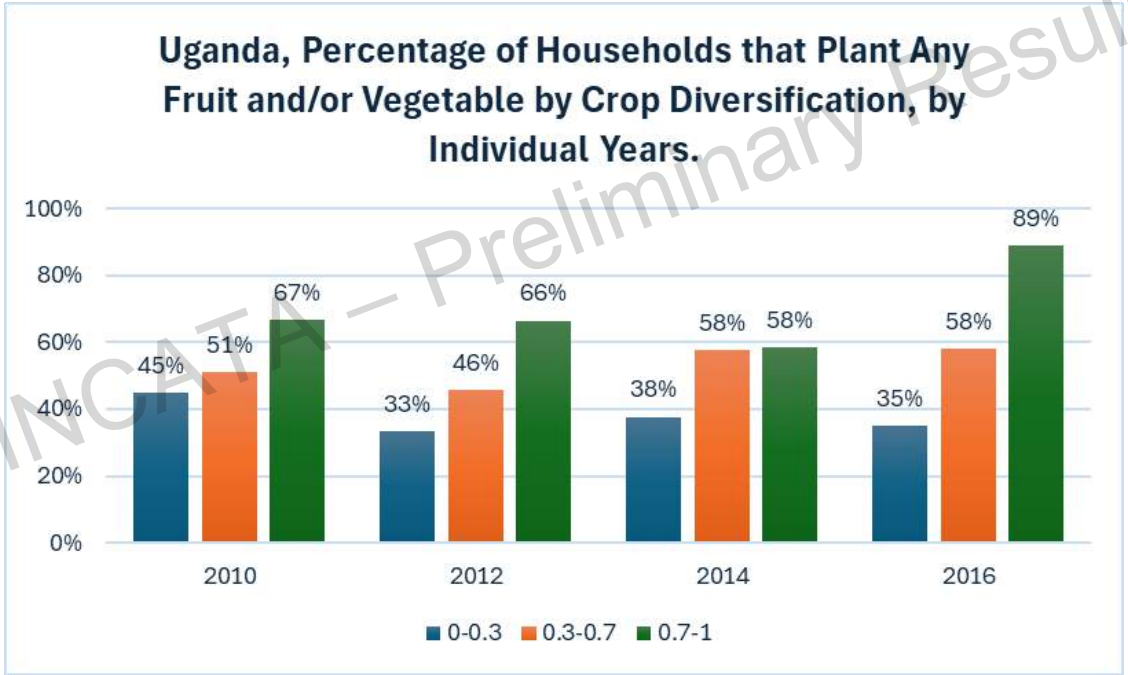


Fig 29: Percentage of households planting fruits or vegetables in Uganda, year by year comparison.

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- **Diversified SSPs in middle and lower-income countries present higher rates of women's economic empowerment (WEE)**
  - SSP households with high crop diversification (based on quantity produced for each crop) in the middle and lower-income strata countries have significantly higher percentages of empowered households.
  - This same trend is present in Ghana only in the latest wave (2017) (Appendix Figure B2, Excel "Slide 45").

