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Agricultural Production and Children's Diets

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Motivation

- Ethiopian children follow extremely monotonous diet (e.g. Headey, 2015)
- Number of health benefits from diverse diets: physical development, micronutrient intakes, reduced mortality risk from cardiovascular diseases & cancer, etc
- Increasing production diversity at the household level is often cited as a policy tool to achieve better diets – but little evidence whether this works
- This study: Attempts to understand the relationship between children's diet diversity and HH's production diversity – and market access

Korcho village in SNNP region

Nearest market place: Turmi
– 62 km away –

HHs grow maize, sorghum, green beans

Stored for several months after harvest

Typical diet?

HHs eat maize, sorghum, green beans

- Sometimes fish - thanks to Omo river
- Consumption & production decision are non-separable

The role of market access in Ethiopia

Hoddinott, Headey & Dereje (2015, J. of Development Studies):

Self-sufficiency in milk is associated with increased milk consumption and improvements in children's growth

- But not in villages that have an access to markets!

→ consumption & production decisions are separable

Minten, Koru & Stifel (2013, Ag Economics):

HHs located closer to markets use more modern seeds & fertilizers

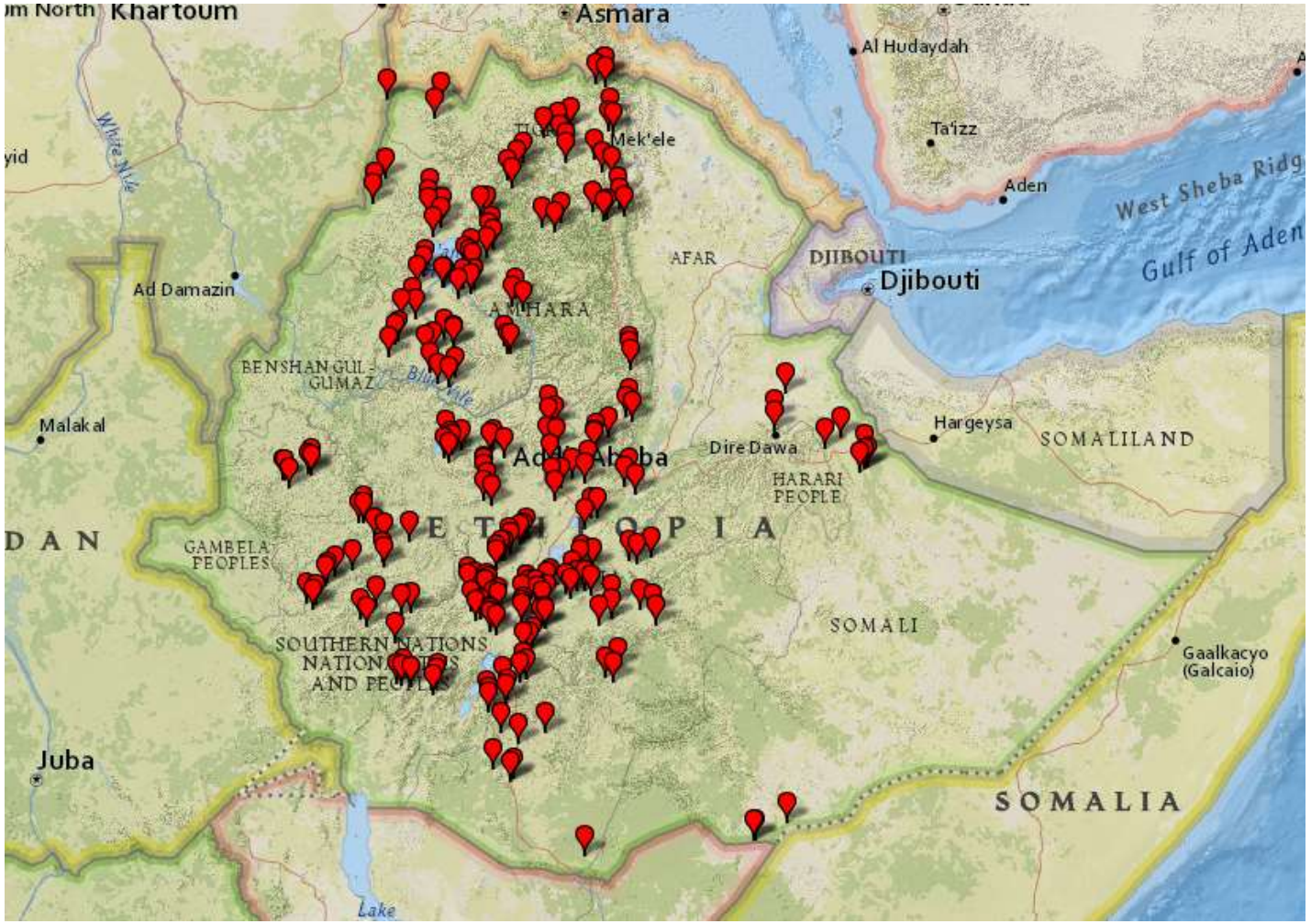
Feed the Future baseline survey – 2013

7,056 households, 252 villages, 84 woredas

5 Regions: Amhara, Oromia, SNNP, Somali & Tigray

Interviews held in June-July 2013

USAID funded



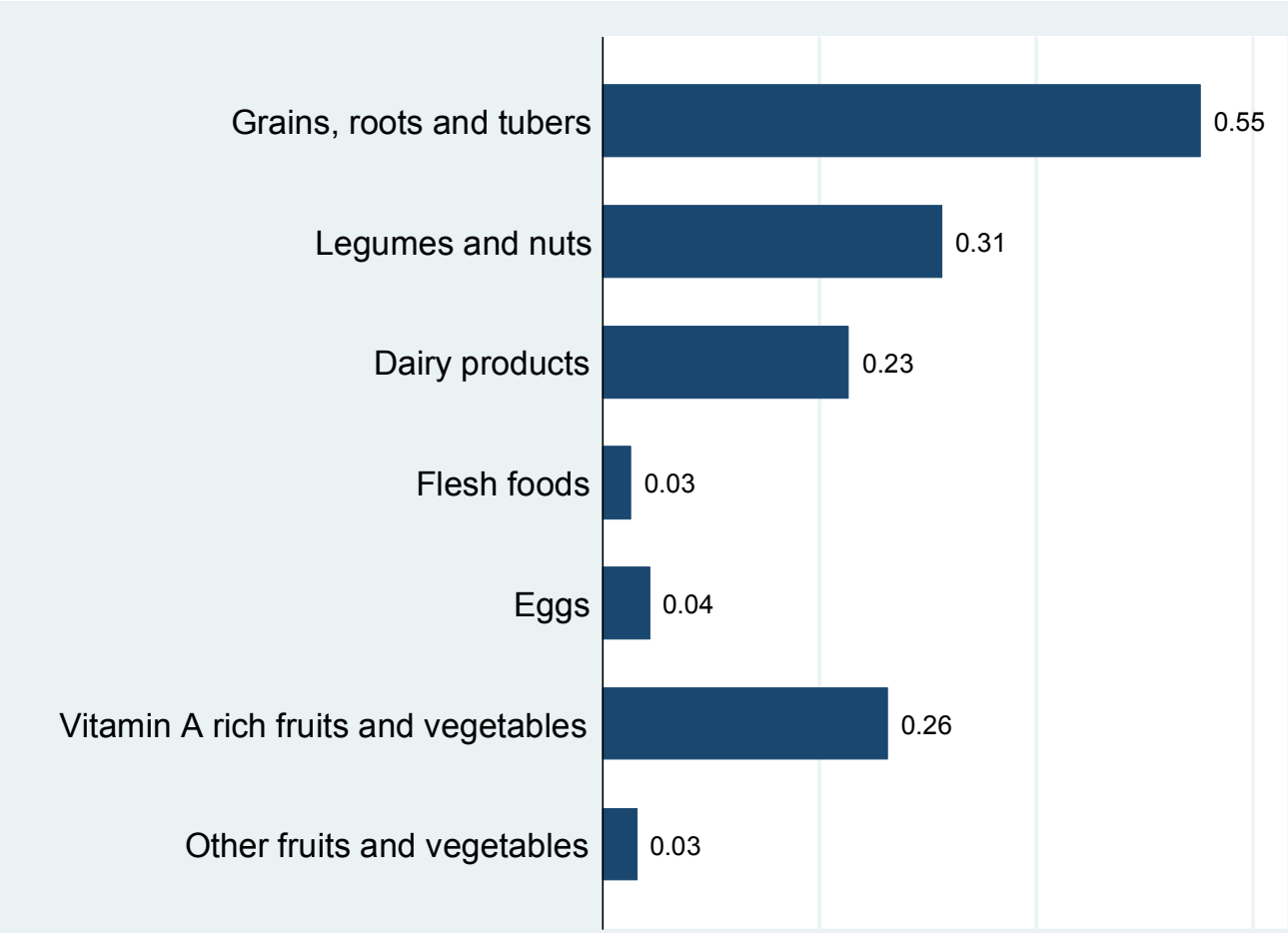
Unique opportunity to study diets and ag-production

