

# Diet quality in rural Ethiopia: Does consumption smoothing maintain household dietary diversity during lean seasons?

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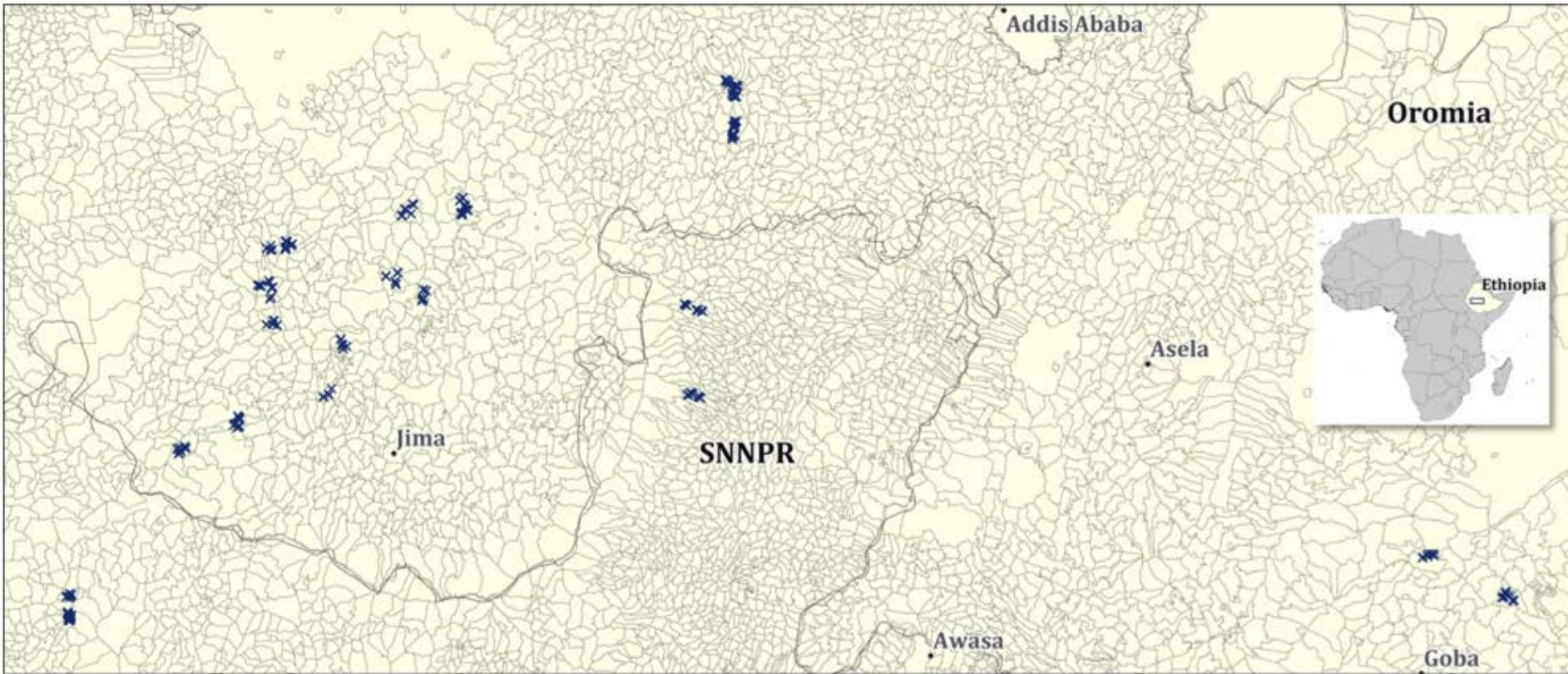


# Motivation

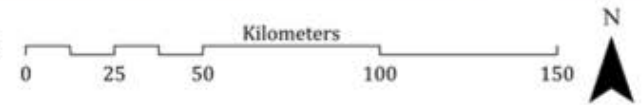
- Diet quality is low *and variable*
  - We know that people seek to smooth consumption
  - Are richer households able to smooth their diet quality?
- We have four rounds of survey data over 2 years
  - We can see variation both within and between years
  - Most studies have just cross-sections, or one visit/year
- We know the farm's own production each year
  - We can test for separability of consumption & production for each food group, in each season



# Our survey data



Data sources:  
African country boundaries: ArcGIS, July 2016  
Cities: ArcGIS, February 2014  
Kebele boundaries: ArcGIS, August 2015



