Building Agriculture- Nutrition Linkages: Evidence Base

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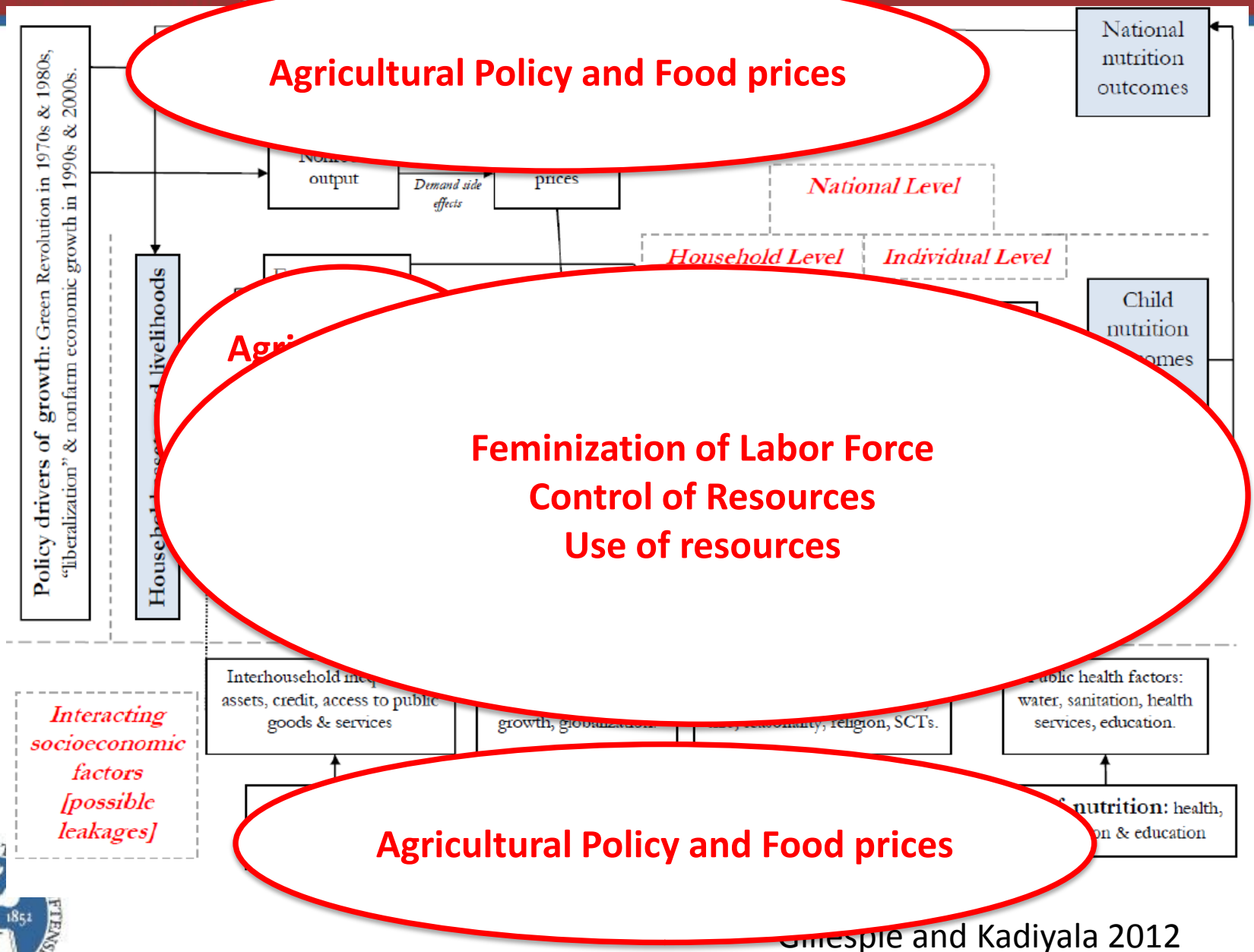
"Nutrition can serve as a bridge between agriculture, food security and health to strengthen a coordinated approach across sectors."

"The main challenge…lies in urging decision makers *to use evidence based analysis to target resources in a more disciplined way*."

Source: USAID Country X
Feed the Future Implementation Strategy (FY 2010)

Presentation Overview

- Conceptual Pathway for linking agriculture to nutrition
- Evidence of Association
- Evidence of Causality

