

**LSMS - INTEGRATED SURVEYS ON AGRICULTURE
UNITED REPUBLIC OF TANZANIA: PADDY APPENDIX**

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Appendix: LSMS-ISA: Paddy

The tables below provide the details for analysis done in EPAR Brief #188, including 95% confidence intervals, the number of observations, and p-values where available.

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Paddy Cultivation Frequency

Proportion of Agricultural Households Cultivating Crop across Tanzania			
Crop	Estimated Proportion	95% C.I.	No. of Observations
Maize	83%	[80%, 85%]	1695 out of 2298
Cassava	35%	[31%, 38%]	929 out of 2298
Beans	34%	[30%, 38%]	642 out of 2298
Mango	33%	[30%, 36%]	700 out of 2298
Groundnut	22%	[19%, 25%]	422 out of 2298
Paddy	17%	[14%, 20%]	481 out of 2298
Sweet potatoes	15%	[13%, 17%]	293 out of 2298
Sorghum	13%	[10%, 15%]	293 out of 2298
Cowpeas	8%	[7%, 10%]	179 out of 2298
Millet	6%	[4%, 8%]	105 out of 2298
Yams	1%	[0%, 1%]	27 out of 2298

Proportion of Agricultural Households Cultivating Paddy by Zone (Long Rainy Season)				
Zone	Estimated Proportion	95% C.I.	No. of Observations	Wald test P-value
Zanzibar	51%	[38%, 64%]	136 out of 262	<0.0001
Eastern	38%	[23%, 52%]	65 out of 195	
Southern	27%	[20%, 34%]	120 out of 456	
Lake	19%	[10%, 28%]	45 out of 246	
Western	18%	[11%, 25%]	56 out of 320	
Southern Highlands	9%	[3%, 16%]	33 out of 343	
Central	8%	[-5%, 20%]	10 out of 136	
Northern	5%	[0%, 11%]	16 out of 340	

Mean Plot Size by Zone, Long Rainy Season				
Zone	Median (ha)	Mean (ha)	95% C.I.	No. of Observations
Western	0.81	1.50	[1.03, 1.97]	46
Eastern	0.71	0.97	[0.66, 1.28]	70
Southern	0.40	0.74	[0.55, 0.94]	131
Southern Highlands	0.40	0.62	[0.40, 0.83]	42
Zanzibar	0.20	0.26	[0.23, 0.29]	191

*Insufficient observations (less than 30) to calculate means for Northern, Central, and Lake zones.

Households Cultivating Paddy by Gender of Household Head					
	Household Head	Estimated Proportion	95% C.I.	No. of Observations	Wald test P-value
Paddy	Male	18%	[14%, 21%]	312 out of 1740	0.2503
	Female	15%	[11%, 20%]	92 out of 558	

Paddy Sales

Average Price per Kilogram of Sales of Paddy

	Mean (\$USD/kg)	95% C.I.	No. of Observations	Median (\$USD/kg)
Long Rainy Season	\$0.34	[\$0.31, \$0.36]	157	\$0.33
Short Rainy Season	\$0.22	[\$0.02, \$0.45]	22	\$0.14

Mean and Median Value of Paddy Sales by Household

	Mean (\$USD/kg)	95% C.I.	No. of Observations	Median (\$USD/kg)
Long Rainy Season	\$209.77	[\$145.63, \$273.90]	157	\$83.42
Short Rainy Season	\$388.67	[\$80.11, \$697.22]	22	\$250.26

Comparison of Average Household Level Paddy Yields of Those who Sold and did not Sell Paddy in Long Rainy Season

Household	Mean (t/ha)	95% C.I.	No. of Observations	Wald test P-value	Median (t/ha)
Sales	1.89	[1.66, 2.12]	152	0.0008	1.70
No Sales	1.09	[0.74, 1.44]	246		0.62

Comparison of Average Yields of Top 20% Value Earning Households and Bottom 80% Value-Earning Households that Sold Paddy in Long Rainy Season

Household	Mean (t/ha)	95% C.I.	No. of Observations	Wald test P-value	Median (t/ha)
Top 20%	2.73	[2.13, 3.32]	30	0.0015	2.25
Bottom 80%	1.67	[1.44, 1.89]	127		1.48