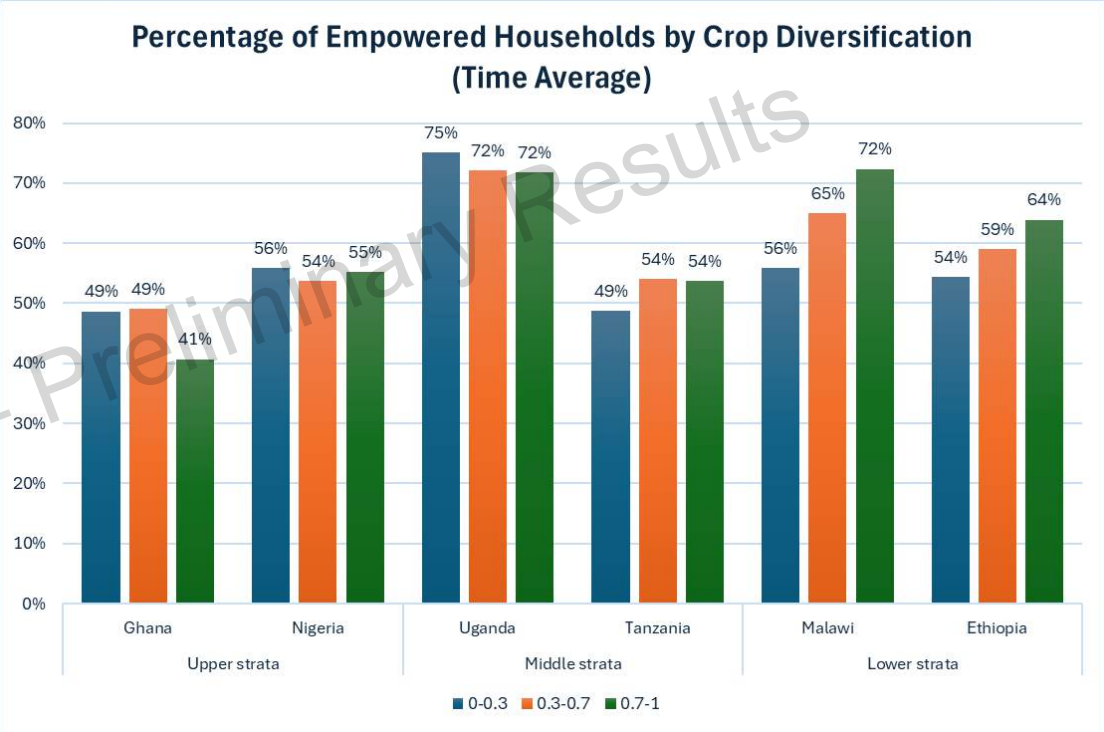


Fig 30: Percentage of empowered households by crop diversification.

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- **Crop diversification is positively associated with higher levels of women's economic empowerment in low-income countries**

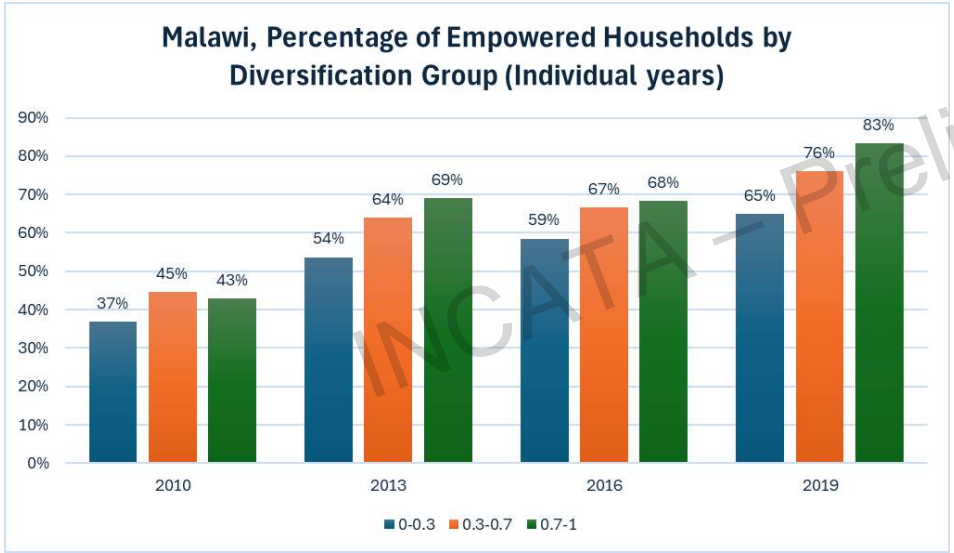


Fig 31: Empowered Households in Malawi, by years.

