

Rural Household Food Preferences, Dietary Diversity and Supply Chain Development

Dave D. Weatherspoon, **Marie Steele**, James Oehmke and Lorraine Weatherspoon

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Introduction

- ▶ Over the past two decades, **Rwanda** has experienced impressive economic growth, resulting in considerable improvements in living standards and poverty reduction.
 - ▶ Despite these gains, progress on nutritional status, especially those of children, continues to be of serious concern.
 - ▶ Increasing dietary diversity is the focus of several donors and multinationals to address these issues
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Introduction

There are two, non-exclusive approaches to increasing dietary diversity among smallholders (in addition to raising incomes):

- Diversify own production for home consumption
- Improve access to and the affordability of diverse foods in local markets



Objective


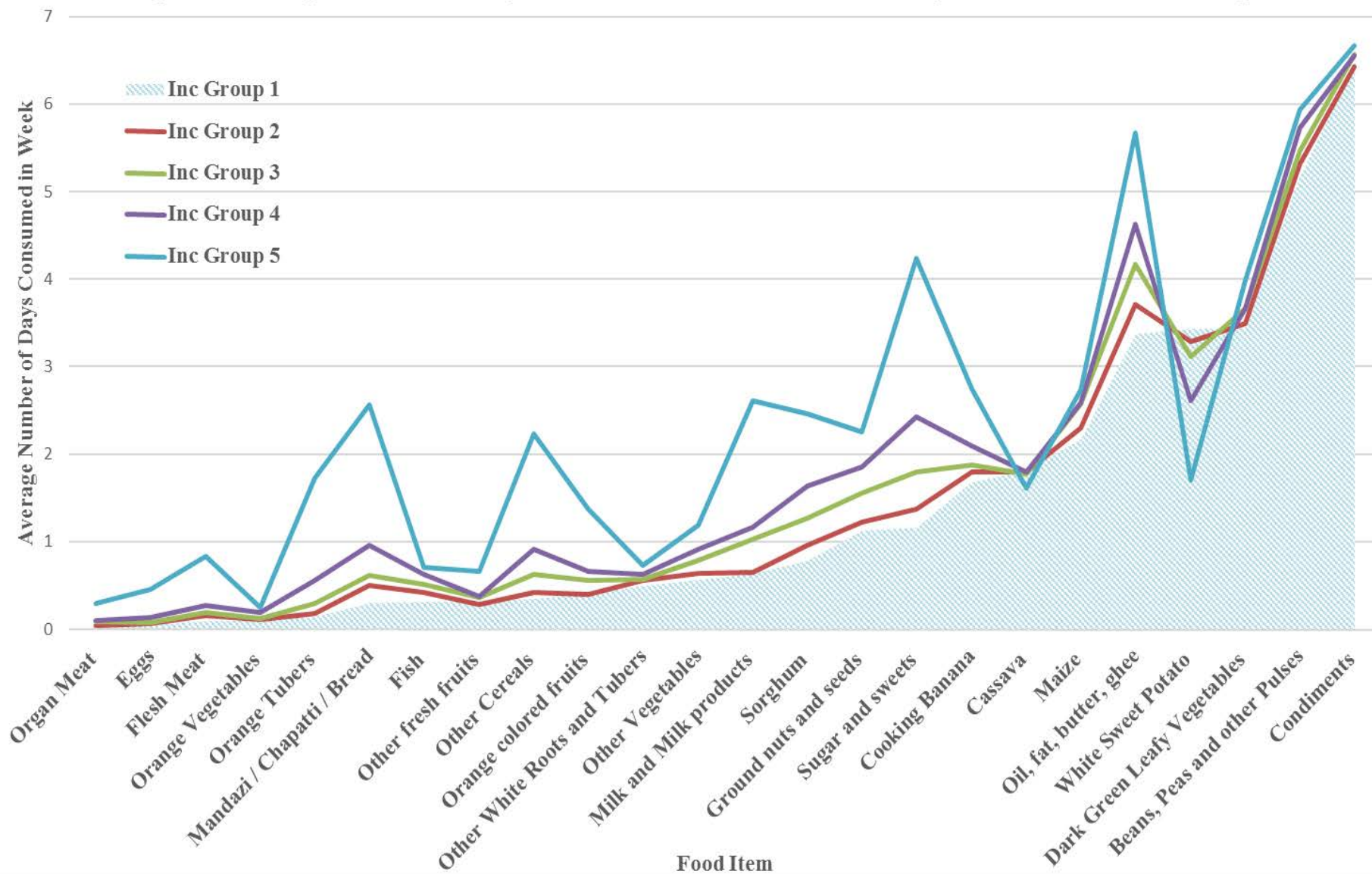
- Determine factors that influence dietary diversity and nutritional quality of diets relative to income, prices, and other demographics.
 - Discuss implications of food supply chain development to address the nutritional needs of rural households.
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Figure 1: Average Number of Days/Week a Food Item is Consumed by Household Income Group





