



**Examining the influence of agricultural
production and socioeconomic status on
seasonal changes in household dietary diversity
in Burkina Faso**

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Background

- Diet diversity is an important determinant of nutritional status and many associated health outcomes

Kant et al., J Am Coll Nutr 1995; Steyn et al., Pub Health Nutr 2006

- In low-income rural areas of sub-Saharan Africa (SSA), smallholder farm households are vulnerable to seasonal changes in diet diversity because of variation in food availability and access
- Nutrition-sensitive agricultural policies and programs target improvements to dietary diversity as a key outcome with the aim of addressing seasonal gaps in availability of nutrient-rich foods

Background

- Few studies have examined the temporal variability in dietary diversity (in general based on data at two time points) or the household-level characteristics that may modify this variability in SSA

Savy et al., J Nutr 2006; Arsenault et al., J Nutr Sci 2014

- It is important to assess temporal variability in dietary diversity across more than two periods of the yearly agricultural production cycle to better characterize seasonal influences
- Identification of household characteristics that may mitigate seasonal variation in dietary diversity could provide guidance to improve the timing and targeting of interventions aimed at improving diet quality

Study objectives

- To assess seasonal variation in household dietary diversity across the annual agricultural production cycle in Burkina Faso
- To determine the extent to which **household agricultural characteristics** (i.e., crop production diversity, total crop production, agricultural production orientation) and **socioeconomic status** (i.e., wealth and education) modify changes in household dietary diversity across seasons

Study design and setting

- Secondary analyses of data from Burkina Faso 2014 Continuous Multisectoral Survey
- Nationally representative survey, two-stage sampling design; n = 10,860 households
- Burkina Faso characterized by:
 - Single rainy season from May-Oct followed by main harvest season
 - Lean season from Apr-Sep with shortage of staple foods and increased market prices of many foods
 - 3 agro-ecological zones with differences in agricultural and livestock production



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Dependent and independent variables

-> Dependent variable

- Dietary diversity assessed by a 9-food groups indicator score using weekly food consumption data collected at 4 different rounds (or seasons)

-> Independent variable

- Seasons based on 4 survey rounds: post-harvest season, beginning of and end of the lean season, and harvest season
- Agricultural production characteristics collected during the harvest season:
 - crop production diversity: number of crops cultivated by household
 - Total crop production: total quantity of harvested crops
 - Percent of harvested crops sold or planned to be sold by household
- Socioeconomic characteristics: wealth index, education level of household head

Measurement of variables

	1 st Round Jan - Mar	2 nd Round Apr - Jun	3 rd Round Jul - Aug	4 th Round Oct - Dec
	Post-harvest season	Beginning of lean season	End of lean season	Harvest season
Weekly Food consumption	X	X	X	X
Weekly food expenditures	X	X	X	X
Socio-demographic characteristics	X			
Agricultural production characteristics				X