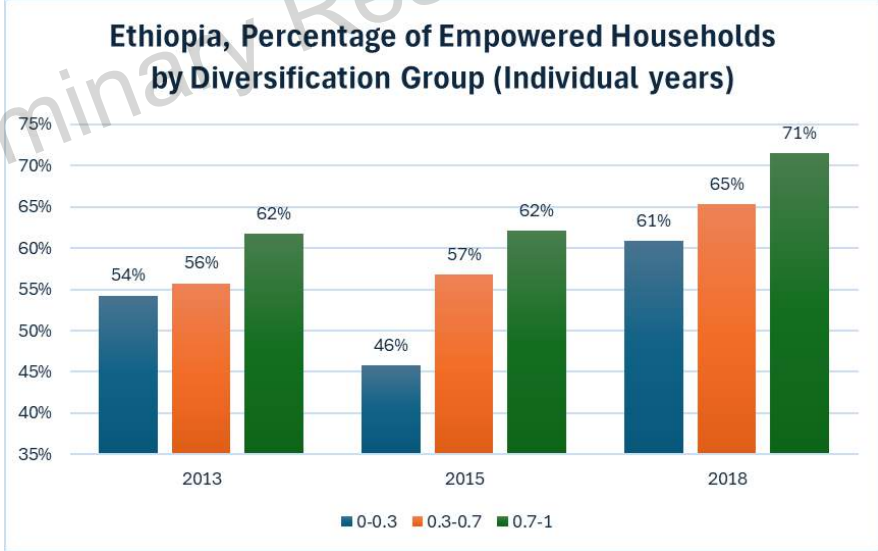


Fig 32: Empowered Households in Ethiopia, by years.

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- **Commercial SSPs have more WEE levels, especially in low-income countries**

  - Households that commercialize any of their agricultural production exhibits, on average, nearly double the WEE levels compared to non-seller small-scale producers (SSPs) in low-income countries such as Ethiopia and Malawi.
  - This is also observed in Tanzania and, to a lesser extent, in Nigeria and Uganda.

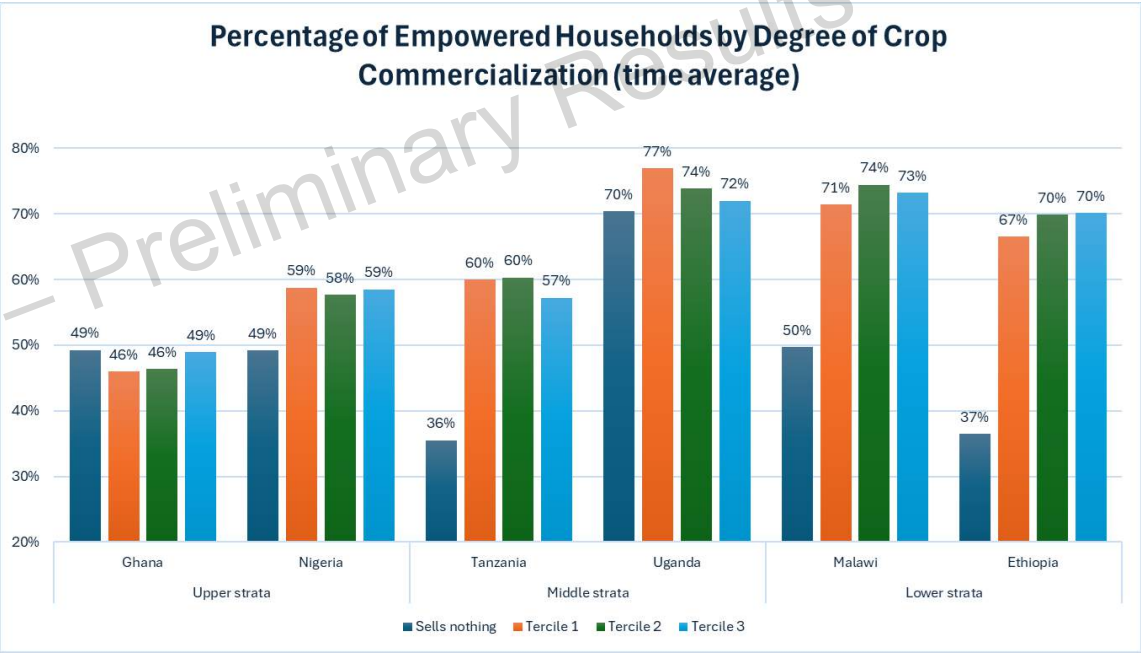


Fig 33: Percentage of empowered households by crop diversification.

