EVANS SCHOOL OF PUBLIC AFFAIRS

UNIVERSITY of WASHINGTON

Evans School Policy Analysis and Research (EPAR)

LSMS – INTEGRATED SURVEYS ON AGRICULTURE
UNITED REPUBLIC OF TANZANIA: LEGUMES APPENDIX

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Appendix: *LSMS-ISA: Legumes*

The tables below provide the details for analysis done in EPAR Brief #189, including 95% confidence intervals, the number of observations, and p-values where available.

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Household Legume Cultivation

Households Cultivating Legumes, Long and/or Short Rainy Season

	Estimated Proportion	95% C.I.	Observations (of n=2229)
Legumes	57%	[53%, 61%]	1162
Beans	34%	[30%, 38%]	642
Groundnuts	22%	[19%, 25%]	421
Cowpeas	89%	[7% to 10%]	179
Pigeon Pea	4%	[3%, 6%]	132
Bambara Nuts	4%	[3%, 5%]	90
Mung Beans	3%	[1%, 4%]	56
Chickpeas	1%	[0%, 2%]	15
Fieldpeas	1%	[0%, 1%]	15
Soya Beans	0%	[0%, 1%]	11

Households Cultivating Legumes by Gender of Household Head, Long and/or Short Rainy Season

	Household Head	Estimated Proportion	95% C.I.	Observations	Wald test P-value
Legumes	Male	57%	[52%, 61%]	869 out of 1740	0.6291
	Female	58%	[52%, 64%]	293 out of 558	
Beans	Male	34%	[29%, 38%]	483 out of 1740	0.7671
	Female	34%	[28%, 41%]	159 out of 558	
Cowpeas	Male	8%	[6%, 10%]	135 out of 1740	0.8023
	Female	9%	[6%, 12%]	44 out of 558	
Groundnut	Male	22%	[19%, 26%]	321 out of 1740	0.4751
	Female	20%	[16%, 25%]	100 out of 558	

Households Cultivating Legumes by Zone, Long and/or Short Rainy Season					
	Zone	Estimated Proportion	95% C.I.	Observations	Wald test P-value
Legumes	Western	71%	[63%, 79%]	226 out of 320	<0.0001
	Central	66%	[52%, 79%]	88 out of 136	
	Lake	64%	[52%, 76%]	163 out of 246	
	Southern Highlands	62%	[52%, 72%]	211 out of 343	
	Northern	52%	[44%, 61%]	183 out of 340	
	Southern	46%	[38%, 53%]	199 out of 456	
	Eastern	34%	[23%, 45%]	62 out of 195	
	Zanzibar	12%	[4%, 20%]	30 out of 262	
Beans	Lake	54%	[40%, 68%]	138 out of 246	<0.0001
	Southern Highlands	52%	[41%, 62%]	177 out of 343	
	Northern	40%	[31%, 50%]	141 out of 340	
	Western	38%	[26%, 49%]	118 out of 320	
	Central	11%	[1%, 21%]	16 out of 136	
	Eastern	10%	[1%, 19%]	18 out of 195	
	Southern	9%	[3%, 15%]	34 out of 456	
	Zanzibar	0%	-	0 out of 262	
Cowpeas	Eastern	17%	[10%, 23%]	31 out of 195	0.0028
	Central	13%	[6%, 20%]	17 out of 136	
	Western	10%	[6%, 14%]	29 out of 320	
	Northern	8%	[3%, 12%]	26 out of 340	
	Southern	8%	[6%, 11%]	38 out of 456	
	Lake	6%	[0%, 12%]	14 out of 246	
	Zanzibar	5%	[1%, 8%]	12 out of 262	
	Southern Highlands	3%	[1%, 6%]	12 out of 343	
Groundnut	Central	54%	[38%, 69%]	72 out of 136	<0.0001
	Western	44%	[35%, 53%]	140 out of 320	
	Southern Highlands	24%	[15%, 33%]	79 out of 343	
	Lake	15%	[9%, 22%]	40 out of 246	
	Southern	15%	[10%, 20%]	63 out of 456	
	Zanzibar	5%	[-2%, 11%]	13 out of 262	
	Eastern	3%	[-1%, 7%]	6 out of 195	
	Northern	2%	[0%, 4%]	8 out of 340	

Households Cultivating Legumes by Region, Long and/or Short Rainy Season				
Zone	Estimated Proportion	95% C.I.	Observations	Wald test P-value
Kagera	93%	[87%, 100%]	102 out of 110	<0.0001
Kigoma	81%	[70%, 92%]	76 out of 94	
Dodoma	77%	[66%, 88%]	68 out of 88	
Mbeya	73%	[59%, 87%]	102 out of 142	
Tabora	71%	[58%, 85%]	74 out of 104	
Shinyanga	64%	[51%, 77%]	76 out of 122	
Kilimanjaro	61%	[46%, 76%]	63 out of 101	
Manyara	60%	[40%, 79%]	40 out of 66	
Rukwa	59%	[39%, 80%]	50 out of 82	
Mwanza	59%	[44%, 74%]	54 out of 92	
Ruvuma	50%	[35%, 64%]	66 out of 134	
Iringa	49%	[34%, 64%]	59 out of 119	
Mtwara	47%	[36%, 58%]	80 out of 178	
Arusha	45%	[24%, 67%]	33 out of 70	
Tanga	45%	[29%, 60%]	47 out of 103	
Singida	42%	[14%, 70%]	20 out of 48	
Lindi	39%	[26%, 51%]	53 out of 144	
Morogoro	37%	[21%, 52%]	37 out of 97	
Pwani	31%	[15%, 46%]	16 out of 54	
Pemba South	23%	[-2%, 48%]	15 out of 72	
Dar es salaam	17%	[5%, 29%]	9 out of 44	
Mara	16%	[5%, 27%]	7 out of 44	
Zanzibar North	15%	[-2%, 32%]	9 out of 62	
Pemba North	7%	[0%, 14%]	4 out of 65	
Zanzibar South	5%	[-5%, 14%]	1 out of 25	
Urban/West Zanzibar	3%	[-2%,8%]	1 out of 38	