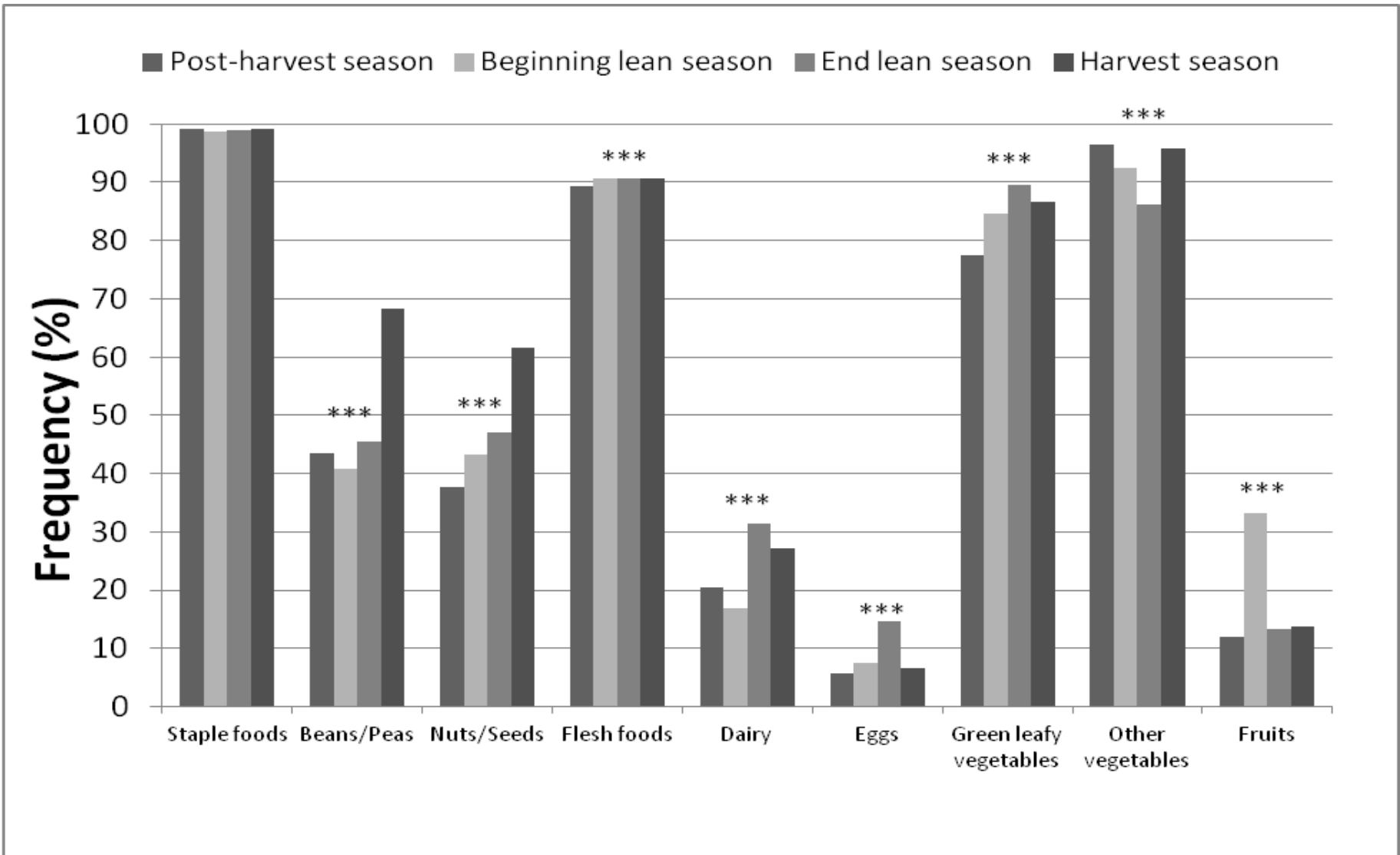
Statistical analyses

- Calculation of descriptive statistics (sampling weight)
- Chi-square test used for comparison of proportion of households consuming specific food groups among seasons
- Mixed effect model used for comparison of household dietary diversity across seasons
 - Account for sampling design and repeated measures
 - Control for predefined covariates
 - Tukey-Kramer test used for pairwise comparisons
- Test for statistical interactions: household crop production diversity, total crop production, agricultural production orientation, wealth status, and education level of household head
- Stratified analyses if interaction significant at 5% level