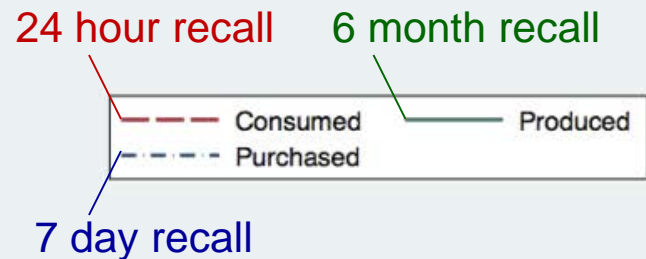
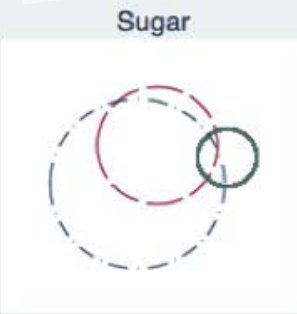
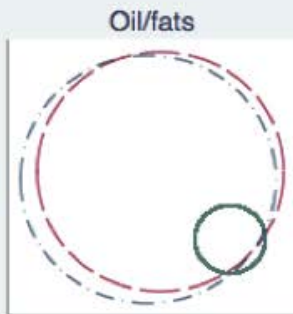
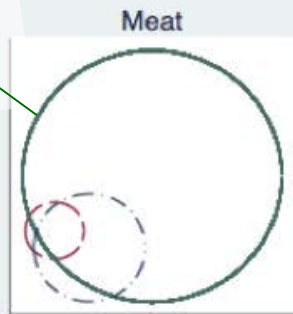
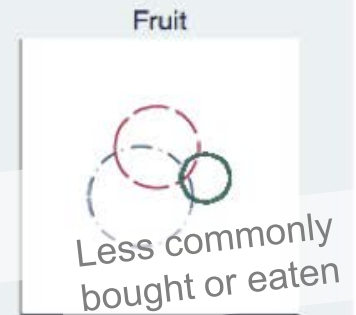
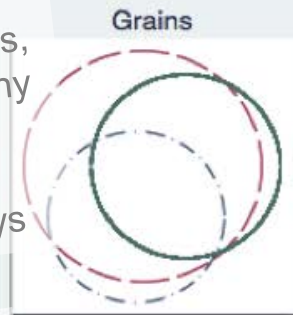
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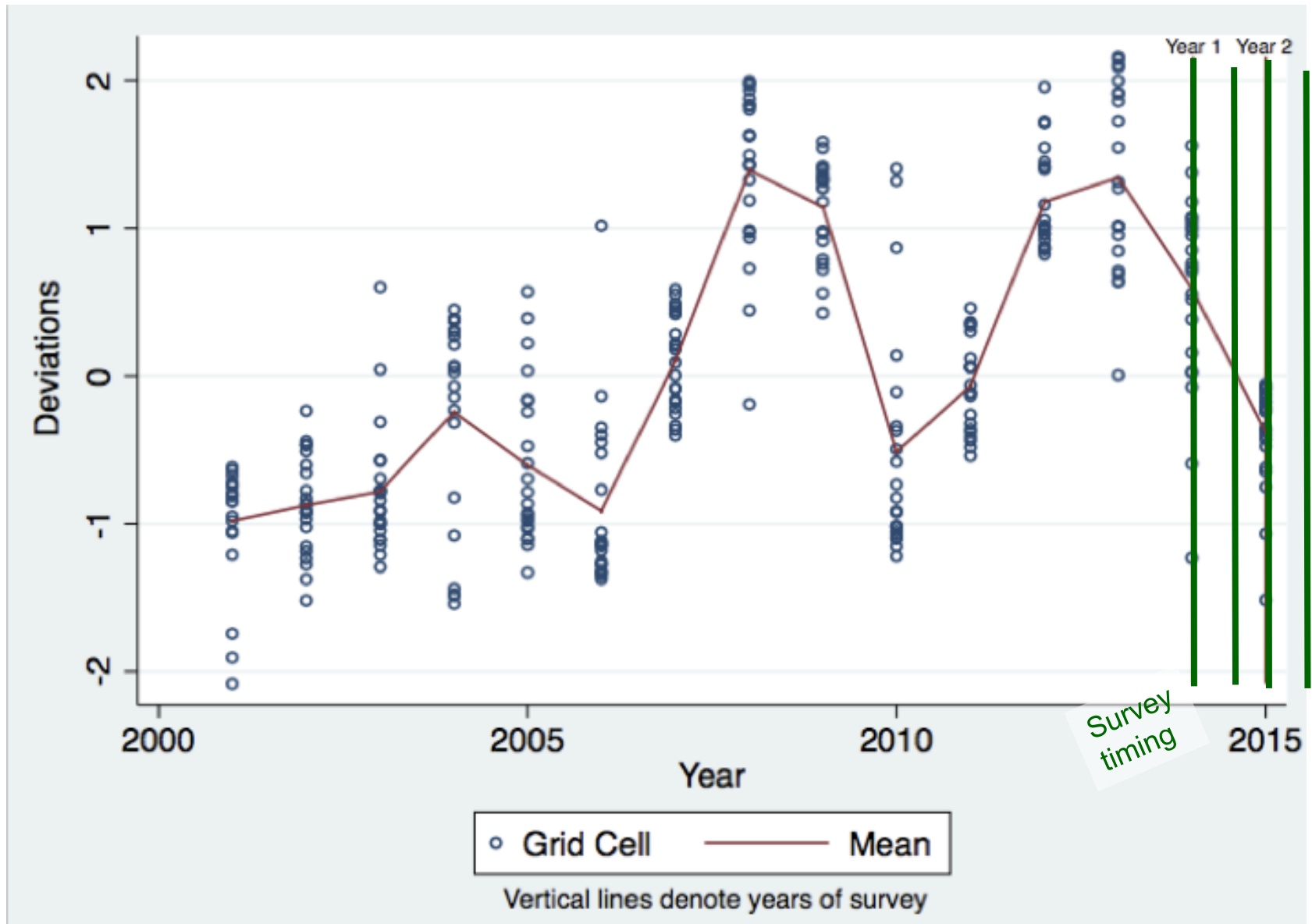
# Food groups differ greatly frequency of production, consumption and purchase