Proportion of Households that Sold Paddy

	Estimated Proportion	95% C.I.	No. of Observations
Long Rainy Season	52%	[44%, 60%]	157 out of 423
Short Rainy Season	49%	[34%, 64%]	22 out of 53

Proportion of Households that Sold Paddy by Zone

	Estimated Proportion	95% C.I.	No. of Observations
Southern Highlands	88%	[74%, 102%]	28 out of 32
Northern	84%	[65%, 103%]	11 out of 13
Central	71%	[33%, 109%]	7 out of 10
Southern	56%	[43%, 70%]	62 out of 118
Western	48%	[30%, 66%]	21 out of 45
Lake	44%	[25%, 64%]	8 out of 17
Eastern	41%	[25%, 56%]	20 out of 58
Zanzibar	0%	-	0 out of 130

Proportion of Households Selling Paddy Produced by Gender of Household Head					
Season	Head of Household	Estimated Proportion	95% C.I.	No. of Observations	Wald test P-value
Long Rainy Season	Male	53%	[45%, 62%]	120 out of 325	0.4109
	Female	48%	[34%, 61%]	37 out of 98	
Short Rainy Season	Male	54%	[36%, 72%]	20 out of 46	0.1627
	Female	28%	[-1%, 57%]	2 out of 7	

Average Value of Paddy Sales by Gender of Household Head, Long Rainy Season					
Head of Household	Mean (\$USD)	95% C.I.	No. of Observations	Wald test P-value	Median (\$USD)
Male	\$238.92	[\$158.17, \$319.67]	120	0.0343	\$100.10
Female	\$111.99	[\$33.17, \$190.80]	37		\$29.20

Average Quantity of Paddy Sold by Gender of Household Head, Long Rainy Season					
Head of Household	Mean (kg)	95% C.I.	No. of Observations	Wald test P-value	Median (kg)
Male	684	[502, 966]	120	0.0045	400
Female	296	[120, 471]	37		110

Average Price of Paddy Sold by Gender of Household Head, Long Rainy Season					
Head of Household	Mean (\$USD/kg)	95% C.I.	No. of Observations	Wald test P-value	Median (\$USD/kg)
Male	\$0.33	[\$0.31, \$0.36]	120	0.6427	\$0.32
Female	\$0.34	[\$0.30, \$0.38]	37		\$0.33

Paddy Plot Productivity

Land Productivity by Primary Crop Planted on Plot, Long Rainy Season

Crop	Mean (USD/ha)	95% C.I.	No. of Observations
Yams	\$368.81	[\$102.50, \$671.11]	15
Paddy	\$349.31	[\$299.71, \$398.90]	460
Maize	\$156.85	[\$145.81, \$167.88]	1547
Groundnut	\$150.32	[\$109.83, \$190.82]	110
Cowpeas	\$126.45	[\$60.68, \$192.21]	15
Beans	\$126.01	[\$94.87, \$157.16]	148
Sweet Potatoes	\$114.20	[\$93.78, \$134.62]	76
Cassava	\$107.42	[\$85.62, \$129.22]	352
Sorghum	\$97.88	[\$71.18, \$124.59]	150
Millet	\$86.64	[\$68.16, \$105.12]	69

Labor Productivity by Primary Crop Planted on Plot, Long Rainy Season

Crop	Mean (USD/Work Day)	95% C.I.	No. of Observations
Paddy	\$2.25	[\$1.83, \$2.67]	470
Cowpeas	\$2.18	[\$0.35, \$4.00]	15
Maize	\$1.82	[\$1.64, \$1.99]	1538
Yams	\$1.63	[\$0.51, \$2.75]	15
Groundnut	\$1.34	[\$1.01, \$1.66]	110
Beans	\$1.33	[\$1.01, \$1.65]	147
Sweet Potatoes	\$1.20	[\$0.77, \$1.63]	77
Sorghum	\$1.16	[\$0.82, \$1.49]	151
Millet	\$0.97	[\$0.76, \$1.17]	69
Cassava	\$0.97	[\$0.73, \$1.22]	352

Paddy Yield Analysis

Note: FAO's estimate of Tanzania's annual paddy yield (most comparable to the LSMS country level area harvested measure) is 2.03 t/ha.