- **Diet diversity questions at the individual level**
  - 4,214 children (6 months to 6 years)
  - Previous day (24h recall)
  - Diet diversity score: 7 food groups (WHO – IYCF 2008)
- **Production diversity from comprehensive crop and livestock modules (measured at the HH level)**
  - Last year (12 month recall)
  - Production diversity score: same 7 food groups

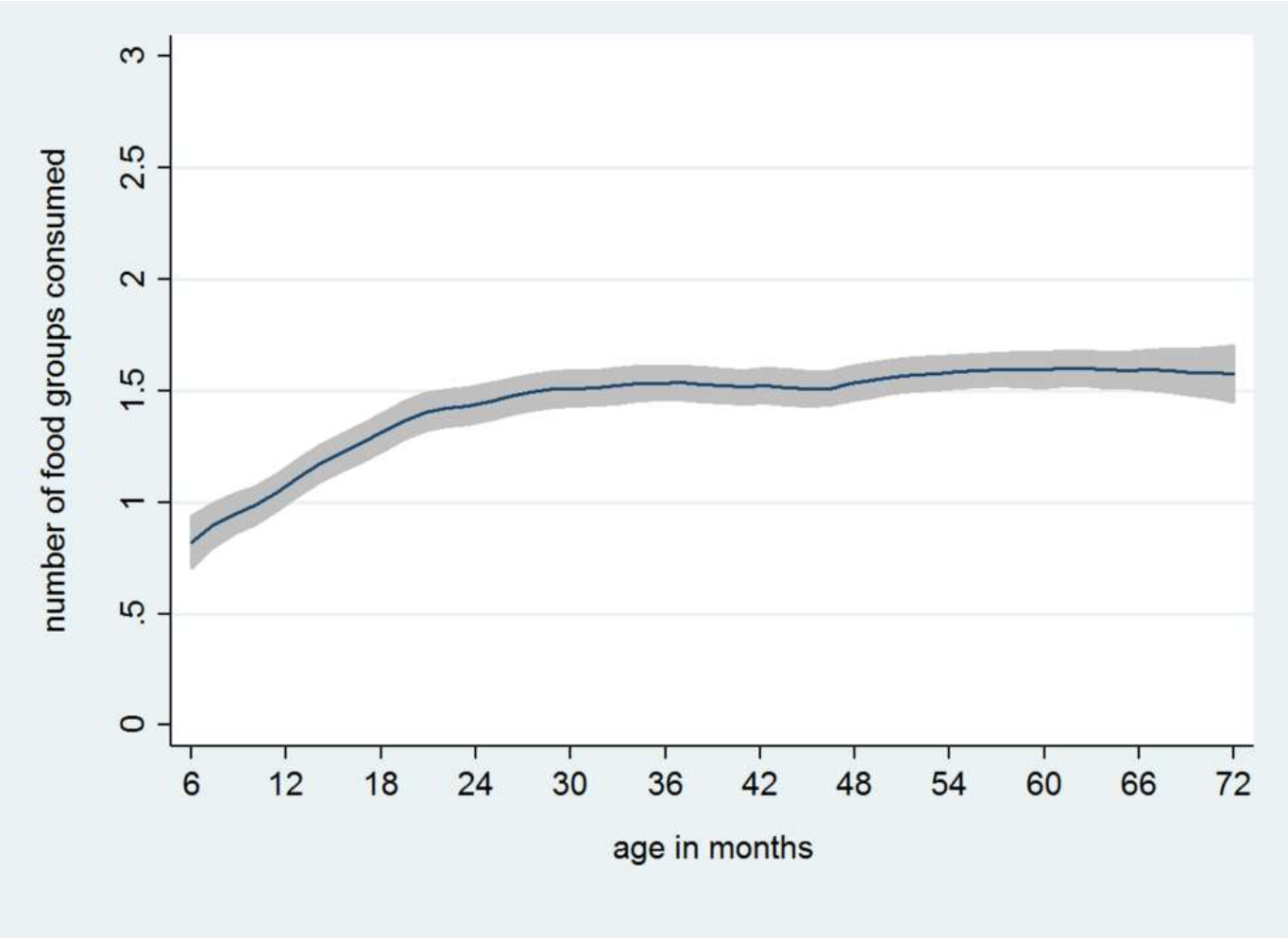
Average child eats from 1.46 food groups