Grown in almost all years, bought in many weeks, consumed almost all days

Livestock ownership, not offtake



# Rainfall was OK in year 1, bad in year 2





# Diet diversity worsened in year 2

Household characteristics	Year 1		Year 2	
	Round 1 (post-harvest)	Round 2 (lean season)	Round 3 (post-harvest)	Round 4 (lean season)
<b>Dietary diversity</b> (HDDS, no. of food groups consumed, 0-12)	4.07 (1.5)	3.77 (1.3)	3.82 (1.4)	3.68 (1.3)
<b>Food production diversity</b> (no. of food groups produced, 0-11)	2.68 (1.5)	1.83 (1.1)	2.72 (1.1)	1.77 (1.0)
<b>Food purchase diversity</b> (no. of food groups purchased, 0-11)	5.46 (1.7)	5.15 (1.6)	5.31 (1.5)	5.14 (1.7)
<b>Wealth, in quintiles</b> (PCA over household assets, 1-5)	3.13 (1.4)	2.75 (1.4)	2.99 (1.4)	3.13 (1.4)
<b>Women's say in decision-making</b> (based on self-reporting, 1-4)	2.66 (0.6)	2.77 (0.5)	2.74 (0.5)	2.70 (0.5)
<b>Group participation index</b> (no. of social groups, 0-7)	2.21 (1.7)	2.37 (1.4)	1.92 (1.3)	1.85 (1.3)
<b>Early program participation</b> (round 1 program participation, %)	55%			
<b>Orthodox fasting on day of survey</b> (based on self-reporting, 0-1)	0.08 (0.3)	0.02 (0.1)	0.08 (0.3)	0.01 (0.1)
<b>Rainfall during previous year growing season</b> (from climate data, in meters)	0.68 (0.1)		0.56 (0.1)	
<b>Number of growing degree days over 30c</b> (in previous year growing season, GDDs)	3.64 (2.8)		21.09 (13.9)	
No. of observations	911	911	911	911

*Purchases are more diverse, more stable than production*

# Season and year affects production much more than purchases, but still difficult to smooth consumption

		Consumed (past 24 hrs.)	Purchased (past 7 days)	Produced (past 6 mo.)		Consumed (past 24 hrs.)	Purchased (past 7 days)	Produced (past 6 mo.)
R1	Veg.	36.4	95.5	10.8	Fruit	12.5	15.7	7.1
R2		26.2	93.2	0.8		8.6	10.9	1.4
R3		25.9	96.0	2.4		9.8	17.2	2.1
R4		29.8	92.3	0.6		2.9	7.6	0.9
R1	Eggs	6.9	7.2	17.3	Dairy	30.5	10.1	33.8
R2		1.8	4.5	17.1		26.7	11.2	35.1
R3		2.7	3.8	18.9		21.1	7.8	31.8
R4		1.3	3.2	17.8		23.4	11.2	38.9
R1	Meat	2.2	9.6	63.9				
R2		7.2	25.1	85.3				
R3		0.8	4.4	92.2				
R4		6.6	21.2	90.0				