Long Rainy Season		Median Yield (t/ha)	Mean Yield (t/ha)	95% C.I.	No. of Observations
Country	Harvested		1.29		492
	Planted		1.04		506
Household	Harvested	1.11	1.51	[1.30, 1.73]	404
	Planted	0.83	1.20	[1.03, 1.38]	413
Plot	Harvested	1.13	1.57	[1.35, 1.79]	492
	Planted	0.89	1.27	[1.07, 1.47]	506
Short Rainy Season					
Country	Harvested		3.20		47
	Planted		3.12		48
Household	Harvested	1.93	2.58	[1.85, 3.32]	44
	Planted	1.65	2.52	[1.61, 3.42]	45
Plot	Harvested	1.93	2.63	[1.90, 3.36]	47
	Planted	1.65	2.51	[1.62, 3.41]	48

Paddy Plot Yields for Male- and Female-Headed Households (Area Harvested)					
Season	Head of Household	Mean Yield (t/ha)	95% C.I.	No. of Observations	Wald test P-value
Long Rainy Season	Male	1.58	[1.33, 1.84]	387	0.8224
	Female	1.53	[1.10, 1.95]	105	
Short Rainy Season	Male	2.94	[1.98, 3.90]	40	0.0105
	Female	1.09	[0.34, 1.84]	7	

Paddy Plot Yields by Zone in the Long Rainy Season (Area Harvested)				
Zone	Median Yield (t/ha)	90 th Percentile Yield (t/ha)	No. of Observations	
Tanzania	1.13	3.46	492	
Southern Highlands	1.85	4.63	41	
Western	1.11	2.97	45	
Southern	0.74	2.59	119	
Eastern	0.62	1.98	61	
Zanzibar	0.59	1.94	174	

*Insufficient observations (less than 30) to calculate yields for Northern, Central, and Lake zones.

Household Paddy Yields by Ownership of Livestock, Long Rainy Season (Area Harvested)				
Ownership	Mean Yield (t/ha)	95% C.I.	No. of Observations	Wald test P-value
Livestock	1.73	[1.48, 1.99]	251	0.0001
No Livestock	1.04	[0.81, 1.27]	152	

Paddy Yields for Not Intercropped and Intercropped Plots (Area Harvested)					
Season		Mean Yield (t/ha)	95% C.I.	No. of Observations	Wald test P- value
Long Rainy Season	Not Intercropped	1.73	[1.49, 1.98]	403	0.0000
	Intercropped	0.98	[0.75, 1.22]	89	
Short Rainy Season	Not Intercropped	2.59	[1.78, 3.40]	44	0.6905
	Intercropped	3.16	[0.63, 5.69]	3	

High Producing Paddy Plot Analysis

Average Plot Size, Long Rainy Season

Producer	Mean (ha)	95% C.I.	No. of Observations	Wald test P-value
≥90 th Percentile	0.53	[0.22, 0.85]	36	0.0350
<90 th Percentile	0.89	[0.75, 1.02]	456	

Average Distance from Plot to Market, Long Rainy Season

Producer	Mean (km)	95% C.I.	No. of Observations	Wald test P-value
≥90 th Percentile	5.3	[4.1, 6.5]	36	0.0020
<90 th Percentile	8.2	[7.0, 9.3]	454	

Plot Soil Type Estimated Proportions, Long Rainy Season

Producer	Sandy	95% C.I.	Loam	95% C.I.	Clay	95% C.I.	Other	95% C.I.	No. of Observations
≥90 th Percentile	20%	[4%, 36%]	34%	[17%, 50%]	42%	[23%, 62%]	4%	[-4%, 12%]	36
<90 th Percentile	11%	[7%, 14%]	54%	[46%, 61%]	35%	[28%, 41%]	1%	[-0.1%, 3%]	455

Proportion of Plots using Inorganic Fertilizer, Long Rainy Season

Producer	Estimated Proportion	95% C.I.	No. of Observations	Wald test P-value
≥90 th Percentile	14%	[-4%, 32%]	6 out of 36	0.6052
<90 th Percentile	9%	[4%, 14%]	52 out of 455	