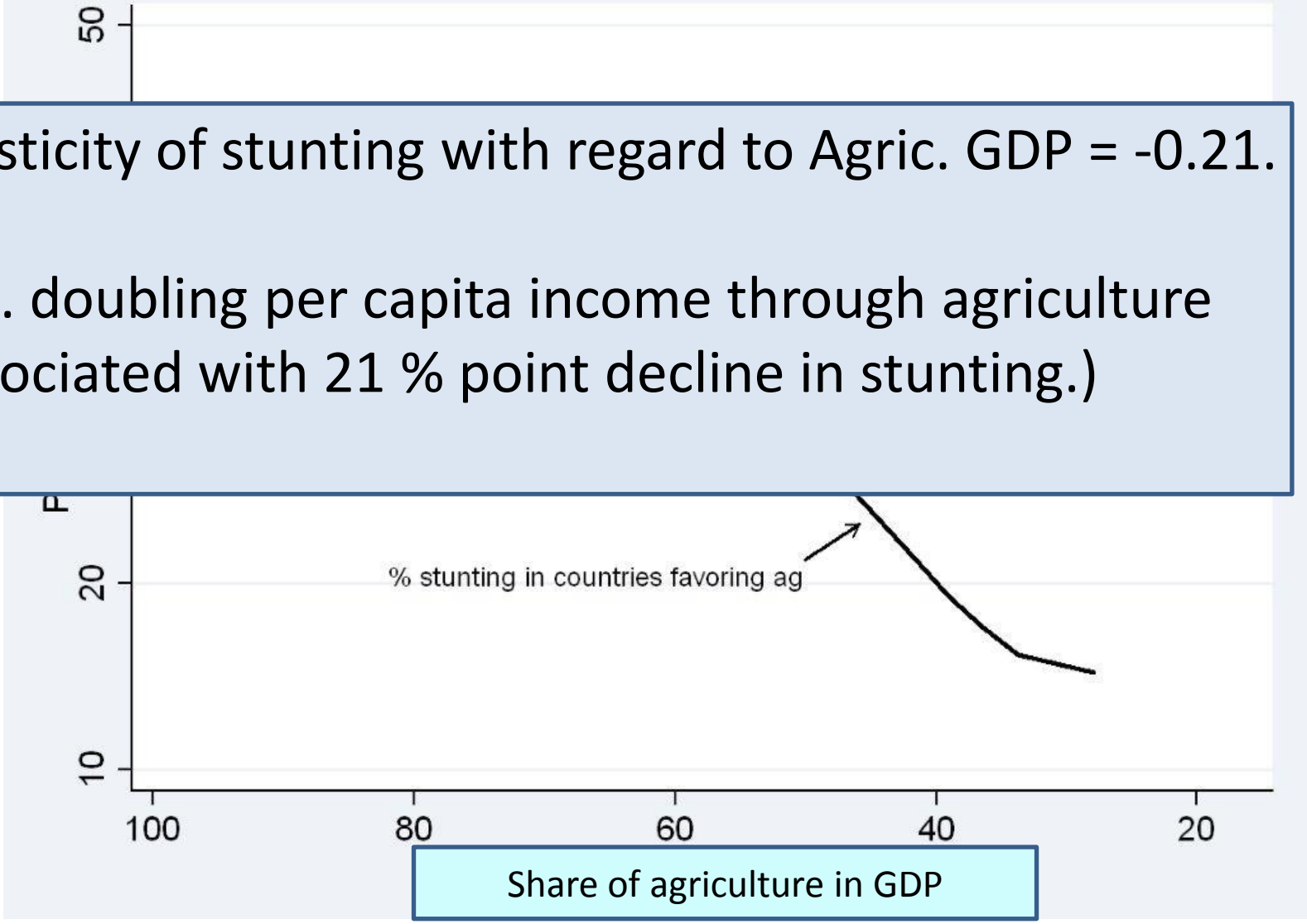


Gillespie and Kadiyala 2012

EVIDENCE OF ASSOCIATION

Elasticity of stunting with regard to Agric. GDP = -0.21.

(i.e. doubling per capita income through agriculture associated with 21 % point decline in stunting.)



Source: Webb and Block (2012)

Table B-1. Statistical relationship between malnutrition and income		
VARIABLES	**Stunting incidence**	**Underweight incidence**
Log per capita GDP	-14.77***	-11.36***
	(-4.74)	(-5.20)
Initial inequality (GINI)	0.09**	0.11**
	(2.32)	(2.17)
Initial inequality x Log per capita GNP	0.13***	0.10**
	(3.09)	(2.09)
Female literacy rate	-0.02**	-0.00
	(-2.03)	(-0.34)
Public expenditure on health (% of GDP)	-0.39*	-0.40***
	(-1.93)	(-2.90)
Country fixed effect	Yes	Yes
Number of countries	78	78
Observations	255	255

Note: All the data used are from WDI. Robust t-statistics in parentheses. Significance level of *** is 1%; ** is 5%; and * is 10%.

World Bank 2013
Cross country fixed effects regression
255 country- year pairs (1981-2007, 78 countries