Households Cultivating Groundnuts by Region, Long and/or Short Rainy Season				
Zone	Estimated Proportion	95% C.I.	Observations	Wald test P-value
Dodoma	70%	[56%, 84%]	62 of 88	<0.0001
Shinyanga	48%	[33%, 62%]	58 of 122	
Kigoma	41%	[22%, 61%]	38 of 94	
Tabora	41%	[26%, 56%]	44 of 104	
Mbeya	32%	[16%, 48%]	44 of 142	
Mtwara	26%	[15%, 37%]	44 of 178	
Rukwa	23%	[8%, 37%]	20 of 82	
Singida	21%	[2%, 39%]	10 of 48	
Kagera	20%	[9%, 31%]	22 of 110	
Pemba South	20%	[-5%, 44%]	13 of 72	
Mwanza	19%	[9%,29%]	18 of 92	
Iringa	14%	[5%, 23%]	15 of 119	
Ruvuma	9%	[5%, 13%]	12 of 134	
Kilimanjaro	7%	[0%, 13%]	7 of 101	
Lindi	5%	[2%, 9%]	7 of 144	
Morogoro	4%	[-2%, 10%]	4 of 97	
Dar es Salaam	3%	[-1%, 7%]	2 of 44	
Manyara	2%	[-1%, 4%]	1 of 66	
Arusha	0%		0 of 70	
Tanga	0%		0 of 103	
Pwani	0%		0 of 54	
Mara	0%		0 of 44	
Zanzibar North	0%		0 of 62	
Zanzibar South	0%		0 0f 25	
Urban/West Zanzibar	0%		0 of 38	
Pemba North	0%		0 of 65	

Households Cultivating Beans by Region, Long and/or Short Rainy Season

Zone	Estimated Proportion	95% C.I.	Observations	Wald test P-value
Kagera	93%	[86%, 99%]	101 of 110	<0.0001
Kigoma	69%	[57%, 82%]	65 of 94	
Mbeya	64%	[48%, 79%]	89 of 142	
Kilimanjaro	51%	[35%, 67%]	53 of 101	
Manyara	48%	[25%, 72%]	33 of 66	
Rukwa	48%	[26%, 70%]	41 of 82	
Iringa	37%	[24%, 50%]	47 of 119	
Arusha	36%	[14%, 49%]	25 of 70	
Mwanza	35%	[18%, 52%]	32 of 92	
Tabora	32%	[14%, 49%]	31 of 104	
Tanga	28%	[11%, 46%]	30 of 103	
Singida	27%	[2%, 52%]	13 of 48	
Ruvuma	24%	[9%, 40%]	32 of 134	
Shinyanga	19%	[5%, 33%]	22 of 122	
Morogoro	15%	[2%, 29%]	18 of 97	
Mara	12%	[4%, 19%]	5 of 44	
Dodoma	4%	[0%, 7%]	3 of 88	
Lindi	1%	[-1%, 2%]	1 of 144	
Mtwara	1%	[-1%, 2%]	1 of 178	
Pwani	0%		0 of 54	
Dar es Salaam	0%		0 of 44	
Zanzibar North	0%		0 of 62	
Zanzibar South	0%		0 of 25	
Urban/West Zanzibar	0%		0 of 38	
Pemba North	0%		0 of 65	
Pemba South	0%		0 of 72	

Legume Consumption, Production, and Purchase

Estimated Proportion of Agricultural Households Reporting Consumption in Last Seven Days

Food Item	Estimated Proportion	95% C.I.	Observations
Peas, beans, lentils, and other pulses	72%	[69%, 75%]	1759 of 2472
Groundnuts in shell/shelled	37%	[34%, 40%]	780 of 2474

Estimated Proportion of Agricultural Households that Produced a Portion of Legumes Consumed in Last Seven Days

Food Item	Estimated Proportion	95% C.I.	Observations
Groundnuts in shell/shelled	52%	[47%, 58%]	390 of 780
Peas, beans, lentils, and other pulses	41%	[37%, 45%]	645 of 1759

Estimated Proportion of Agricultural Households that Purchased a Portion of Legumes Consumed in Last Seven Days

Food Item	Estimated Proportion	95% C.I.	Observations
Peas, beans, lentils, and other pulses	56%	[52%, 60%]	1054 of 1759
Groundnuts in shell/shelled	41%	[35%, 46%]	331 of 780