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- **cSSPs present slightly higher resilience scores than non-seller SSPs in upper and middle-income strata countries**

  - SSPs who commercialize their own produce have, on average, higher resilience scores (normalized from 0 to 1) over the analyzed years than non-seller SSPs.
  - Being in the upper tercile of commercialization is associated with higher resilience scores in every country except Ethiopia.

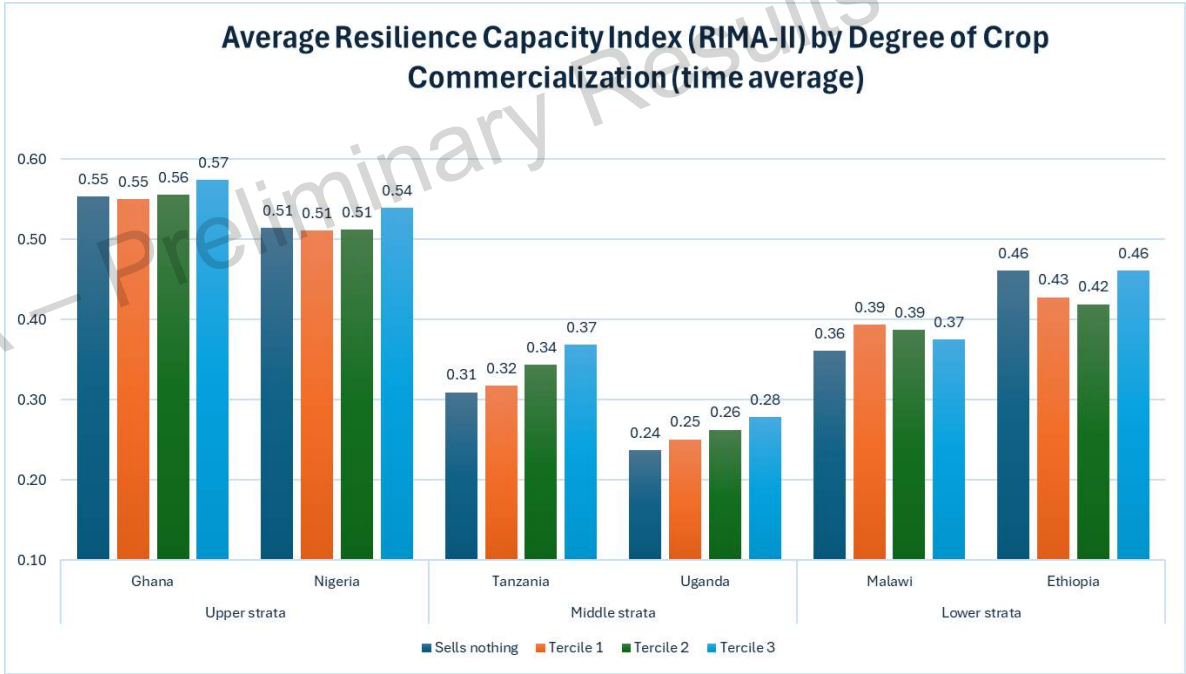


Fig 34: RCI by crop commercialization.

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- **Diversified SSPs are, on average, more resilient to economic shocks in the most recent years**
  - SSPs with higher crop diversification present higher resilience scores on average.
  - This pattern has not been present in all years. When analyzing the average across time, only Uganda shows an increase in resilience.