Proportion of Plots using Pesticides, Herbicides, or Fungicides, Long Rainy Season

Producer	Estimated Proportion	95% C.I.	No. of Observations	Wald test P-value
≥90 th Percentile	14%	[-1%, 30%]	4 out of 36	0.5096
<90 th Percentile	11%	[4%, 18%]	37 out of 455	

Average Education of Household Head, Plot Level, Long Rainy Season

Producer	Education (years)	95% C.I.	No. of Observations	Wald test P-value
≥90 th Percentile	6.4	[5.3, 7.5]	34	0.0338
<90 th Percentile	5.3	[4.9, 5.7]	437	

Proportion of Households Owning Livestock, Long Rainy Season

Producer	Estimated Proportion	95% C.I.	No. of Observations	Wald test P-value
≥90 th Percentile	85%	[75%, 95%]	24 out of 30	0.0012
<90 th Percentile	67%	[61%, 73%]	227 out of 373	

Pre- and Post-Harvest Paddy Losses

Proportion of Paddy Plots with Pre-Harvest Losses

Crop	Estimated Proportion	95% C.I.	No. of Observations
Long Rainy Season	52%	[44%, 59%]	295 out of 501
Short Rainy Season	53%	[34%, 72%]	23 out of 47

Causes of Pre-Harvest Losses on Paddy Plots, Long Rainy Season

Causes	Estimated Proportion	95% C.I.	No. of Observations
Birds	67%	[57%, 76%]	167 out of 295
Animals	15%	[7%, 23%]	35 out of 295
Insects	9%	[5%, 12%]	40 out of 295
Other	4%	[0%, 9%]	14 out of 295
Diseases	3%	[2%, 5%]	32 out of 295
Theft	2%	[0%, 5%]	7 out of 295

Proportion of Paddy Plots with Post-Harvest Losses

Crop	Estimated Proportion	95% C.I.	No. of Observations
Long Rainy Season	15%	[10%, 20%]	65 out of 442
Short Rainy Season	22%	[9%, 35%]	10 out of 53

Causes of Post-Harvest Losses on Paddy Plots, Long Rainy Season

Causes	Estimated Proportion	95% C.I.	No. of Observations
Rodents, Pests	85%	[75%, 95%]	51 out of 65
Insects	10%	[1%, 18%]	11 out of 65
Other	5%	[-2%, 12%]	2 out of 65
Rotting	0%	[0%, 1%]	1 out of 65
Theft	0%	-	0 out of 65

Proportion of Paddy Plots Suffering Pre-Harvest Losses by Zone, Long Rainy Season

Zone	Estimated Proportion	95% C.I.	No. of Observations
Zanzibar	72%	[63%, 80%]	130 out of 177
Eastern	54%	[38%, 70%]	37 out of 62
Southern	49%	[37%, 61%]	63 out of 122
Southern Highlands	48%	[21%, 75%]	21 out of 42
Western	22%	[7%, 37%]	11 out of 46

*Insufficient observations (less than 30) to calculate proportions for Northern, Central, and Lake zones.

Proportion of Paddy-Growing Households Reporting Post-Harvest Losses by Zone, Long Rainy Season

Zone	Estimated Proportion	95% C.I.	No. of Observations
Zanzibar	28%	[16%, 39%]	33 out of 130
Eastern	18%	[4%, 32%]	10 out of 58
Western	10%	[2%, 18%]	4 out of 45
Southern Highlands	5%	[-1%, 12%]	2 out of 32
Southern	5%	[1%, 9%]	6 out of 117

*Insufficient observations (less than 30) to calculate proportions for Northern, Central, and Lake zones.

Paddy Inputs

Proportion of Paddy Plots Using Inputs, Long Rainy Season

Input	Estimated Proportion	95% C.I.	No. of Observations
Organic Fertilizer	5%	[2%, 8%]	24 out of 532
Inorganic Fertilizer	9%	[4%, 14%]	59 out of 532
Pesticides, Herbicides, and/or Fungicides	11%	[4%, 18%]	45 out of 532
Improved Variety (IV) Seeds	5%	[2%, 8%]	29 out of 532
Irrigation	5%	[1%, 8%]	19 out of 533

Proportion of Paddy Plots Using Inputs, Short Rainy Season

Input	Estimated Proportion	95% C.I.	No. of Observations
Organic Fertilizer	14%	[2%, 26%]	10 out of 67
Inorganic Fertilizer	11%	[0%, 23%]	9 out of 67
Pesticides, Herbicides, and/or Fungicides	8%	[0%, 16%]	6 out of 67
Improved Variety (IV) Seeds	7%	[1%, 14%]	14 out of 76

*Insufficient observations (less than 30 in the denominator) to calculate proportion for irrigation.