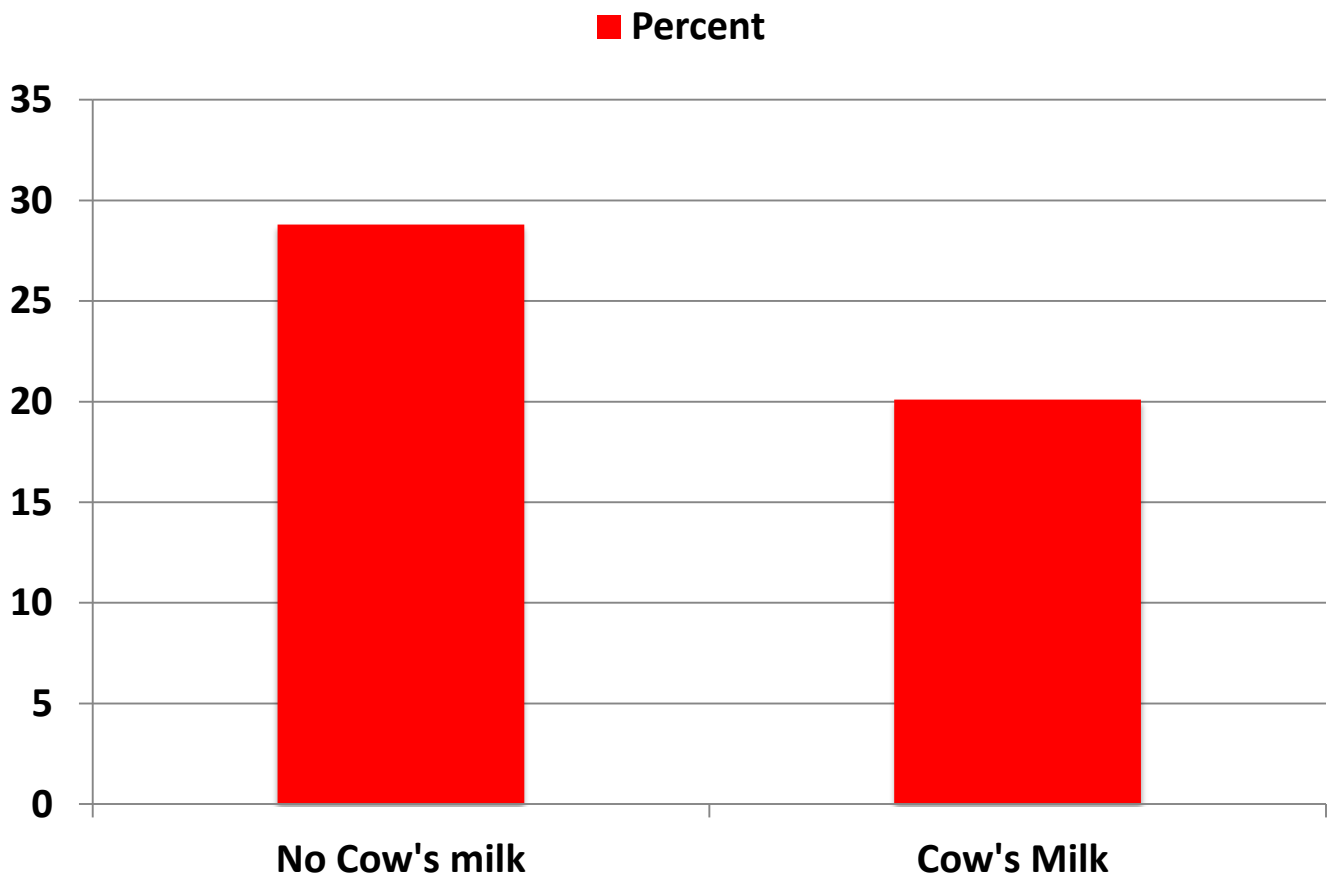
Uganda Panel Study: Baseline 2012

Bernard Bashaasha, Makerere
Joyce Kikafunda, Makerere
Nassul Kabunga, IFPRI- Uganda
Edgar Agaba, Makerere,
Nilupa Gunaratna, Harvard School of Public Health
Chris Duggan, Harvard School of Public Health
Wafaie Fawzi, Harvard School of Public Health
Jeff Griffiths, Tufts
Shibani Ghosh, Tufts

Panel Study Design

- 3 UCCP Phase I districts, 3 UCCP Phase II districts
- 3600 households, interviewed annually.

Prevalence of Stunting * Cow's milk



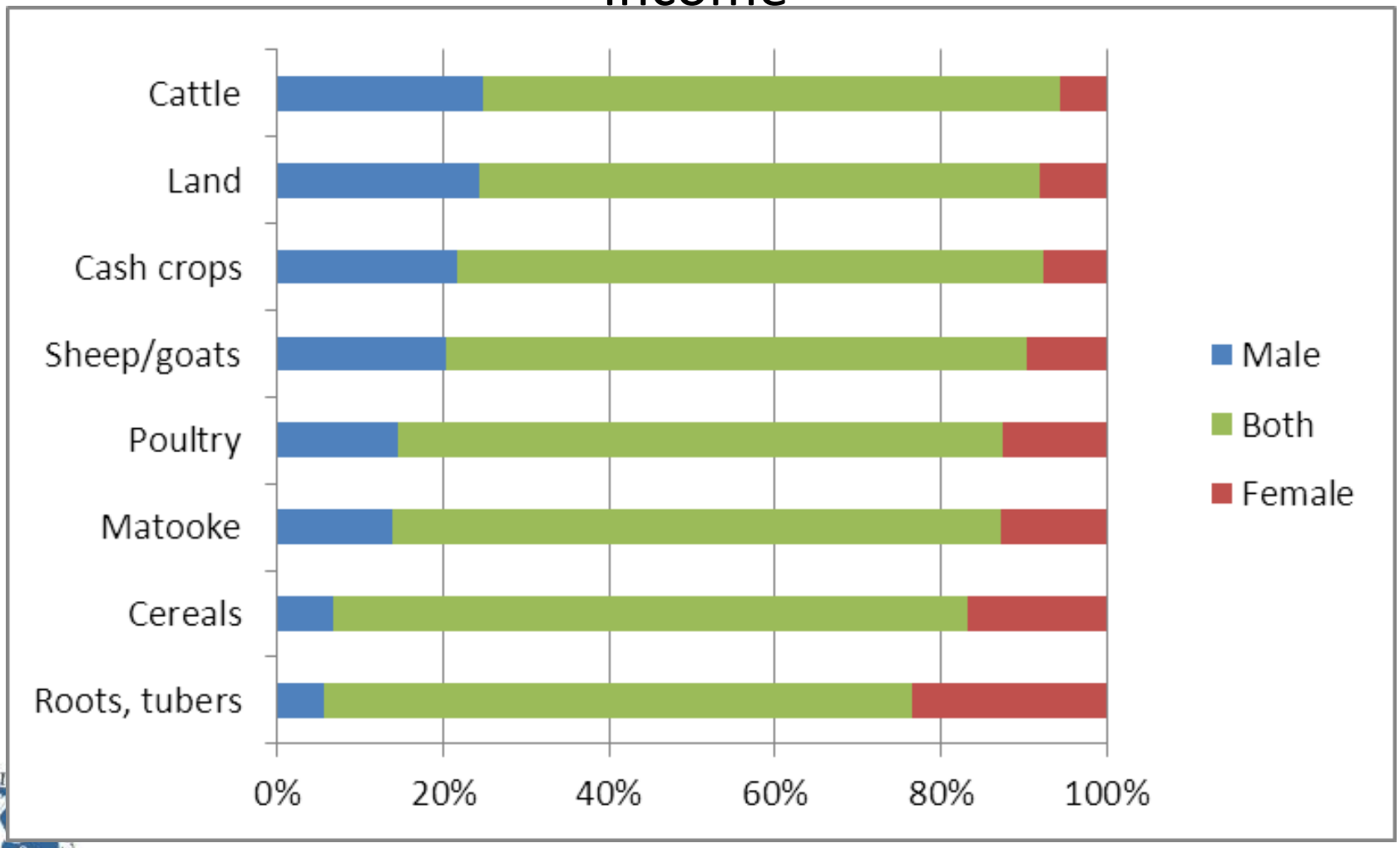
- Chi Square Test: p=0.018
- Children who consumed cow's milk were 38% less likely to be stunted