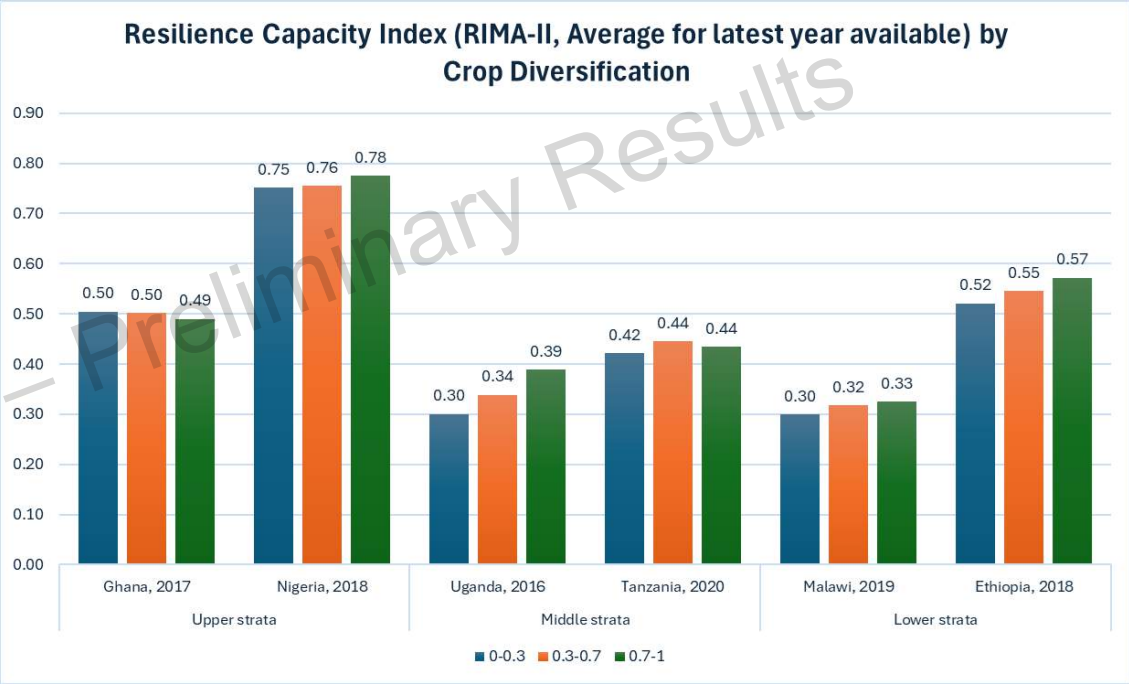


Fig 35: RCI by crop diversification. Most recent year.

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- **Commercial SSPs have better food security levels**
  - cSSPs, on average, have higher Food Consumption Scores (FCS).
  - In Nigeria and Tanzania, those in the upper commercialization tercile have better food security outcomes than non-commercial SSPs.
  - In Uganda, each tercile has, on average, a higher value of FCS.
  - In Ethiopia, only the bottom tercile has, on average, a higher value of FCS than non-commercial SSPs.
  - In Malawi, regardless of the commercialization degree, FCS is between 49-50.