About 96% of all children eat from 3 of fewer groups

The content of diet varies considerably across regions



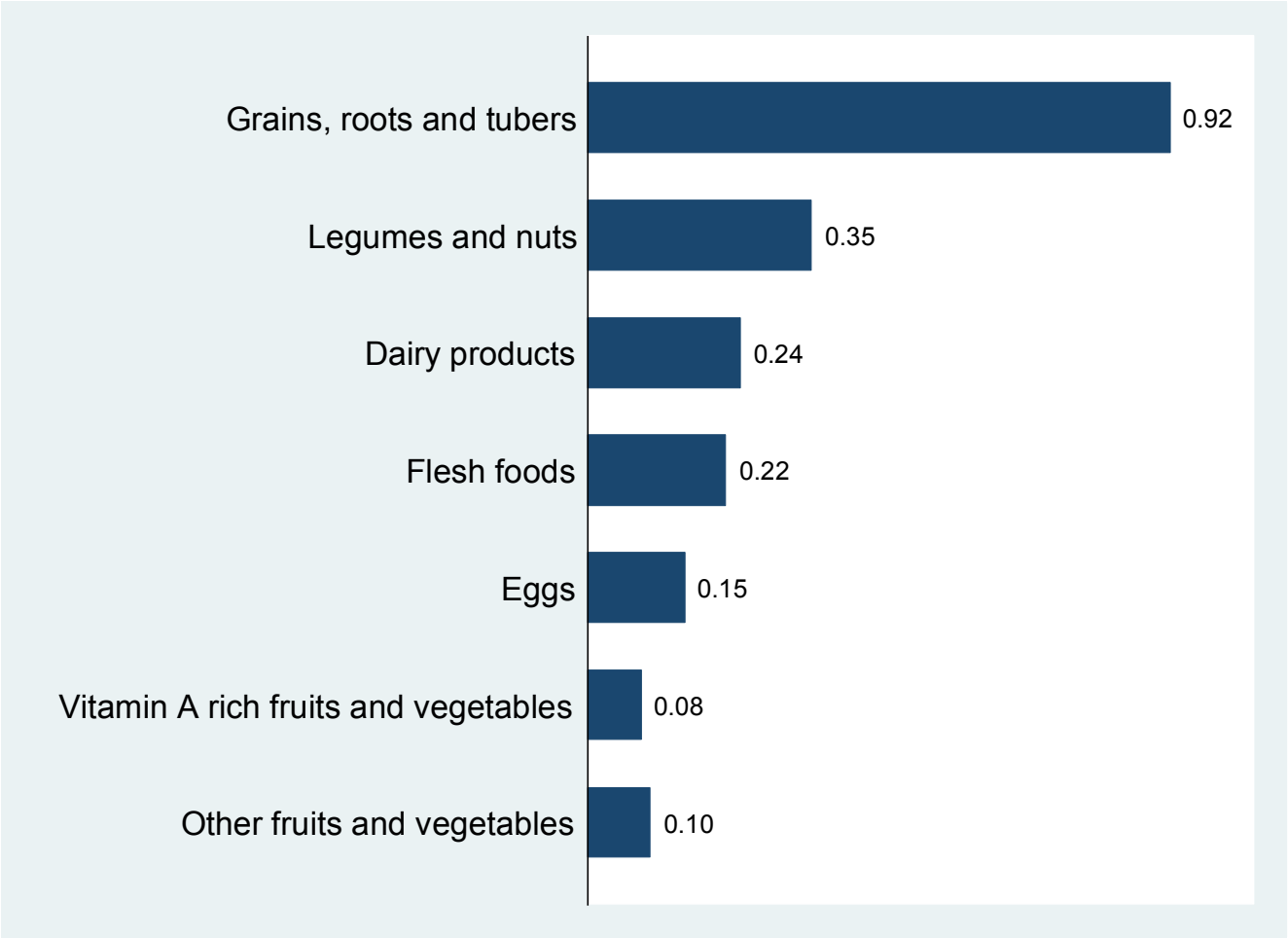
Little improvement as children grow older