Maternal Underweight and Diet in Female-headed Households

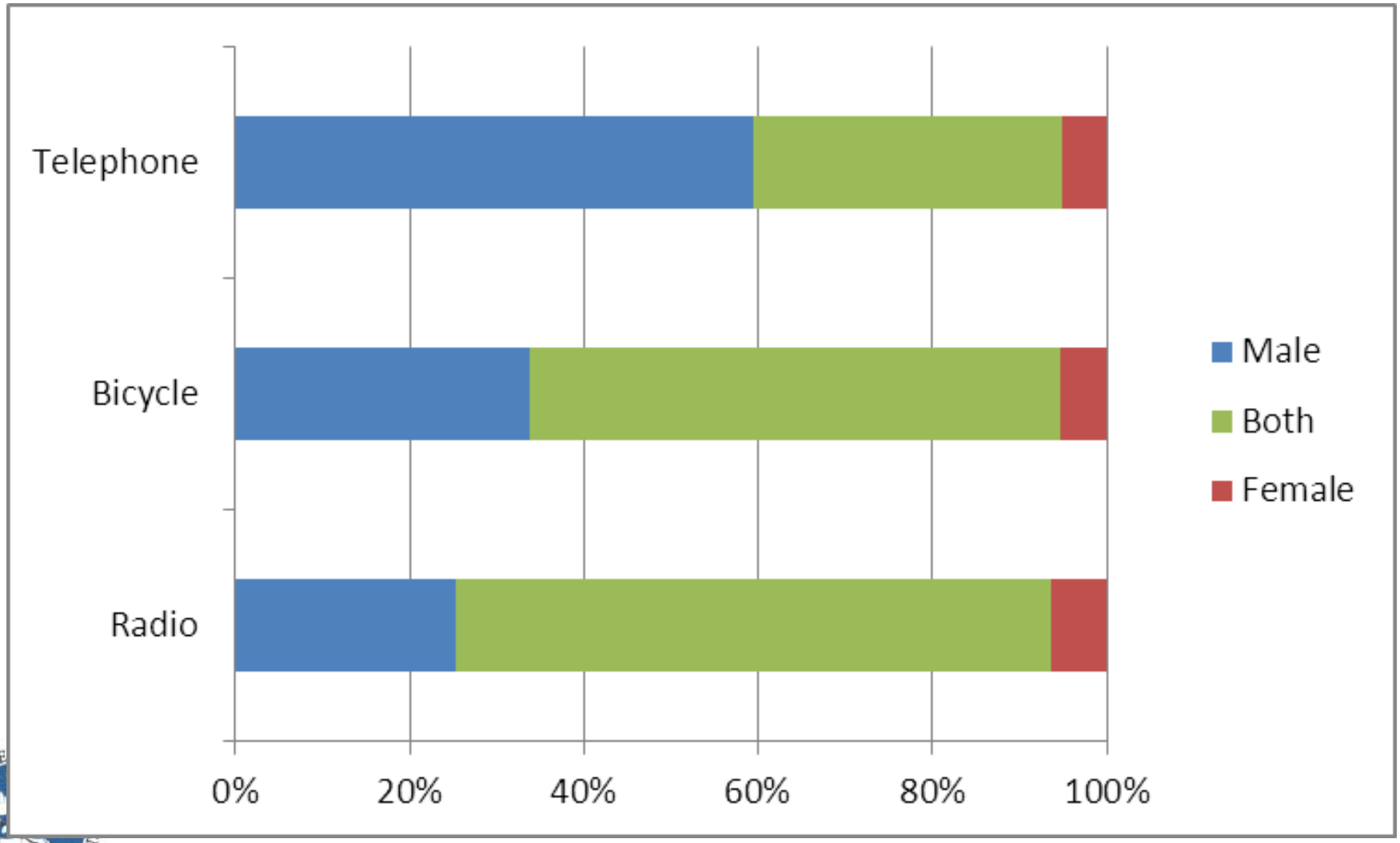
- Women in female-headed households:
  - Are 64% more likely to be underweight
  - Had a less diverse diet
  - Were marginally less likely to report consuming animal source foods

Sex of household head	Maternal underweight	Number of food groups	Consumption of animal source foods
Male	10%	4.5	21%
Female	16%	4.2	16%