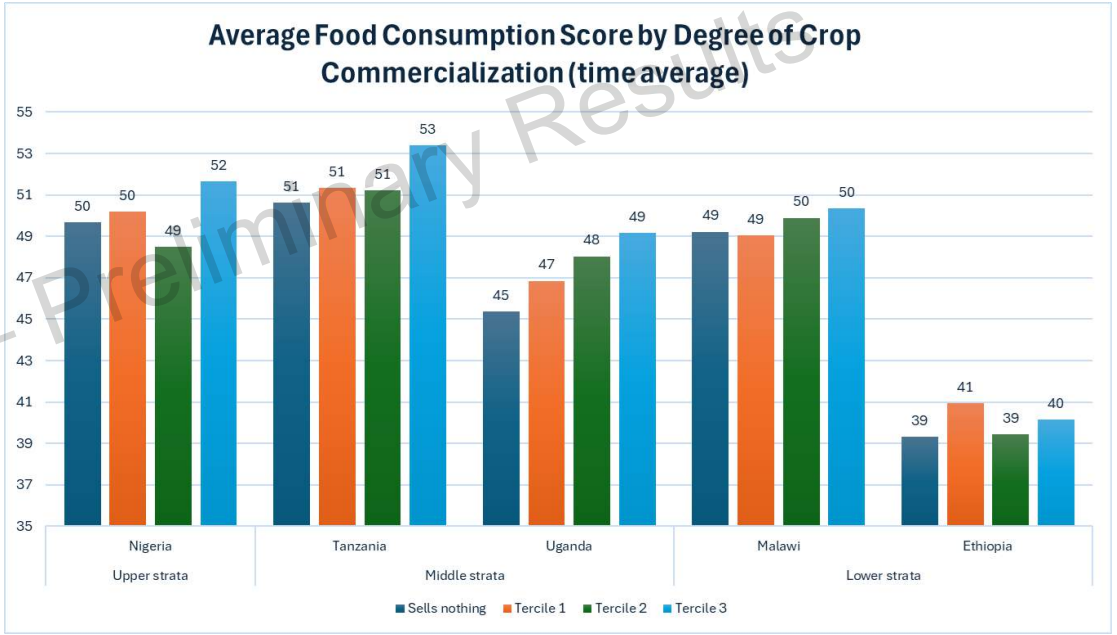
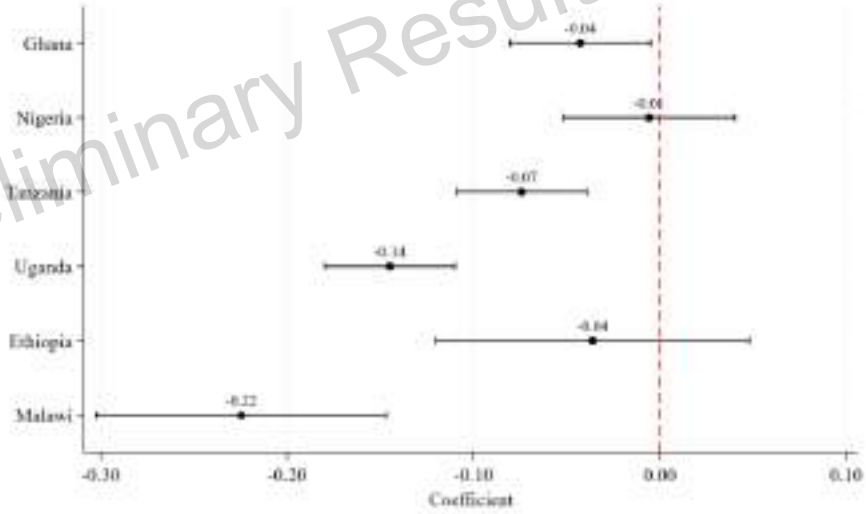


Fig 36: Food Consumption Score (time average) by crop commercialization.

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- **Increasing commercialization is associated with meaningful poverty reduction in Uganda and Malawi**
  - We regressed the poverty headcount ratio on the ratios of output sales to output harvested while controlling for time and location fixed effects.
  - The most significant magnitude of association between commercialization and poverty was in Malawi, where a ten percentage-point increase in commercialization is associated with a 2.2 percentage-point decrease in poverty headcount.
  - The association between the degree of commercialization and poverty reduction is significant but small in Ghana and Tanzania and absent in Nigeria and Ethiopia.

Fig 37: Association between commercialization and headcount poverty ratio



Note: The line caps represent 95% confidence intervals. Full results are in Table 21 (Excel, "Slide 50")

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- **Little commercialization is not good for poverty reduction**
  - Except in Malawi, where being at the lowest tercile of commercialization rate is associated with a ten percentage-point reduction in poverty relative to being a non-seller SSP.
  - Reaching the highest tercile of commercialization rate (relative to being a non-seller SSP) is associated with meaningful poverty reduction in all countries except Nigeria and Ethiopia.
  - Appendix Figures 21-23 (Excel, “Slide 51”) show more country-specific results.
  - Appendix Figures 24-26 (Excel, “Slide 51”) show country-specific time-varying results.