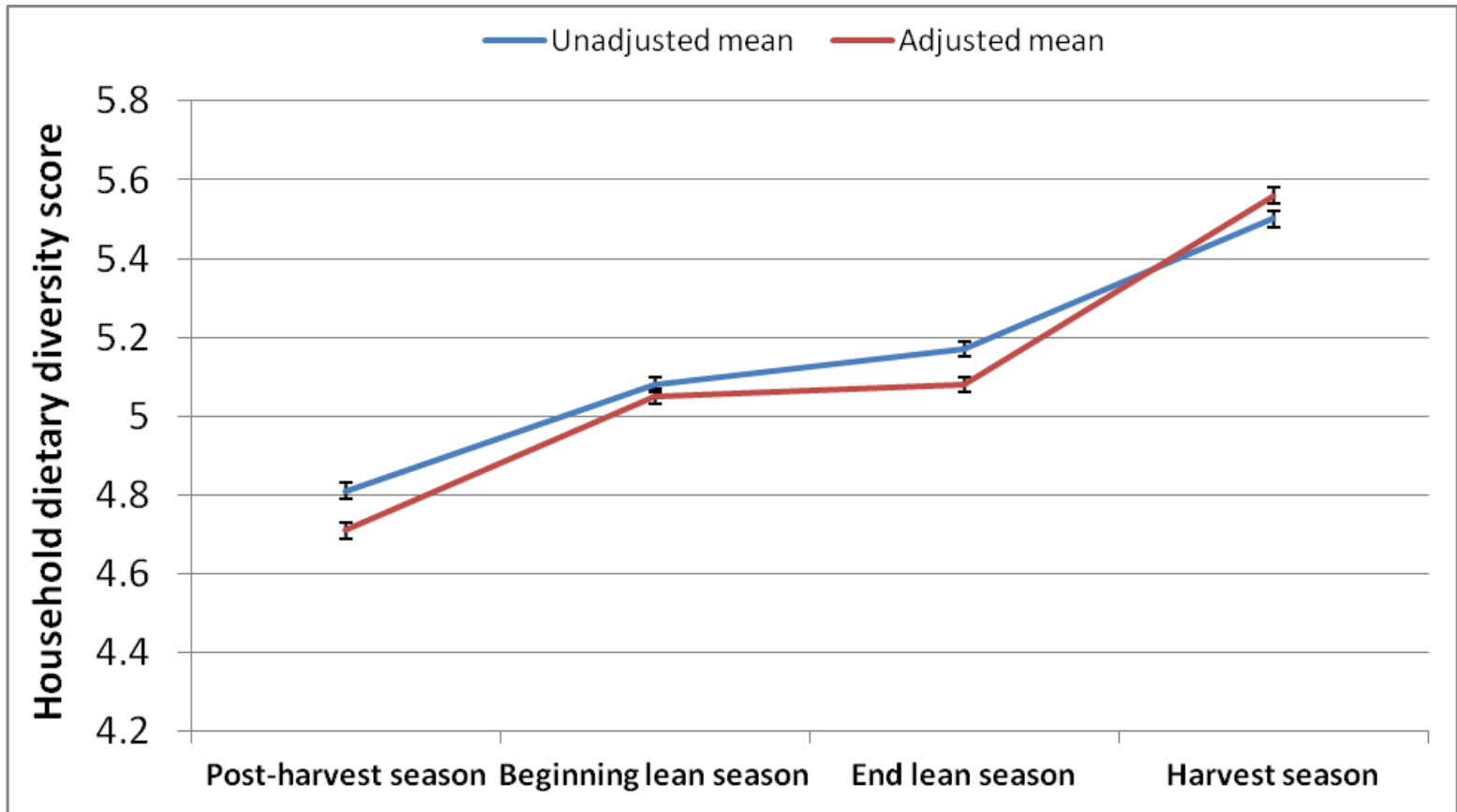
Characteristics of households

	Mean \pm SD or % (number)
Male head of household	86.1 (9265)
Age head of household	46.1 \pm 15.4
Education of household head	
No formal education	75.3 (7862)
Kindergarten or primary school	11.3 (1301)
Secondary or professional school	10.1 (1199)
University	3.3 (312)
Location of household residence	
Urban	27.9 (4218)
Rural	72.1 (6528)
Median (IQR) household size	6 (IQR: 4; 9)
Household main activity type	
Agricultural household	71.6 (7513)
Non-agricultural household	28.4 (3052)
Median (IQR) amount harvested crops (kg)	1,400 (640; 3,000)
Median(IQR) number of crops cultivated	3 (2; 4)
Households with < 5% harvested crops sold or planned to be sold	56.5 (4091)

Seasonal variations in dietary patterns of households



Seasonal variations of household dietary diversity



Results from mixed linear model regressing household dietary diversity on seasons

Independent variables	Household dietary diversity	p-value
Seasons (post-harvest season)		
Beginning lean season	0.3427 (0.0168)	< 0.0001
End lean season	0.3727 (0.0167)	< 0.0001
Harvest season	0.8463 (0.0168)	< 0.0001
Crop production diversity	0.0617 (0.0067)	< 0.0001
Total crop production (kg)	-1.11e-07 (0)	< 0.0001
Proportion of harvested crops sold or planned to be sold (%)	0.0016 (0.0004)	0.0002
Household head education level (no formal education)		
Kindergarten or primary education	0.0619 (0.0283)	0.0289
Secondary education	0.0602 (0.0495)	0.224
Post-secondary education	0.5562 (0.2196)	0.0113
Household wealth status (quintile 1)		
Quintile 2	0.1277 (0.0230)	< 0.0001
Quintile 3	0.1823 (0.0254)	< 0.0001
Quintile 4	0.2569 (0.0278)	< 0.0001
Quintile 5	0.3860 (0.0478)	< 0.0001
Intercept	4.1630 (0.0740)	< 0.0001