Gender and Decision-making on the Use of Agricultural Income



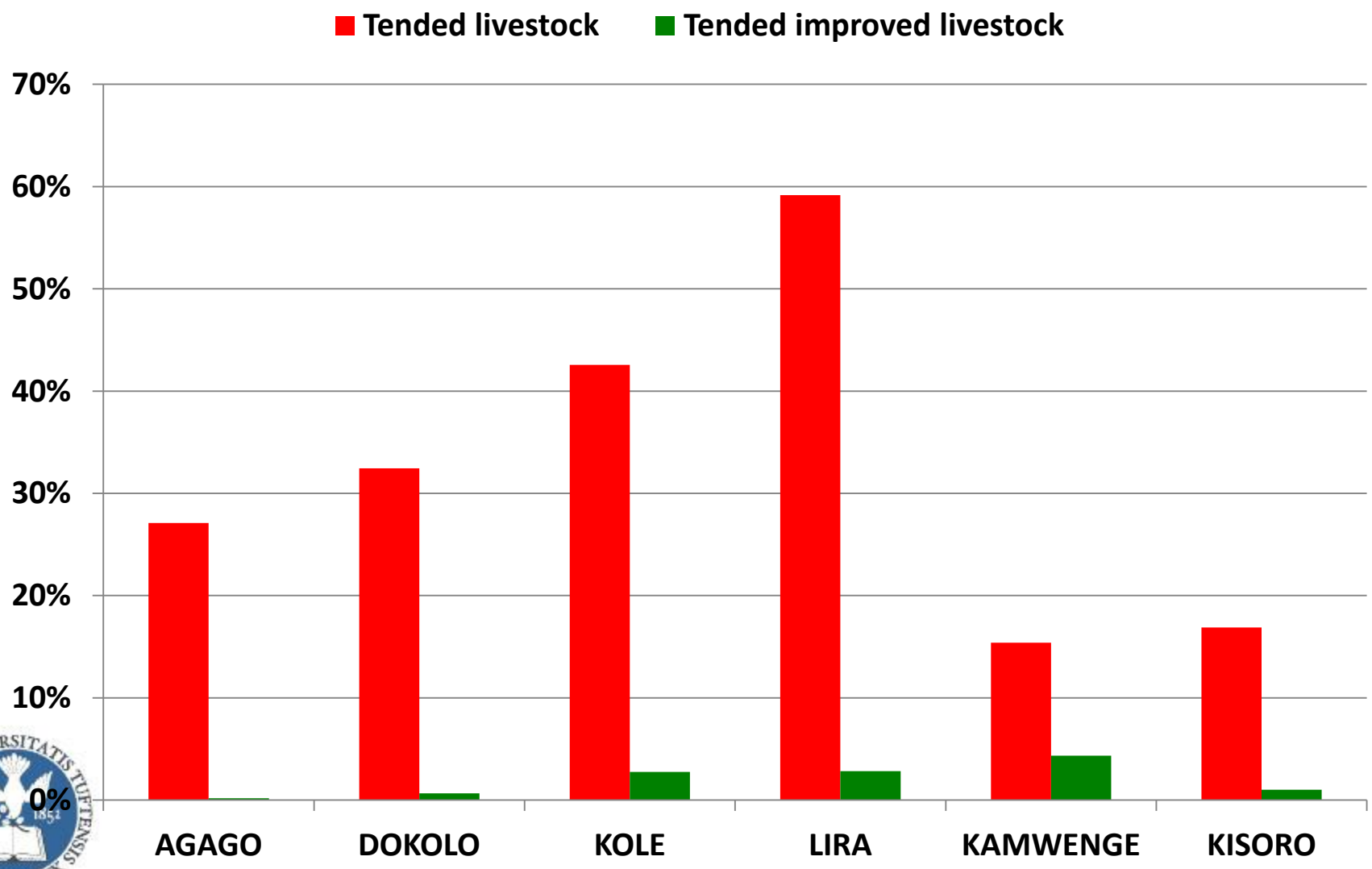
Gender and Control of Durable Goods



Agricultural Inputs and Practices

District	Improved seed	Agrochemicals	Improved drying	Improved storage	Improved marketing
Agago	19%	3%	11%	18%	13%
Dokolo	39%	3%	12%	13%	26%
Kole	68%	13%	13%	12%	29%
Lira	34%	37%	33%	16%	43%
Kamwenge	6%	25%	16%	1%	5%
Kisoro	9%	34%	35%	2%	2%
All	29%	19%	20%	10%	20%

Livestock

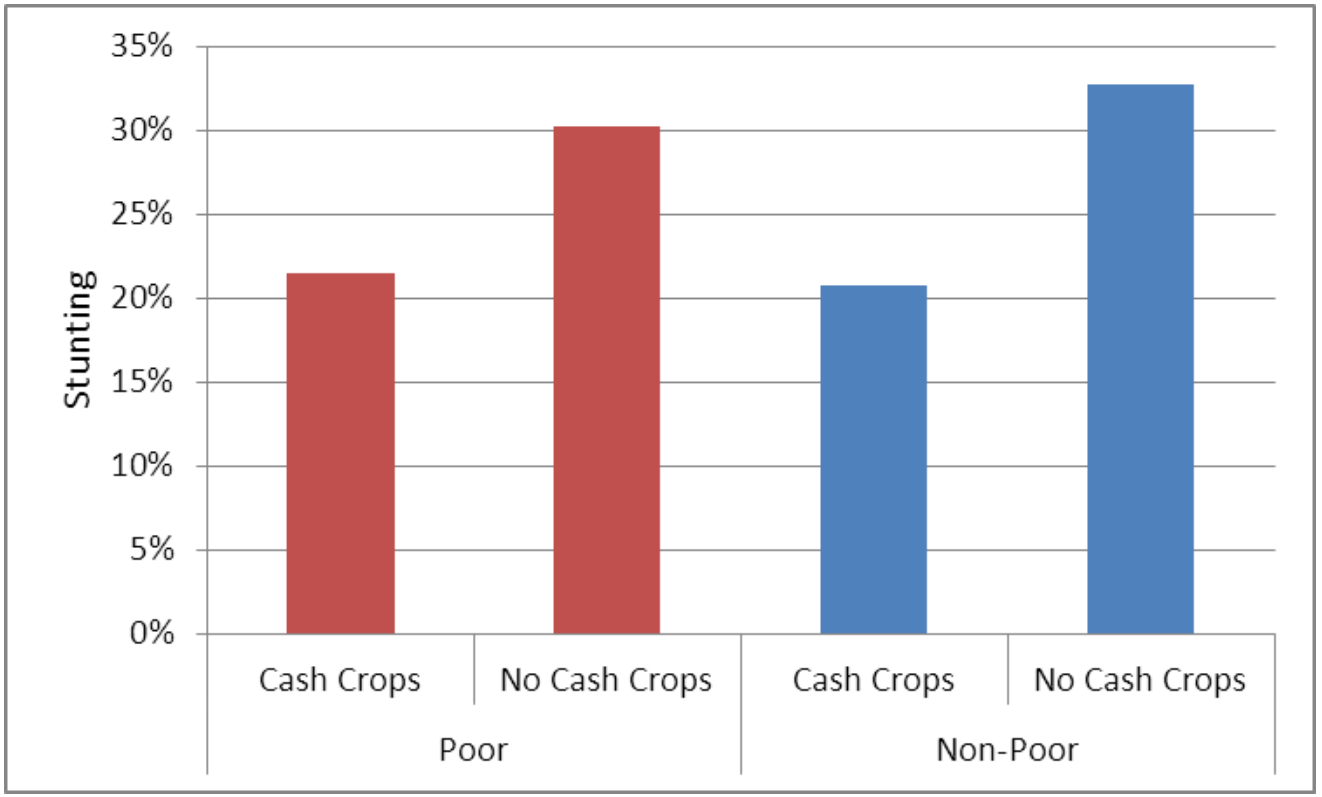

Tended livestock
Tended improved livestock
70%
60%
50%
40%
30%
20%
10%
0%
AGAGO
DOKOLO
KOLE
LIRA
KAMWENGE
KISORO