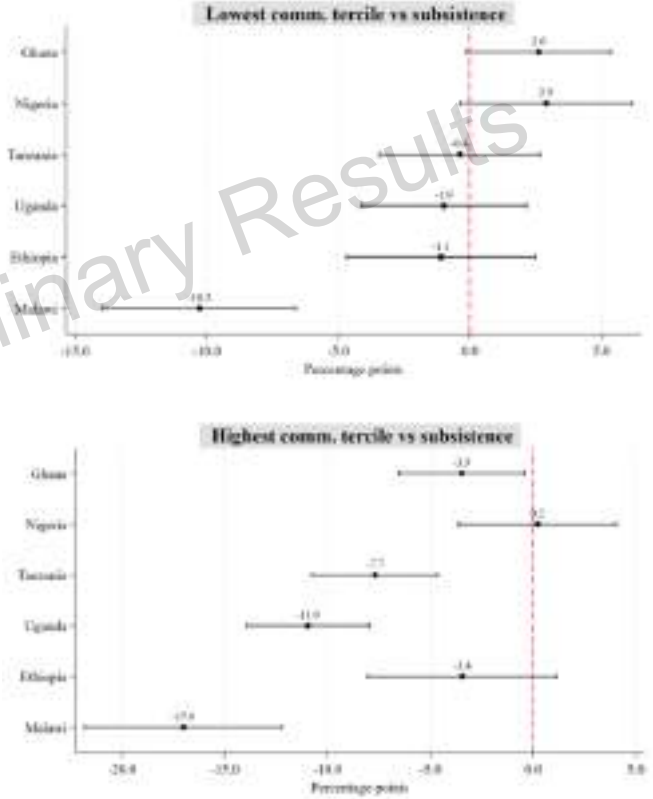


Fig 38: Association between commercialization thresholds and headcount poverty ratio

V. Commercial and diversified SSPs exhibit more resilience, WEE, and food security and less poverty

- **Fruit and vegetable production is associated with poverty reduction in Ghana, Tanzania, and Uganda**
  - The full regression results are in Appendix Table A7 (Excel, “Slide 52”)
  - Appendix Figures 27-29 (Excel, “Slide 52”) show detailed time-varying results.

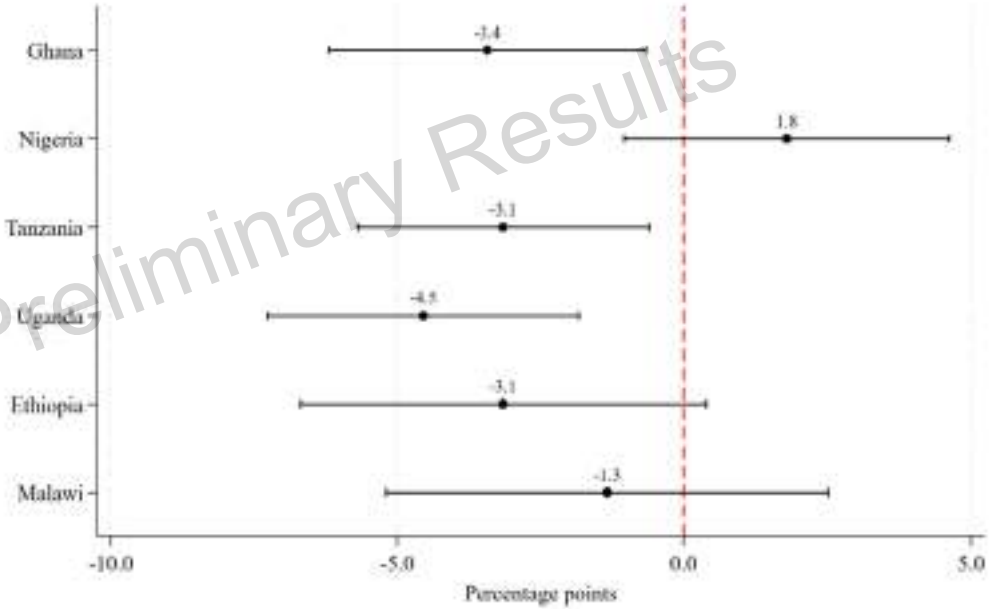


Fig 39: Association between fruits and vegetables production and poverty

Appendix: Definitions

- **Two definitions of Small-Scale Producer (SSP):**

  1. Below 90th percentile cultivated area at survey baseline
     - Ranges between **1.4 ha** for Malawi in 2011 to **5.3 ha** for Ghana in 1993