Mean Quantity Consumed from Own-Production in Last Seven Days

Food Item	Mean (kg)	95% C.I	Observations
Peas, beans, lentils, and other pulses	3.3	[2.9, 3.7]	645
Groundnuts in shell/shelled	2.0	[1.8, 2.3]	388

Mean Quantity Consumed from Purchases in Last Seven Days

Food Item	Mean (kg)	95% C.I	Observations
Peas, beans, lentils, and other pulses	1.6	[1.6, 1.8]	1052
Groundnuts in shell/shelled	0.9	[0.8, 1.1]	330

Nutrient Content of Priority Crop Dishes (per 100 grams)

Food	Kcal.	Protein (grams)
Maize Ugali	123.8	2.7
Rice Ugali	149	2.7
Beans, Boiled without salt	127	8.7
Bean Relish, No Oil	117.2	6.4
Groundnuts	567	25.8

Source: Lukmanji, Z., E. Hertzmark, N. Mlingi, V. Assey, G. Ndossi, & W. Fawzi. (2008). "Tanzania Food Composition Tables." MUHAS- TFNC, HSPH, Dar es Salaam, Tanzania.

Plot Yield Calculations

Estimated Proportion of Plots Planted with Legumes, Long and Short Rainy Seasons

	Season	Estimated Proportion	95% C.I.	Observations (of n=5225)
Legumes	Long Rainy Season	26%	[23%, 28%]	1230
	Short Rainy Season	12%	[10%, 15%]	520
Beans	Long Rainy Season	14%	[12%, 16%]	609
	Short Rainy Season	9%	[6%, 10%]	347
Groundnuts	Long Rainy Season	8%	[7%, 9%]	363
	Short Rainy Season	5%	[2%, 5%]	147

Median and 90th Percentile Harvested Plot Yields

	Season	Median Yield (t/ha)	90th Percentile Yield (t/ha)	Observations
Beans	Long Rainy Season	0.2	0.67	546
	Short Rainy Season	0.25	0.59	248
Cowpeas	Long Rainy Season	0.15	0.59	125
	Short Rainy Season	0.18	0.49	39
Groundnut	Long Rainy Season	0.44	1.21	340
	Short Rainy Season	0.33	0.89	56

Average Plot Yields
Beans, Long Rainy Season

		Mean Yield (t/ha)	95% C.I.	Observations
Country	Harvested	0.24		546
	Planted	0.16		572
Household	Harvested	0.32	[0.28, 0.35]	442
	Planted	0.22	[0.19, 0.25]	463
Plot	Harvested	0.31	[0.28, 0.35]	546
	Planted	0.22	[0.20, 0.35]	572
Beans, Short Rainy Season				
Country	Harvested	0.24		248
	Planted	0.15		265
Household	Harvested	0.30	[0.25, 0.34]	205
	Planted	0.22	[0.18, 0.27]	218
Plot	Harvested	0.31	[0.26, 0.36]	248
	Planted	0.23	[0.18, 0.27]	265

Average Plot Yields Cowpeas, Long Rainy Season		Mean Yield (t/ha)	95% C.I.	Observations
Country	Harvested	0.14		125
	Planted	0.09		139
Household	Harvested	0.25	[0.18, 0.33]	115
	Planted	0.14	[0.11, 0.17]	129
Plot	Harvested	0.24	[0.17, 0.31]	125
	Planted	0.14	[0.11, 0.17]	139
Cowpeas, Short Rainy Season				
Country	Harvested	0.14		39
	Planted	0.09		46
Household	Harvested	0.24	[0.12, 0.36]	37
	Planted	0.16	[0.05, 0.28]	43
Plot	Harvested	0.25	[0.13, 0.37]	39
	Planted	0.17	[0.17, 0.06]	46

Average Plot Yields Groundnut, Long Rainy Season		Mean Yield (t/ha)	95% C.I.	Observations
Country	Harvested	0.47		340
	Planted	0.26		349
Household	Harvested	0.59	[0.12, 0.36]	308
	Planted	0.47	[0.05, 0.28]	317
Plot	Harvested	0.58	[0.13, 0.37]	340
	Planted	0.44	[0.17, 0.06]	349
Groundnut, Short Rainy Season				
Country	Harvested	0.47		56
	Planted	0.26		63
Household	Harvested	0.48	[0.49, 0.68]	52
	Planted	0.36	[0.20, 0.51]	58
Plot	Harvested	0.47	[0.35, 0.58]	56
	Planted	0.35	[0.20, 0.50]	63

Plot Yields for Male and Female Headed Households (Area Harvested)

Season	Head of Household	Average Yield (t/ha)	95% C.I.	Observations	Wald test P-value
Beans					
Long Rainy Season	Male	0.32	[0.29, 0.29]	338	0.3362
	Female	0.29	[0.22, 0.22]	104	
Short Rainy Season	Male	0.29	[0.25, 0.25]	149	0.5935
	Female	0.31	[0.23, 0.23]	56	
Cowpeas					
Long Rainy Season	Male	0.27	[0.21, 0.21]	91	0.0497
	Female	0.18	[0.05, 0.30]	24	
Short Rainy Season	Male	0.26	[0.10, 0.10]	25	0.5580
	Female	0.20	[0.07, 0.07]	12	
Groundnut					
Long Rainy Season	Male	0.62	[0.51, 0.51]	233	0.1253
	Female	0.49	[0.34, 0.34]	75	
Short Rainy Season	Male	0.49	[0.36, 0.36]	45	0.2659
	Female	0.36	[0.17, 0.17]	7	