Crop Production

- Crop diversity was not associated with child stunting
- Households that produced cash crops were 30% less likely to have child stunting
  - coffee, cotton, sugar cane, sunflower, sesame, tobacco
- Was this because households with cash crops may be less poor, and better-off households have less stunting?

Cash Crops

- The relationship between cash crop production and child stunting held regardless of poverty status



1. Effect of F&V production on HAZ for children <5 years, by age

Effect of production; 1= if household is grows only fruits…

	Producers		Non-Producers			
	N	Mean	N	Mean	Difference	t-Value
all	936	-0.72	4018	-1.04	0.31*	1.84
>=6 months	845	-0.83	3674	-1.22	0.37**	2.31
>=12 months	758	-0.89	3285	-1.36	0.47***	2.94
>=24 months	553	-0.72	2448	-1.38	0.66***	3.57
>=36 months	392	-0.68	1664	-1.37	0.69***	3.15

- The differences are significant across all age groups, indicating that children living in producer households are on average taller
- The effect of fruit production on children's height increases with age

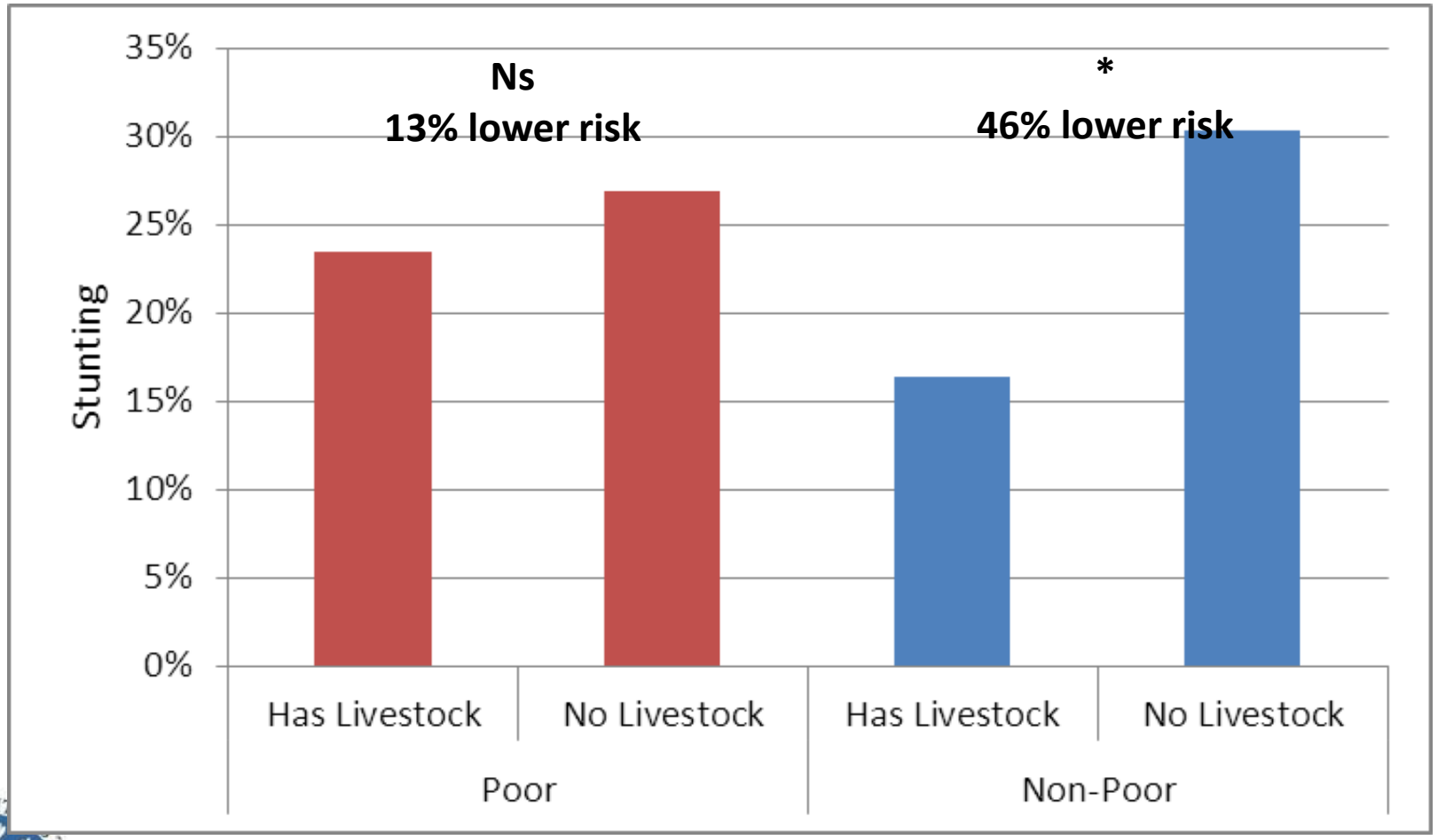
1. Effect of F&V production on HAZ for children <5 years, by age