Data

- ▶ Rwanda Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey, 2012
 - ▶ Household Questionnaire, 7,000 households
 - ▶ Village Key Informant Questionnaire (prices)
 - ▶ Calculated a continuous Food Consumption Score (FCS) to measure dietary diversity

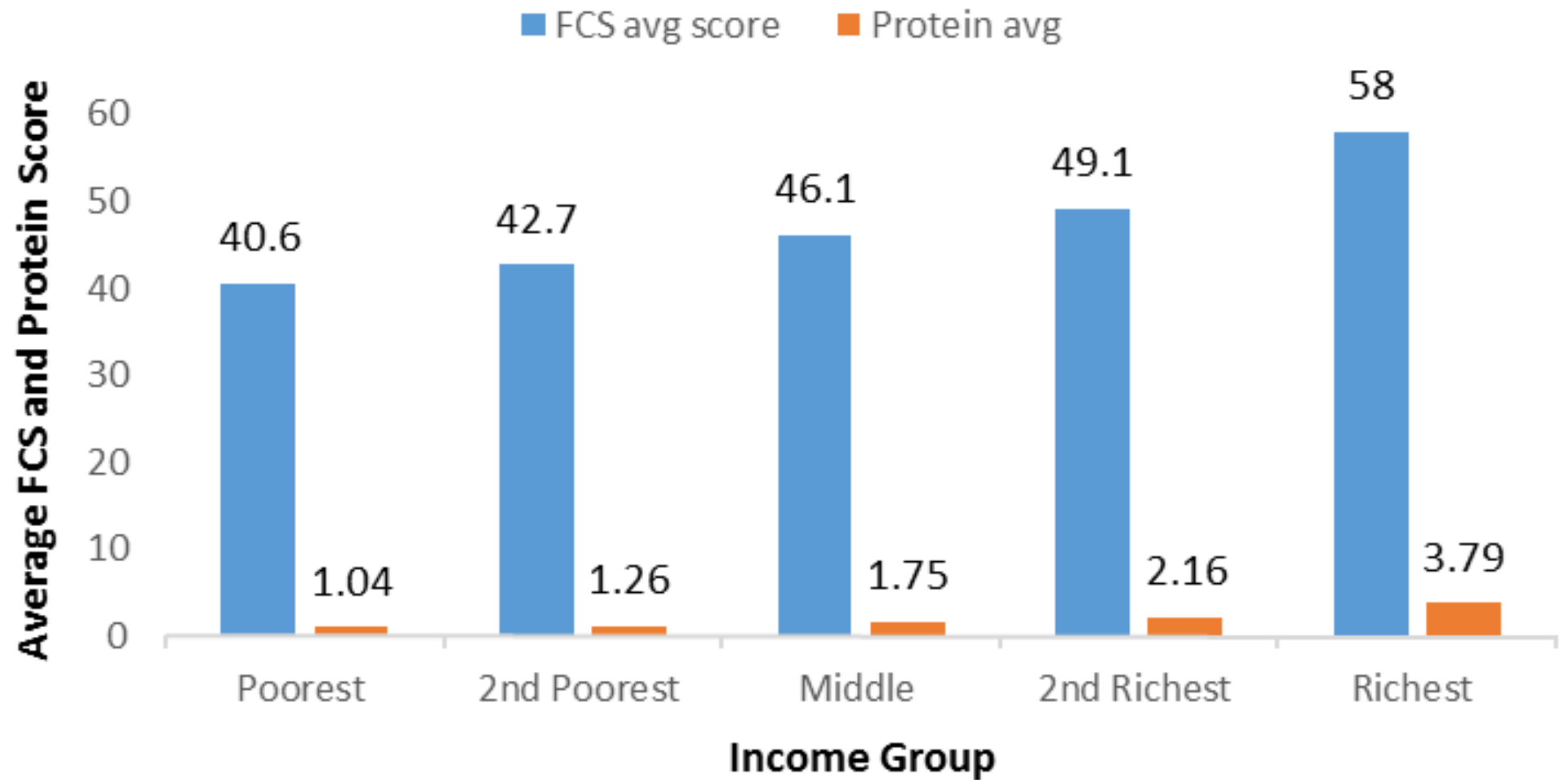


FCS Calculation



FOOD ITEM (FROM SURVEY)	FOOD GROUP CLASSIFICATION	WEIGHT IN CALCULATION
Maize / Maize Meal	Main Staples	2
Sorghum	Main Staples	2
Other Cereals	Main Staples	2
Cassava	Main Staples	2
White Sweet Potato	Main Staples	2
Other White Roots and Tubers	Main Staples	2
Bread	Main Staples	2
Sweet Potato and other Orange Tubers	Main Staples	2
Cooking Banana	Main Staples	2
Beans, Peas and other Pulses	Pulses	3
Dark Green Vegetables	Vegetables	1
Orange Vegetables	Vegetables	1
Other Vegetables	Vegetables	1
Ground Nuts and Seeds	Pulses	3
Orange colored Fruits	Fruit	1
Fish	Meat and Fish	4
Organ Meat	Meat and Fish	4
Flesh Meat	Meat and Fish	4
Eggs	Meat and Fish	4
Oil, fat, butter, Ghee	Oil	0.5
Sugar and Sweets	Sugar	0.5
Milk and Milk Products	Milk	4
Condiments	Condiments	0

Figure 2: FCS and Protein Consumption by Income Group



Determining What influences FCS

- ▶ **OLS regressions** were estimated for **all** the households and then estimated **per income group**.