Beans Zonal Average Yield, Long Rainy Season

Zone	Average Yield (t/ha)	95% C.I.	Observations
Lake	0.38	[0.25, 0.51]	95
Central	0.29	[0.10, 0.48]	18
Northern	0.29	[0.24, 0.35]	136
Southern Highlands	0.39	[0.28, 0.50]	219
Eastern	0.32	[0.24, 0.40]	24
Western	0.23	[0.15, 0.31]	73
Southern	0.27	[0.19, 0.34]	44

Groundnuts Zonal Average Yield, Long Rainy Season

Zone	Average Yield (t/ha)	95% C.I.	Observations
Zanzibar	0.74	[-0.04, 1.52]	11
Central	0.65	[0.45, 0.85]	85
Southern Highlands	0.61	[0.42, 0.80]	82
Western	0.58	[0.48, 0.69]	88
Eastern	0.57	[-0.13, 1.27]	5
Lake	0.43	[0.19, 0.67]	14
Southern	0.37	[0.30, 0.44]	71
Northern	0.30	[-0.03, 0.63]	7

High and Low Producing Plot Differences

Average Plot Size for Plots Yielding Below and Above the 90th Percentile, Long Rainy Season

	Yields	Mean Plot Size (ha)	95% C.I.	Observations	Wald test P-value
Beans	< 90th Percentile	1.02	[0.79, 1.24]	546	0.9763
	≥ 90th Percentile	1.02	[0.54, 1.5]		
Groundnut	< 90th Percentile	1.29	[0.99, 1.58]	339	0.5101
	≥ 90th Percentile	1.55	[1.55, 0.76]		

Loam Soil for Plots Yielding Below and Above the 90th Percentile, Long Rainy Season

	Yields	Estimated Proportion Loam Soil	95% C.I.	Observations	Wald test P-value
Beans	< 90th Percentile	73%	[67%, 79%]	363 out of 491	0.0955
	≥ 90th Percentile	82%	[71%, 92%]	44 out of 53	
Groundnut	< 90th Percentile	70%	[63%, 76%]	203 out of 304	0.2906
	≥ 90th Percentile	57%	[34%, 81%]	21 out of 35	

Input Use for Plots Yielding Below and Above the 90th Percentile, Long Rainy Season

	Yields	Estimated Proportion Using	95% C.I.	Observations	Wald test P-value
Inorganic Fertilizer					
Beans	< 90th Percentile	19%	[12%, 25%]	107 out of 491	0.9405
	≥ 90th Percentile	19%	[6%, 32%]	12 out of 53	
Groundnut	< 90th Percentile	11%	[5%, 17%]	36 out of 304	0.1374
	≥ 90th Percentile	5%	[-2%, 11%]	2 out of 35	
Organic Fertilizer					
Beans	< 90th Percentile	14%	[9%, 18%]	70 out of 491	0.4531
	≥ 90th Percentile	10%	[1%, 19%]	6 out of 53	
Groundnut	< 90th Percentile	13%	[8%,17%]	34 out of 304	0.6665
	≥ 90th Percentile	16%	[1%, 32%]	6 out of 35	
Pesticide, Herbicide, or Fungicide					
Beans	< 90th Percentile	11%	[7%, 15%]	58 out of 491	0.6023
	≥ 90th Percentile	13%	[4%, 22%]	7 out of 53	
Groundnut	< 90th Percentile	6%	[3%, 8%]	22 out of 304	0.2018
	≥ 90th Percentile	3%	[-1%, 6%]	2 out of 35	

Estimated Proportion Intercropped for Plots Yielding Below and Above the 90th Percentile, Long Rainy Season

	Yields	Estimated Proportion Intercropped	95% C.I.	Observations	Wald test P-value
Beans	< 90th Percentile	86%	[80%, 92%]	423 out of 493	0.0666
	≥ 90th Percentile	43%	[57%, 88%]	38 out of 53	
Groundnut	< 90th Percentile	78%	[73%, 84%]	243 out of 305	0.021
	≥ 90th Percentile	55%	[33%, 76%]	20 out of 35	

Distance to Market for Plots Yielding Below and Above the 90th Percentile, Long Rainy Season

	Yields	Distance to Market (km)	95% C.I.	Median (km)	Observations	Wald test P-value
Beans	< 90th Percentile	7.56	[6.37, 8.75]	5	546	0.0007
	≥ 90th Percentile	10.51	[8.48, 12.55]	11		
Groundnut	< 90th Percentile	8.87	[7.09, 10.64]	6	340	0.7722
	≥ 90th Percentile	9.33	[6.10, 12.56]	7		

Intercropping and Reasons for Intercropping

Estimated Proportion of Plots Intercropped by Crop Planted, Long Rainy Season

Crop	Estimated Proportion	95% C.I.	Observations
Legumes	81%	[77%, 85%]	976 of 1182
Cowpeas	91%	[86%, 97%]	127 of 137
Beans	85%	[80%, 91%]	496 of 582
Groundnut	75%	[66%, 81%]	270 of 355