Household characteristics modifying seasonal changes in dietary diversity

Greater difference in diet diversity between post-harvest and harvest seasons for households with heads lacking formal education vs. those with secondary or professional education (0.87 vs. 0.56), and for lowest vs. higher wealth status (0.99 vs. 0.53)

No seasonal variation in diet diversity of household when head of household had post-secondary education

Lower difference in diversity of household diet between post-harvest and harvest seasons for households with lower vs. higher crop diversity (0.77 vs. 0.90), and subsistence-oriented vs. market-oriented production (0.80 vs. 0.91)

Summary and Conclusions

- Dietary diversity of agricultural households in Burkina Faso was lowest during the post-harvest season, higher during the lean season periods, and higher still during the harvest season
- Distinct food groups made unique contributions to dietary diversity during different times of the year
- Household socioeconomic status had an especially high buffering effect on seasonal changes in household dietary diversity as compared to household agricultural characteristics

Summary and conclusions

- Households with lower crop production diversity, or subsistence-oriented production also had lower dietary diversity and therefore lower potential to change across seasons
- Agricultural policies and programs aimed at improving household diet diversity should consider post-harvest as well as lean season fluctuations, and household characteristics that buffer seasonal changes



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Back up slides

Household characteristics modifying seasonal changes in dietary diversity

Effect modifier	Adjusted mean \pm standard error dietary diversity				p-value
	Postharvest season	Beginning of lean season	End of lean season	Harvest season	
Crop production diversity²					
< 3 crops	4.60 \pm 0.03 ^a	4.93 \pm 0.03 ^b	4.90 \pm 0.03 ^b	5.37 \pm 0.03 ^c	< 0.0001
3-4 crops	4.71 \pm 0.02 ^a	5.04 \pm 0.02 ^b	5.11 \pm 0.02 ^c	5.58 \pm 0.02 ^d	< 0.0001
> 4 crops	4.82 \pm 0.03 ^a	5.24 \pm 0.03 ^b	5.24 \pm 0.03 ^b	5.72 \pm 0.03 ^c	< 0.0001
Household agricultural production orientation^{4*}					
Subsistence-oriented production	4.67 \pm 0.02 ^a	4.97 \pm 0.02 ^b	5.01 \pm 0.02 ^b	5.47 \pm 0.02 ^c	< 0.0001
Market-oriented production	4.75 \pm 0.03 ^a	5.16 \pm 0.03 ^b	5.17 \pm 0.03 ^b	5.66 \pm 0.03 ^c	< 0.0001
Household head education¹					
No formal education	4.67 \pm 0.02 ^a	5.01 \pm 0.02 ^b	5.05 \pm 0.02 ^b	5.54 \pm 0.02 ^c	< 0.0001
Kindergarten or primary education	4.91 \pm 0.04 ^a	5.31 \pm 0.04 ^b	5.29 \pm 0.04 ^b	5.69 \pm 0.04 ^c	< 0.0001
Secondary or professional education	5.02 \pm 0.09 ^a	5.39 \pm 0.09 ^b	5.32 \pm 0.09 ^b	5.58 \pm 0.09 ^b	< 0.0001
Post-secondary education	5.38 \pm 0.43	5.67 \pm 0.41	6.08 \pm 0.41	6.07 \pm 0.42	0.624
Household wealth status³					
Quintile 1	4.38 \pm 0.03 ^a	4.72 \pm 0.03 ^b	4.69 \pm 0.03 ^b	5.37 \pm 0.03 ^c	< 0.0001
Quintile 2	4.62 \pm 0.03 ^a	5.01 \pm 0.03 ^b	5.05 \pm 0.03 ^b	5.55 \pm 0.03 ^c	< 0.0001
Quintile 3	4.75 \pm 0.03 ^a	5.13 \pm 0.03 ^b	5.16 \pm 0.03 ^b	5.53 \pm 0.03 ^c	< 0.0001
Quintile 4	5.00 \pm 0.04 ^a	5.30 \pm 0.04 ^b	5.33 \pm 0.04 ^b	5.73 \pm 0.04 ^c	< 0.0001
Quintile 5	5.36 \pm 0.07 ^a	5.65 \pm 0.07 ^b	5.68 \pm 0.07 ^{bc}	5.89 \pm 0.07 ^c	< 0.0001

Limitations of the study

- Current findings may not be representative of the potential seasonal variations in household dietary diversity over several years because of year-to-year variation of food availability and access
- This new adapted food group indicator may not be very sensitive in fully capturing the variations in diet quality of households across seasons

Consumption of meat and fish by season