  2. Country-specific definition: less than 2 ha cultivated area, on average
     - Ranges from **<0.8 ha** for arable crops in Ghana to **<5 ha** for tree crops in most countries

- **Commercial Small-Scale Producer (cSSP):**

  1. Percentage of SSPs that sell any harvested output

  2. Non-selling SSP + 3 levels of commercialization using terciles of the commercialization distribution for cSSP
     - Non-selling SSP (subSSP)
     - Bottom Tercile cSSP (btcSSP)
     - Middle Tercile cSSP (mtcSSP)
     - Highest Tercile cSSP (htcSSP)

Definitions

- **Micro, Small & Medium Enterprises (MSMEs):**

  1. We classified micro, small, and medium enterprises using country-specific definitions based on workforce size and value of capital (Appendix Tables A8 & A9, Excel “Slide 54”).

  2. We distinguish between enterprises that work upstream and downstream from SSPs
     - By upstream, we mean enterprises that supply inputs (mainly seeds, fertilizers, and pesticides) to farmers
     - By downstream, we mean wholesalers, retailers, and manufacturers of raw or processed agricultural products.
     - Because the LSMS surveys are household surveys (rather than enterprise surveys per se), they capture home-based processing enterprises that are vertically integrated and/or purchase raw materials from farmers.
     - We also examine the role of non-agro enterprises as forward and backward linkages in the rural economy

Appendix: Definitions and datasets

- **Country strata:**
  - We categorize the six countries into three strata based on per capita income and general economic conditions
    - ♦ Upper income (Stratum 1): Ghana and Nigeria
    - ♦ Middle income (Stratum 2): Tanzania and Uganda
    - ♦ Lower income (Stratum 3): Ethiopia and Malawi

Table 15: Selected country characteristics and classification

Country	GDP per capita (const. US$): recent 5-yr avg.	GDP per capita (const. US$): survey period avg.	Agric GDP share (%) recent 5-yr avg.	Agric GDP growth (%) recent 5-yr avg.	Stratum name
Ghana	2,011	1,301	19	6	Upper
Nigeria	2,449	2,529	23	2	Upper
Tanzania	1,050	912	25	3	Middle
Uganda	930	858	24	5	Middle
Ethiopia	836	649	36	5	Lower
Malawi	560	542	23	3	Lower

Source: World Development Indicators, World Bank

Appendix: Definitions and datasets

- **Survey data:**
  - We use LSMS-ISA survey data for 6 countries.
  - Years analyzed correspond to the longest series available.

Country	Survey name	Years analyzed
Ghana	Ghana Living Standards Survey (GLSS)	1992, 1999, 2006, 2013, 2017
Nigeria	General Household Survey (GHS)	2011, 2013, 2016, 2019
Uganda	Uganda National Panel Survey (UNPS)	2010, 2012, 2013, 2016, 2020
Tanzania	Tanzania National Panel Survey (TZNPS)	2009, 2011, 2013, 2015, 2020
Ethiopia	Ethiopia Socioeconomic Survey (ERSS)	2012, 2014, 2016, 2019
Malawi	Integrated Household Panel Survey (IHPS)	2010, 2013, 2016, 2019

Table 16. Countries analyzed, survey names, and survey years.

Appendix: Definitions and datasets

- **Variables created:**

- **For the INCATA project, a set of variables was created:**

  - **Women's empowerment:** Abbreviated Women's Empowerment in Agriculture Index by IFPRI, adapted for the datasets.

Empowered household is a binary variable indicating that a household has achieved empowerment in three of four pillars, including input in productive decisions, control over income use, asset ownership, and workload.

  - **Resilience:** Resilience Capacity Index, RIMA-II methodology by FAO

We normalize this index to take values between 0 and 1, with 1 indicating higher resilience.

  - **Food Security:** Food Consumption Score using data available in the LSMS-ISA with 7-day recall

  - **Crop Diversification:**

We construct a Herfindahl index using KG produced for each crop by the farm. This value is subtracted from 1, so 0 indicates perfect specialization and 1 is full diversification.

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