Estimated Proportion of Plots Intercropped by Crop Planted, Short Rainy Season

Crop	Estimated proportion	95% C.I.	Observations
Legumes	91%	[88%, 94%]	317 of 361
Groundnut	98%	[95%, 100%]	70 of 77
Beans	92%	[88%, 96%]	241 of 265
Cowpeas	93%	[85%, 100%]	40 of 47

Reasons for Intercropping, Long Rainy Season

Reason	Estimated Proportion	95% C.I.	Observations (of n=976)
Substitute if either crop fails	83%	[78%, 87%]	813
More fertile for soil	9%	[7%, 12%]	101
Other	16%	[12%, 20%]	139

Estimated Proportion of Plots Intercropped with Maize, Long Rainy Season

Crop	Estimated Proportion	95% C.I.	Observations
Legumes	77%	[73%, 82%]	757 of 976
Beans	82%	[76%, 87%]	410 of 496
Cowpeas	78%	[69%, 88%]	98 of 127
Pigeon Peas	75%	[67%, 83%]	106 of 141
Groundnut	72%	[64%, 81%]	197 of 270

Estimated Proportion of Legume Plots Intercropped with Other Crops, Long Rainy Season

Crop	Estimated Proportion	95% C.I.	Observations
Other Legumes	17%	[13%, 20%]	162 of 976
Sorghum	7%	[4%, 9%]	81 of 496
Sweet Potatoes	6%	[5%, 8%]	55 of 127
Millet	4%	[2%, 7%]	32 of 141
Paddy	2%	[1%, 3%]	18 of 270

Average Plot Size for Intercropped and Non-Intercropped Plots, Long Rainy Season		Mean Plot Size (ha)	95% C.I.	Observations	Wald test P-value
Beans	Non-Intercropped	0.74	[0.49, 0.49]	86 of 582	0.0622
	Intercropped	1.09	[0.81, 0.81]		
Cowpeas	Non-Intercropped	1.39	[0.81, 0. 81]	10 of 137	0.3725
	Intercropped	1.12	[0.83, 0.83]		
Groundnuts	Non-Intercropped	0.98	[0.71, 0.71]	85 of 354	0.0136
	Intercropped	1.43	[1.09, 1.77]		

Yields for Not Intercropped and Intercropped Plots (Area Harvested), Long Rainy Season					
Mean Yield (t/ha)	95% C.I.	Median Yield (t/ha)	90th Percentile Yield (t/ha)	Wald test P-value	Observations
Beans					
Not Intercropped	0.39	[0.29, 0.49]	0.20	0.80	0.0724	84
Intercropped	0.30	[0.26, 0.34]	0.35	0.59		461
Cowpeas					
Not Intercropped	0.25	[0.12, 0.39]	0.18	0.59	0.8800	8
Intercropped	0.24	[0.17, 0.31]	0.12	0.53		117
Groundnut					
Not Intercropped	0.76	[0.56, 0.97]	0.52	1.19	0.0099	77
Intercropped	0.52	[0.46, 0.59]	0.40	1.61		263

Input Use on Legume Plots

Estimated Proportion of Plots Planted with IV Seeds, Long Rainy Season			
Crop	Estimated Proportion	95% C.I.	Observations
Cowpeas	5%	[1%, 9%]	9 of 147
Beans	2%	[1%, 3%]	11 of 609
Groundnut	2%	[1%, 4%]	11 of 363

Estimated Proportion of Plots Planted with Organic Fertilizer, Long Rainy Season			
Crop	Estimated Proportion	95% C.I.	Observations
Legumes	13%	[10%, 16%	158 of 1225
Cowpeas	18%	[10%, 26%]	23 of 147
Beans	14%	[10%, 18%]	88 of 607
Groundnut	13%	[8%, 17%]	41 of 362

Estimated Proportion of Plots Planted with Inorganic Fertilizer, Long Rainy Season			
Crop	Estimated Proportion	95% C.I.	Observations
Legumes	12%	[9%, 16%]	167 of 1225
Beans	18%	[12%, 24%]	126 of 607
Cowpeas	10%	[3%, 17%]	16 of 147
Groundnut	10%	[5%, 15%]	38 of 362

Inorganic Fertilizer Use on Intercropped and Non-Intercropped Plots, Long Rainy Season				
		Estimated Proportion	95% C.I.	Observations
Beans	Non-Intercropped	6%	[0%, 13%]	7 of 84
	Intercropped	21%	[14%, 27%]	118 of 496
Groundnut	Non-Intercropped	9%	[1%, 18%]	8 of 85
	Intercropped	10%	[5%, 15%]	30 of 269

Frequency of Pre-Harvest Losses

Estimated Proportion of Plots with Pre-Harvest Losses by Crop Planted, Long Rainy Season

Crop	Estimated Proportion	95% C.I.	Observations
Cowpeas	39%	[30%, 48%]	50 out of 129
Beans	35%	[29%, 40%]	188 out of 557
Groundnut	32%	[26%, 38%]	115 out of 346

Estimated Proportion of Plots with Pre-Harvest Losses by Crop Planted, Short Rainy Season

Crop	Estimated Proportion	95% C.I.	Observations
Cowpeas	52%	[33%, 71%]	22 out of 41
Beans	42%	[33%, 52%]	106 out of 250
Groundnut	37%	[23%, 51%]	25 out of 57