Effect of production; 1= if household is grows only vegetables…

	Producers		Non-Producers			
	N	Mean	N	Mean	Difference	t-Value
all	1075	-1.02	3879	-0.96	0.05	0.33
>=6 months	986	-1.14	3533	-1.15	0.01	0.04
>=12 months	873	-1.23	3170	-1.28	0.06	0.37
>=24 months	652	-1.15	2349	-1.29	0.14	0.82
>=36 months	468	-1.06	1588	-1.29	0.23	1.09

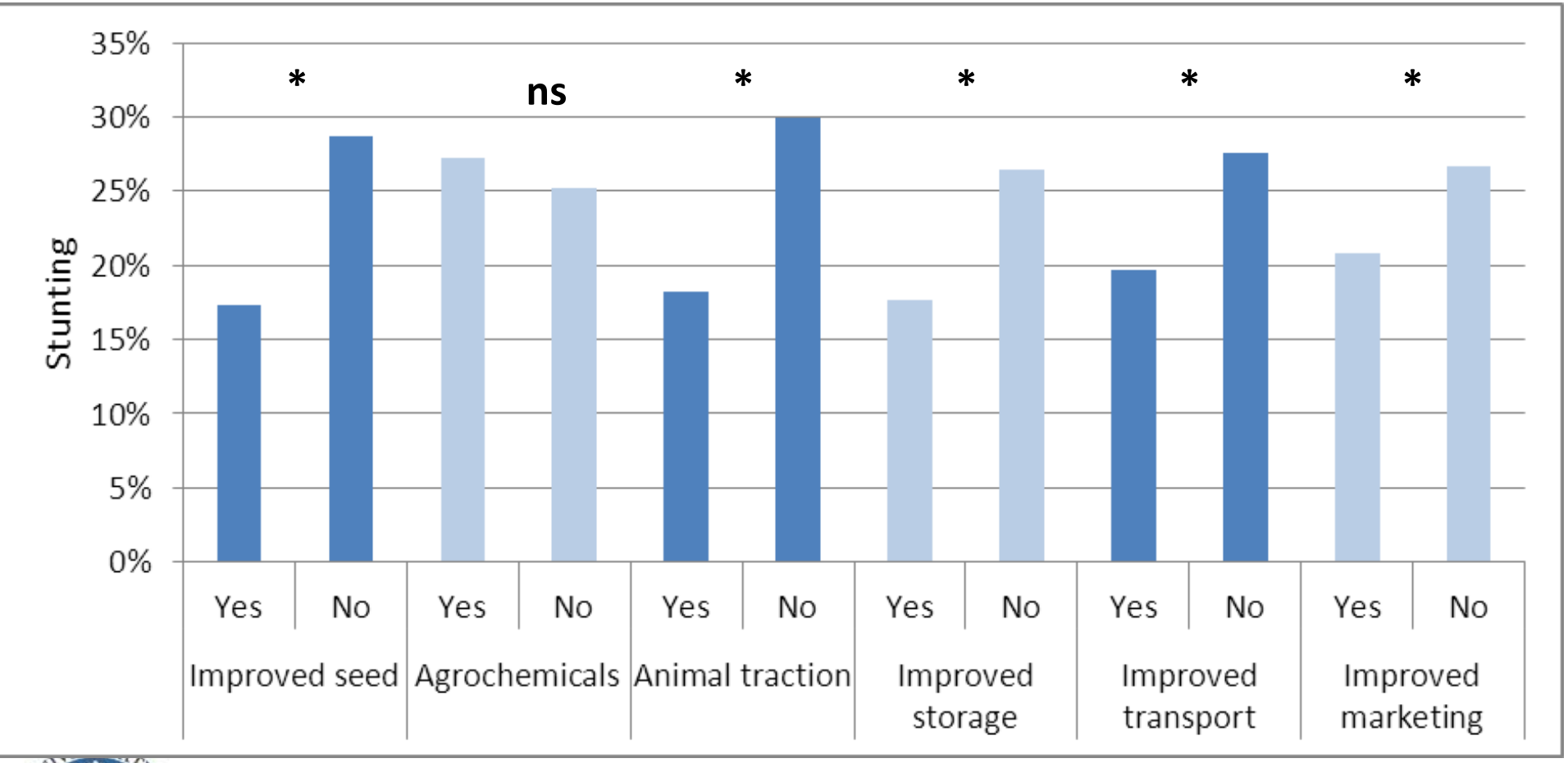
- We do not see differences on HAZ scores across veg and non-veg growing households!

Livestock Production



* p<0.001

Technologies and Practices



* p<0.05

EVIDENCE OF CAUSALITY

Systematic review of agricultural interventions that aim to improve children's nutritional status by improving the incomes and diet of the rural poor.