Average household produces 1.98 food groups

About 90% of all HHs produce 3 of fewer groups

What HHs produce varies considerably across regions



Methods (1): Ordinary least squares regression

- Regress the # of food groups consumed by the child on # food groups produced by the household

- + Child, HH and community specific controls:
  - Age & sex
  - Ag-income, assets, HH demographics, head characteristics (sex, education, religion)
  - Access to electricity & water, food prices, access to market

Methods (2): Instrumental variable approach

- Still # food groups produced by the household might be correlated with unobservable HH characteristics
  - or measured with error

- To establish a causal estimate, we predict # food groups produced using instrumental variables:
  - Average temperature in the past 30 years
  - Elevation
  - Slope of the land

Methods (3): Count data modelling

- Our dependent variable, # food groups consumed, follows a non-normal Poisson distribution

  - Report both linear and Poisson model estimates

Results

	OLS	Poisson	Linear-IV (GMM)	Poisson-IV (GMM)
# of food groups produced	0.107**	0.089**	0.729***	0.574***
	(0.045)	(0.037)	(0.263)	(0.155)
Control variables:	Yes	Yes	Yes	Yes
Cragg-Donald F-statistic	-	-	*21.00*	-
Hansen-J test-statistic	-	-	*1.638*	*2.049*
--- p-value	-	-	*0.651*	*0.562*

Notes: Sample size: 4,214 children. Dependent variable is number of food groups consumed
Standard errors clustered by *woredas*
*** denotes statistical significance at 1 % level; ** at 5 % level; * at 10 % level

Interim conclusion

We find strong and causal relationship between HH production and children's diets.

- We therefore reject the separability of household production and consumption decisions

- This suggests that in order for rural households to improve their children's diets, they need to produce a wider range of agricultural outputs.

Results by market access

	OLS	Poisson	Linear-IV (GMM)	Poisson-IV (GMM)
no market (83% of HHs)	0.128***	0.104***	0.525*	0.425**
market in less than 3km	-0.032	-0.031	0.302	0.167

Notes: Sample size: 4,214 children. Dependent variable is number of food groups consumed
Standard errors clustered by *woredas.*
*** denotes statistical significance at 1 % level; ** at 5 % level; * at 10 % level

Full Table

Conclusions

- We find that children's diets strongly depend on households' production choices
  - But this relationship does not hold for HHs that do have good access to markets where they can buy and sell food products

Does this imply that all HH should be encouraged to produce a diverse basket of foods?

- No: This neglects the basic economic notion of production based on comparative advantage, + the limits imposed by agro-climatic conditions

- Rather: Ag-interventions that aim to
  1) increase productivity (incomes)
  2) deepen market integration
  3) behavioral change communication (nutrition knowledge)

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Other recent ESSP nutrition papers:

- "An Analysis of Trends and Determinants of Child Undernutrition in Ethiopia, 2000-2011" (by Derek Headey)
- "Teff: Nutrient Composition and Health Benefits" (by Baye)
- "Cows, missing milk markets and nutrition in rural Ethiopia" (by Hoddinott, Headey & Dereje)

Appendix

Full results by market access

	OLS	Poisson	Linear-IV (GMM)	Poisson-IV (GMM)
# of food groups produced (*A*)	0.128***	0.104***	0.525*	0.425**
	(0.047)	(0.037)	(0.271)	(0.167)
# of food groups produced *x* market (*B*)	-0.160***	-0.135***	-0.223	-0.258
	(0.047)	(0.043)	(0.366)	(0.248)
Market in less than 3 km	0.374**	0.343**	0.599	0.699
	(0.149)	(0.149)	(0.731)	(0.505)
Other controls	Yes	Yes	Yes	Yes
χ^2-test: joint significance: (*A*)+(*B*) = 0	p=0.49	p=0.48	p=0.36	p=0.53
Angrist-Pischke F-test: (*A*)	-	-	1.90	-
p-value	-	-	0.081*	-
Angrist-Pischke F-test: (*B*)	-	-	6.64	-
p-value	-	-	0.000***	-

Notes: dependent variable is number of food groups consumed
Standard errors clustered by *woredas*
*** denotes statistical significance at 1 % level; ** at 5 % level; * at 10 % level

back