Causes of Pre-Harvest Losses, Beans, Long Rainy Season

Causes	Estimated Proportion	95% C.I.	Observations (of n=188)
Insects	48%	[36%, 59%]	92
Animals	16%	[11%, 22%]	31
Diseases	15%	[7%, 23%]	26
Other	11%	[5%, 16%]	20
Theft	7%	[3%, 10%]	13
Birds	4%	[0%, 7%]	6

Causes of Pre-Harvest Losses, Cowpeas, Long Rainy Season

Causes	Estimated Proportion	95% C.I.	Observations (of n=50)
Insects	59%	[43%, 75%]	29
Animals	27%	[12%, 42%]	12
Birds	9%	[-4%, 22%]	3
Theft	3%	[-1%, 8%]	3
Other	1%	[0%, 2%]	2
Diseases	0%	[0%, 1%]	1

Causes of Pre-Harvest Losses, Groundnut, Long Rainy Season

Causes	Estimated Proportion	95% C.I.	Observations (of n=115)
Insects	48%	[35%, 61%]	51
Animals	37%	[26%, 49%]	43
Birds	7%	[2%, 11%]	10
Theft	4%	[-1%, 9%]	5
Other	3%	[-1%, 8%]	5
Diseases	1%	[-1%, 3%]	1

Estimated Proportion of Plots with Area Harvested less than Area Planted, Long Rainy Season

Crop	Estimated Proportion	95% C.I.	Observations
Beans	33%	[28%, 37%]	176 out of 557
Cowpeas	38%	[30%, 47%]	43 out of 129
Groundnut	26%	[19%, 32%]	86 out of 346

Estimated Proportion of Plots with Area Harvested less than Area Planted, Short Rainy Season

Crop	Estimated Proportion	95% C.I.	Observations
Beans	51%	[41%, 60%]	126 out of 250
Cowpeas	46%	[26%, 67%]	19 out of 41
Groundnut	49%	[30%, 68%]	31 out of 57

Reasons for Harvesting a Smaller Area of Plot than the Area Planted, Beans, Long Rainy Season

Causes	Estimated Proportion	95% C.I.	Observations (of n=176)
Drought	32%	[24%, 39%]	56
Insects	25%	[17%, 32%]	44
Other	21%	[13%, 28%]	37
Rain	15%	[8%, 21%]	24
Diseases and Community Problems	4%	[1%, 8%]	7
Animals	3%	[0%, 5%]	5
Crop Theft	1%	[-1%, 2%]	1
Lack of Casual Labor	1%	[-1%, 3%]	2
Fire	0%	-	0

Reasons for Harvesting a Smaller Area of Plot than the Area Planted, Cowpeas, Long Rainy Season

Causes	Estimated Proportion	95% C.I.	Observations (of n= 43)
Drought	40%	[23%, 57%]	17
Insects	28%	[12%, 43%]	10
Other	13%	[-1%, 27%]	6
Rain	7%	[-1%, 16%]	3
Animals	7%	[-2%, 16%]	4
Lack of Casual Labor	3%	[-2%, 8%]	2
Fire	1%	[-1%, 3%]	1
Crop Theft	0%	-	0
Diseases and Community Problems	0%	-	0

Reasons for Harvesting a Smaller Area of Plot than the Area Planted, Groundnut, Long Rainy Season			
Causes	Estimated Proportion	95% C.I.	Observations (of n=87)
Drought	42%	[26%, 58%]	35
Insects	26%	[13%, 38%]	20
Other	12%	[4%, 21%]	13
Rain	10%	[3%, 17%]	10
Animals	6%	[0%, 11%]	6
Diseases and Community Problems	2%	[-1%, 5%]	2
Lack of Casual Labor	2%	[-2%, 5%]	1
Fire	0%	-	0
Crop Theft	0%	-	0

Plots Not Fully Planted due to Constraints

Estimated Proportion of Plots not Fully Planted due to Constraints, Long Rainy Season			
Crop	Estimated Proportion	95% C.I.	Observations
Beans	26.4%	[20.8%, 32%]	136 out of 517
Groundnut	22.2%	[17.1%, 27.2%]	72 out of 318
Cowpeas	21.5%	[12.1%, 30.9%]	21 out of 115
Millet	21.3%	[11.7%, 30.9%]	22 out of 101
Yams	18.9%	[-2.9%, 40.6%]	4 out of 22
Sweet Potatoes	18.4%	[12.8%, 24.1%]	36 out of 189
Sorghum	16.7%	[10.9%, 22.6%]	37 out of 261
Paddy	13.5%	[8.8%, 18.1%]	47 out of 496
Maize	12.3%	[10.2%, 14.4%]	215 out of 1770
Cassava	8.4%	[3.6%, 13.2%]	13 out of 206

Estimated Proportion of Plots not Fully Planted due to Constraints, Short Rainy Season			
Crop	Estimated Proportion	95% C.I.	Observations
Millet	51.2%	[0.7%, 101.8%]	2 out of 4
Groundnut	30.2%	[13.1%, 47.3%]	14 out of 50
Beans	23.8%	[16.1%, 31.5%]	52 out of 227
Sorghum	20.5%	[6%, 35.1%]	3 out of 15
Sweet Potatoes	15.8%	[6.9%, 24.6%]	11 out of 73
Paddy	14.5%	[1.1%, 27.9%]	7 out of 47
Cowpeas	14.1%	[2.3%, 26%]	5 out of 31
Maize	11.4%	[7.7%, 15.1%]	39 out of 368
Cassava	1.7%	[-1.7%, 5.2%]	1 out of 44
Yams	0.0%	-	0 out of 3