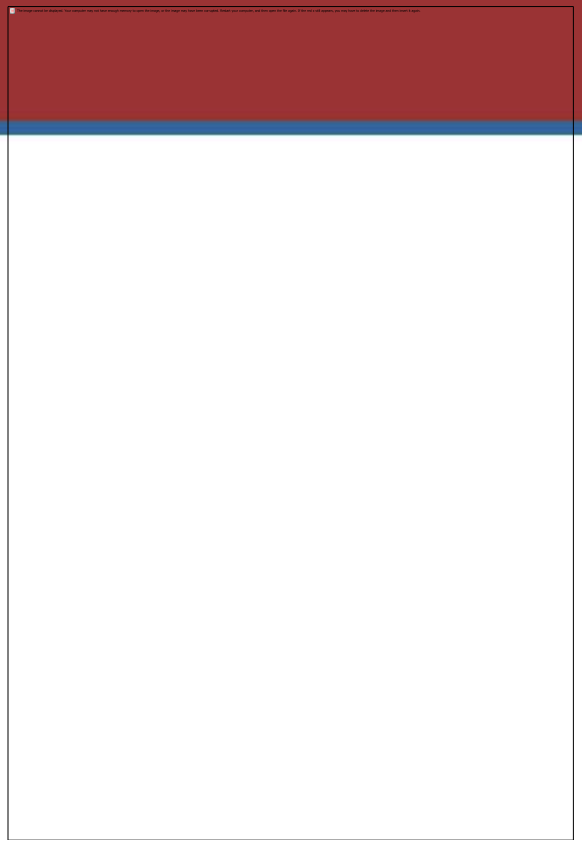
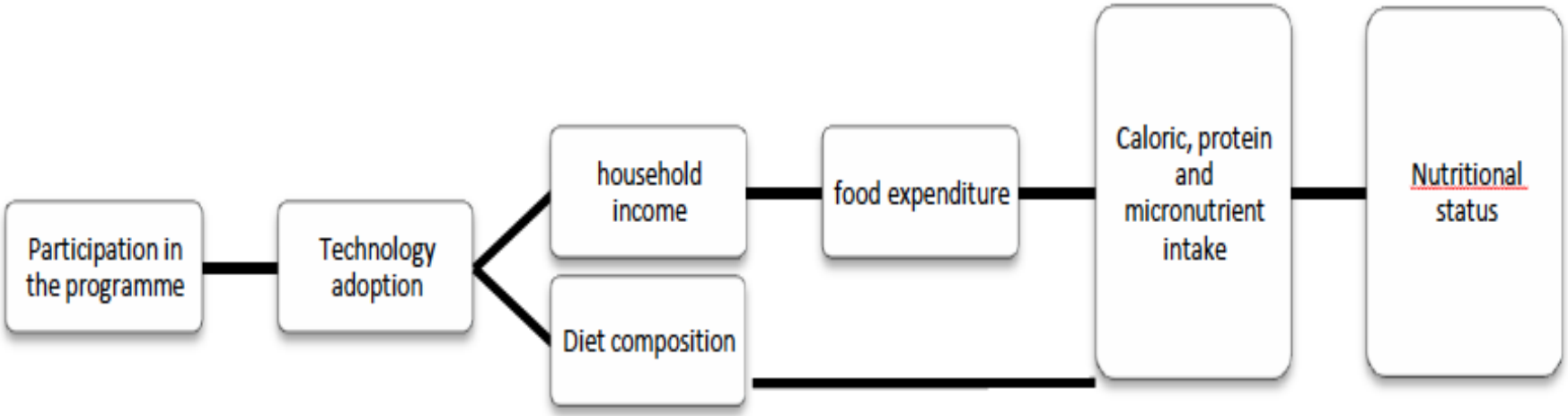


Table 1.2 Types of agricultural interventions included and excluded by the review

Included	Excluded
Bio-fortification	Irrigation
Home gardening	Watershed development
Aquaculture	Credit and microfinance
Small scale fisheries	Land reforms
Poultry development	Marketing
Animal husbandry	Agricultural extension
Dairy development	Food processing and storage

Figure 1.1 Pathways of impact of agricultural interventions on nutrition



Masset et. al. (2011)

Agricultural interventions show...

a) Positive impact on farm output.
b) "Poor evidence of impact on households' income."
c) "Little evidence…on changes in diets of the poor."

d) None assessed if interventions improve quality of whole diet.
e) 9 studies tested impact on Vitamin A (only 4 were positive).
f) "No evidence of impact on stunting, wasting."

Table 3.6 Ex-post power calculations assessing the ability of the studies to detect impact on nutritional status

Study	Sample size	Samples ratio (control/ project)	Change in stunting prevalence			Change in underweight prevalence		
			Small (2%)	Medium (10%)	Large (30%)	Small (2%)	Medium (10%)	Large (30%)
Shmidt et al. (1995)	36	1.00	0.05	0.04	0.08	0.05	0.04	0.09
Schipani et al. (2002)	60	1.00	0.04	0.04	0.06	0.05	0.04	0.04
Aiga et al. (2002)	66	1.00	0.03	0.06	0.35	0.03	0.03	0.12
Hoorweg et al. (2000)	102	1.00	0.03	0.03	0.14	0.03	0.03	0.13
Faber et al. (2002)	165	0.35	0.03	0.05	0.29	0.03	0.04	0.20
Olney et al. (2009)	445	0.44	0.03	0.14	0.80	0.03	0.09	0.54
Low et al. (2007)	741	0.33	0.04	0.49	0.99	0.03	0.16	0.89
Marsh (1998)	1,200	0.17	0.03	0.17	0.90	0.03	0.12	0.75
Makhotla and Hendriks (2004)	2,688	0.25	0.05	0.52	1.00	0.04	0.25	0.98
Average power			0.04	0.15	0.51	0.04	0.09	0.42

Note: the study conducted by Marsh (1998) is not reported in Table 3.5 because did not perform statistical test of the observed differences in prevalence rates.

"Empirical evidence for plausible and significant impacts of agriculture interventions on defined nutrition outcomes remains disappointingly scarce"

"Absence of evidence should not be equated to with evidence of no impact"

"Weaknesses in study design and survey methodology are all too common leading to weak results and limited generalizability"

Impacts of Agriculture on Nutrition: Nature of Evidence and Research Gaps
Webb and Kennedy 2013

Metrics to capture all this complexity?

Gap analysis of research on agriculture - nutrition (151 separate programs)

- "Fifty-seven of the…fully-mapped projects – over half – do not measure or consider nutritional status."
- 48 projects target children (with 17 focused on 1,000 days). But only 14 measure impact on IYCF (<2y diets).
- 40 target 'rural households', with only 6 focused on 'the poor'.
- "The actual methodology used the measure impact on nutritional status is not known for a significant proportion of these studies." (just 8 of them)

Source: Hawkes et al. (2012) DFID review

Conclusions

- Several conceptual frameworks linking agriculture to nutrition
- Evidence of association- Exists
  - Highlights the complexity of the relationship
- Evidence of causality- Poor
  - Specific nutrition interventions (e.g. home gardens, bio-fortification)
  - Scarce, that which exists is based on weak designs and poor methodological rigor
- Need to expand review focus to all agricultural projects
- Incorporate nutrition metrics into project design


THANK YOU