# It's very difficult to smooth consumption, even for wealthier households

## IRR and odds ratios for intake of nutrient-dense foods

	Household Dietary Diversity	Vegetables	Fruit	Meat and Poultry	Eggs	Dairy
Lean season	1.045	2.394	0.071**	41.119*	0.716	0.683
Food production diversity score (proddiv, 0-11)	1.028**					
Food purchase diversity score (spenddiv, 0-11)	1.064**					
Food group produced		2.425	0.504	1.191	10.025**	25.267**
Food group purchased		1.583	3.002**	18.176**	22.388**	4.021**
Food group produced and purchased		0.476	1.348	0.489	0.055**	0.150**
Household wealth, in quintiles (wealth, 1-5)	1.037**	1.150**	1.249**	1.467	1.141	1.062
Women's say in decision-making (wdecision, 1-4)	1.082**	1.475**	1.237	2.631*	0.881	1.101
Group participation index (grppartidx, 0-7)	1.018*	1.113*	1.133	1.02	0.991	0.995
Early program participant (≥4 activities in R1)	1.029**	1.06	0.986	1.617	1.224	1.068
Total rain in previous year growing season	1.624**	0.755	414.695**	681.035*	29.865	22.439**
Total growing degree days >30c in prev. yr season	1.008	0.978	0.923	1.226	0.817*	0.805**
Rain * Growing degree days over 30	0.986	1.012	1.188	0.714	1.448*	1.484**
Orthodox Christian fasting (fastorth)	0.941	1.043	1.173	0.376	0.5	0.078**
Interaction terms (smoothing)						
wealth x season	0.999	0.898	0.887	0.795	0.766	1.025
wdecision x season	0.99	0.941	2.035*	0.361*	0.922	0.9
grppartidx x season	1.001	0.867*	0.999	0.903	1.217	1.055
proddiv * season	1					
spenddiv * season	0.993					
food group produced * season		2.971	2.335	1.354	0.82	1.423
food group purchased * season		0.78	2.998**	4.705**	0.891	0.596*
Number of Observations	3,644	3,644	3,380	3,376	3,144	3,644
Number of households	911	911	845	844	786	911



# Conclusions and implications

- With four rounds of survey data at six-month intervals, for production (6 m), purchases (7 d) and intake (24 h), we can *begin* to investigate fluctuations in diet diversity
- We find the usual determinants for the level of diversity
  - Richer households, with more diverse production and more program participation, consume more nutrient-dense foods
- ...but we find that only fruit and meat purchases (and milk?) are effective at smoothing diet quality
  - To facilitate smoothing, would need greater access to nutrient-dense foods in lean seasons – especially after bad years



# Thank you!

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# Season and year affects purchases much less than production

		Consumed (past 24 hrs.)	Purchased (past 7 days)	Produced (past 6 mo.)		Consumed (past 24 hrs.)	Purchased (past 7 days)	Produced (past 6 mo.)
R1	Grains	87.0	54.8	82.3	Sugar	22.7	39.7	5.4
R2		91.2	38.1	33.1		14.5	30.5	2.6
R3		90.9	56.2	89.9		14.1	30.9	5.8
R4		92.5	49.1	23.2		10.4	27.7	1.1
R1	Roots	25.9	51.3	18.9	Fruit	12.5	15.7	7.1
R2		32.6	36.7	2.9		8.6	10.9	1.4
R3		36.4	40.0	4.7		9.8	17.2	2.1
R4		43.6	42.9	1.3		2.9	7.6	0.9
R1	Legumes	73.4	71.5	13.5	Veg.	36.4	95.5	10.8
R2		68.0	73.2	4.1		26.2	93.2	0.8
R3		74.0	82.6	10.2		25.9	96.0	2.4
R4		48.6	67.3	2.6		29.8	92.3	0.6
R1	Oil/fats	89.8	94.3	14.4	Eggs	6.9	7.2	17.3
R2		85.0	92.2	0.4		1.8	4.5	17.1
R3		85.2	92.5	13.3		2.7	3.8	18.9
R4		85.8	91.8	0.0		1.3	3.2	17.8
R1	Dairy	30.5	10.1	33.8	Meat	2.2	9.6	63.9
R2		26.7	11.2	35.1		7.2	25.1	85.3
R3		21.1	7.8	31.8		0.8	4.4	92.2
R4		23.4	11.2	38.9		6.6	21.2	90.0