Constraints Impeding Planting of Entire Plot of Plots that were not Fully Planted, Beans, Long Rainy Season			
Causes	Estimated Proportion	95% C.I.	Observations (of n=136)
Lack of Tools/Equipment	39.1%	[28%, 50.1%]	50
Lack of Seeds	34.4%	[25.1%, 43.6%]	50
Lack of Agricultural Equipment	23.6%	[12.7%, 34.5%]	32
Drought	3.0%	[-0.6%, 6.6%]	4
Floods	0.0%	-	0
Lack of Loans	0.0%	-	0

Constraints Impeding Planting of Entire Plot of Plots that were not Fully Planted, Cowpeas, Long Rainy Season			
Causes	Estimated Proportion	95% C.I.	Observations (of n=21)
Lack of Tools/Equipment	46.4%	[25.3%, 67.6%]	9
Lack of Agricultural Equipment	20.0%	[1.1%, 38.8%]	5
Lack of Seeds	19.7%	[1.2%, 38.2%]	4
Drought	7.1%	[-3.5%, 17.7%]	2
Floods	6.8%	[-6.3%, 19.9%]	1
Lack of Loans	0.0%	-	0
Constraints Impeding Planting of Entire Plot of Plots that were not Fully Planted, Groundnut, Long Rainy Season			
Causes	Estimated Proportion	95% C.I.	Observations (of n=72)
Lack of Seeds	47.4%	[34.6%, 60.3%]	34
Lack of Tools/Equipment	28.6%	[17.3%, 40%]	22
Lack of Agricultural Equipment	18.7%	[7.2%, 30.2%]	12
Drought	2.6%	[-1.3%, 6.4%]	2
Floods	1.8%	[-1.8%, 5.4%]	1
Lack of Loans	0.8%	[-0.8%, 2.5%]	1

Frequency of Post-Harvest Losses

Estimated Proportion of Plots with Post-Harvest Losses by Crop Planted, Long Rainy Season

Crop	Estimated Proportion	95% C.I.	Observations
Paddy	15%	[10%, 20%]	65 out of 442
Maize	14%	[12%, 17%]	171 out of 1336
Cowpeas	11%	[4%, 17%]	9 out of 121
Cassava	11%	[4%, 17%]	19 out of 186
Groundnut	9%	[5%, 13%]	25 out of 315
Beans	5%	[3%, 8%]	23 out of 457

Estimated Proportion of Plots with Post-Harvest Losses by Crop Planted, Short Rainy Season

Crop	Estimated Proportion	95% C.I.	Observations
Paddy	22%	[9%, 35%]	10 out of 53
Maize	13%	[8%, 18%]	38 out of 313
Beans	8%	[3%, 13%]	15 out of 191
Groundnut	7%	[-1%, 15%]	3 out of 53
Cassava	3%	[-3%, 8%]	2 out of 57
Cowpeas	1%	[-1%, 2%]	1 out of 42

Household Legume Sales

Estimated Proportion of Households Selling Legumes, Long and Short Rainy Seasons

	Season	Estimated Proportion	95% C.I.	Observations
Beans	Long Rainy Season	34%	[28%, 41%]	161 out of 457
	Short Rainy Season	22%	[14%, 30%]	45 out of 200
Cowpeas	Long Rainy Season	26%	[16%, 37%]	30 out of 121
	Short Rainy Season	27%	[10%, 44%]	9 out of 42
Groundnuts	Long Rainy Season	46%	[37%, 54%]	148 out of 315
	Short Rainy Season	26%	[9%, 43%]	14 out of 53

Estimated Proportion of Households Selling Legumes Produced by Gender of Household Head

Season	Head of Household	Estimated Proportion	95% C.I.	Observations	Wald test P-value
Beans					
Long Rainy Season	Male	36%	[29%, 43%]	132 out of 350	0.1703
	Female	29%	[19%, 39%]	29 out of 107	
Short Rainy Season	Male	24%	[16%, 32%]	35 out of 139	0.2788
	Female	18%	[6%, 30%]	9 out of 52	
Cowpeas					
Long Rainy Season	Male	31%	[18%, 43%]	26 out of 94	0.0122
	Female	10%	[0%, 21%]	4 out of 27	
Short Rainy Season	Male	31%	[11%, 50%]	7 out of 29	0.4277
	Female	20%	[-5%, 44%]	2 out of 13	
Groundnut					
Long Rainy Season	Male	48%	[39%, 57%]	116 out of 236	0.2538
	Female	39%	[26%, 53%]	32 out of 79	
Short Rainy Season	Male	25%	[7%, 43%]	12 out of 45	0.7868
	Female	30%	[-5%, 65%]	2 out of 8	

Legume Sales by Zone, Long and Short Rainy Seasons

	Estimated Proportion	95% C.I.	Observations
Beans			
Eastern	46%	[8%, 83%]	9 out of 18
Lake	41%	[23%, 59%]	29 out of 70
Southern	39%	[21%, 57%]	14 out of 34
Southern Highlands	37%	[26%, 49%]	65 out of 168
Central	32%	[9%, 54%]	5 out of 16
Northern	32%	[18%, 46%]	29 out of 91
Western	16%	[6%, 26%]	10 out of 60
Zanzibar	0%	-	0 out of 0