Proportion of Paddy Plots Using Improved Variety Seeds by Zone, Long Rainy Season

Zone	Estimated Proportion	95% C.I.	No. of Observations
Eastern	9%	[0%, 18%]	6 out of 70
Zanzibar	7%	[2%, 12%]	12 out of 189
Southern	5%	[0%, 9%]	6 out of 131
Southern Highlands	0%	n/a	0 out of 42
Western	0%	n/a	0 out of 46

*Insufficient observations (less than 30 in the denominator) to calculate proportions for Northern, Central, and Lake zones.

Proportion of Paddy Plots Using Pesticides, Herbicides, or Fungicides by Zone, Long Rainy Season

Zone	Estimated Proportion	95% C.I.	No. of Observations
Southern Highlands	37%	[1%, 73%]	15 out of 41
Eastern	13%	[2%, 24%]	9 out of 70
Southern	8%	[3%, 13%]	9 out of 131
Zanzibar	4%	[1%, 7%]	7 out of 191
Western	3%	[-3%, 9%]	1 out of 46

*Insufficient observations (less than 30 in the denominator) to calculate proportions for Northern, Central, and Lake zones.

Proportion of Paddy Plots Using Organic Fertilizer by Zone, Long Rainy Season			
Zone	Estimated Proportion	95% C.I.	No. of Observations
Zanzibar	4%	[0%, 7%]	7 out of 191
Southern	3%	[0%, 6%]	4 out of 131
Southern Highlands	2%	[-1%, 6%]	1 out of 41
Western	2%	[-2%, 6%]	1 out of 46
Eastern	0%	[0%, 1%]	1 out of 70

*Insufficient observations (less than 30 in the denominator) to calculate proportions for Northern, Central, and Lake zones.

Proportion of Paddy Plots Using Inorganic Fertilizer by Zone, Long Rainy Season			
Zone	Estimated Proportion	95% C.I.	No. of Observations
Southern	19%	[8%, 31%]	23 out of 131
Zanzibar	11%	[5%, 17%]	23 out of 191
Southern Highlands	6%	[-4%, 15%]	2 out of 41
Eastern	2%	[-2%, 6%]	2 out of 70
Western	0%	n/a	0 out of 46

*Insufficient observations (less than 30 in the denominator) to calculate proportions for Northern, Central, and Lake zones.

Proportion of Paddy Plots Irrigating by Zone, Long Rainy Season			
Zone	Estimated Proportion	95% C.I.	No. of Observations
Southern Highlands	10%	[-2%, 21%]	4 out of 41
Southern	3%	[-3%, 9%]	3 out of 131
Eastern	2%	[-2%, 6%]	2 out of 70
Zanzibar	1%	[0%, 3%]	3 out of 191
Western	0%	n/a	0 out of 46

*Insufficient observations (less than 30 in the denominator) to calculate proportions for Northern, Central, and Lake zones.

Plot Yield by Use of Inorganic Fertilizer, Long Rainy Season					
Inorganic Fertilizer	Median Yield (t/ha)	Mean Yield (t/ha)	95% C.I.	No. of Observations	Wald test P-value
User	1.73	1.92	[1.29, 2.55]	58 out of 491	0.2453
Non-user	1.11	1.53	[1.30, 1.76]	433 out of 491	

Plot Yield by Use of Pesticides, Herbicides, and/or Fungicides, Long Rainy Season					
Pesticides, Herbicides, and/or Fungicides	Median Yield (t/ha)	Mean Yield (t/ha)	95% C.I.	No. of Observations	Wald test P-value
User	1.76	2.21	[1.63, 2.79]	41 out of 491	0.0232
Non-user	1.04	1.49	[1.26, 1.72]	450 out of 491	