Legume Sales by Zone, Long and Short Rainy Seasons			
	Estimated Proportion	95% C.I.	Observations
Cowpeas			
Southern Highlands	60%	[38%, 82%]	7 out of 12
Eastern	29%	[-2%, 60%]	5 out of 24
Southern	28%	[12%, 44%]	9 out of 31
Central	21%	[-5%, 48%]	3 out of 15
Western	20%	[-5%, 46%]	2 out of 10
Northern	19%	[-5%, 43%]	3 out of 15
Lake	11%	[0%, 22%]	1 out of 9
Zanzibar	0%	-	0 out of 5
Groundnut			
Zanzibar	82%	[63%, 101%]	9 out of 11
Eastern	60%	[-1%, 122%]	3 out of 5
Southern Highlands	50%	[33%, 68%]	37 out of 73
Western	48%	[32%, 64%]	37 out of 73
Central	45%	[27%, 62%]	31 out of 69
Southern	42%	[30%, 54%]	27 out of 62
Lake	24%	[0%, 48%]	3 out of 11
Northern	21%	[-21%, 63%]	1 out of 5

Average Price per Kilogram of Sales of Priority Crops				
		Mean ($USD/Kg)	95% C.I.	Observations	Median
Beans	Long Rainy Season	$0.50	[$0.46, $0.55]	161	$0.42
	Short Rainy Season	$0.44	[$0.33, $0.56]	44	$0.42
Cowpeas	Long Rainy Season	$0.35	[$0.28, $0.42]	30	$0.25
	Short Rainy Season	$0.08	[$-0.02, $0.19]	9	$0.01
Groundnuts	Long Rainy Season	$0.36	[$0.31, $0.41]	148	$0.25
	Short Rainy Season	$0.31	[$0.14, $0.48]	14	$0.25

Average Value of Sales of Priority Crops by Household				
		Mean ($US)	95% C.I.	Observations	Median
Beans	Long Rainy Season	$57.71	[$41.89, $73.53]	161	$25.03
	Short Rainy Season	$42.55	[$19.53, $65.57]	44	$16.68
Cowpeas	Long Rainy Season	$22.95	[$8.57, $37.33]	30	$10.51
	Short Rainy Season	$32.19	[$9.5, $54.89]	9	$20.02
Groundnuts	Long Rainy Season	$55.32	[$42.47, $68.18]	148	$33.37
	Short Rainy Season	$45.59	[$11.17, $80]	14	$25.03

Plot Land and Labor Productivity

Long Rainy Season Land Productivity by Primary Crop Planted on Plot

	Mean (USD/ha)	95% C.I.	Observations
Groundnut	$150.31	[$109.81, $190.81]	110
Cowpeas	$126.44	[$60.69, $192.22]	15
Beans	$126.02	[$94.86, $157.16]	148

Short Rainy Season Land Productivity by Primary Crop Planted on Plot

	Mean (USD/ha)	95% C.I.	Observations
Beans	$119.62	[$88.04, $151.20]	86
Groundnut	$97.11	[$55.99, $138.23]	21
Cowpeas	$33.98	[$9.02, $58.93]	16

Long Rainy Season Labor Productivity by Primary Crop Planted on Plot

	Mean (USD/Work Day)	95% C.I.	Observations
Cowpeas	$2.18	[$0.35, $4]	15
Groundnut	$1.34	[$1.01, $1.66]	110
Beans	$1.33	[$1.01, $1.65]	147

Short Rainy Season Labor Productivity by Primary Crop Planted on Plot

	Mean (USD/Work Day)	95% C.I.	Observations
Beans	$1.08	[$0.76, $1.4]	85
Groundnut	$0.88	[$0.49, $1.27]	21
Cowpeas	$0.83	[$0.47, $1.18]	14

Land Productivity and Intercropping, Long Rainy Season

		Mean Land Productivity (USD/ha)	95% C.I.	Observations	Wald test P-value
Beans	Not Intercropped	$152.41	[$90.09, $214.73]	68	0.2997
	Intercropped	$114.01	[$81.62, $146.41]	73	
Cowpeas	Not Intercropped	$72.87	[$29.75, $115.99	4	0.1012
	Intercropped	$152.86	[$67.31, $238.43]	10	
Groundnut	Not Intercropped	$167.19	[$118.12, $216.29]	51	0.5120
	Intercropped	$141.94	[$79.91, $203.99]	57	

Labor Productivity and Intercropping, Long Rainy Season		Mean Labor Productivity (USD/day)	95% C.I.	No. of Observations	Wald test P-value
Beans	Not Intercropped	$1.19	[$0.78, $1.6]	68	0.2373
	Intercropped	$1.57	[$1.08, $2.06]	73	
Cowpeas	Not Intercropped	$1.40	[$0.37, $2.44]	4	0.4112
	Intercropped	$2.56	[$-0.01, $5.14]	10	
Groundnut	Not Intercropped	$1.43	[$0.97, $1.9]	51	0.7225
	Intercropped	$1.31	[$0.84, $1.78]	57	