$$y_i = \sum \beta_j x_{ji} + e_i$$

Where y is the FCS and i represents household i and the j 's index the explanatory variables included in the regressions, x , and the e is the error term.

- ▶ Models' were clustered at the village level.

Quintile Regression Results

VARIABLES	All	Poorest	2nd Poorest	Middle	2nd Richest	Richest
Ln(Cereal Price)	0.055***	0.004	0.013	0.091***	0.096***	0.017
Ln(Root Price)	0.004	0.047	-0.036	-0.069	0.017	0.089
Ln(Banana Price)	-0.034***	-0.072**	-0.023	-0.042	-0.033	-0.032
Ln(Meat Price)	0.157***	0.154***	0.194***	0.173***	0.172***	0.122***
Ln(Bean Price)	-0.225***	-0.379***	-0.283***	-0.224**	-0.222**	-0.253**
Ln(Milk Price)	-0.079***	-0.087*	-0.081	-0.027	-0.150***	-0.074
Ln(Total Exp)	0.119***	0.114***	0.117***	0.090***	0.128***	0.143***
Milk Project	-0.066***	-0.112**	-0.089**	0.004	0.067	-0.102*
HH Size	-0.018***	-0.025**	-0.000	-0.020	-0.027*	-0.019
HH Head Edu	0.018***	0.034***	0.016	-0.003	0.018	0.019*
Taken Loan	0.012	0.034	0.008	0.078***	-0.036	-0.031
Time To Market	-0.000***	-0.001***	-0.000	-0.000	-0.000	0.000
Dist To Main Road	-0.000***	-0.000	-0.000	-0.000	-0.000*	-0.000**
Own Land	0.027**	0.018	0.050*	0.027	-0.005	0.003
Land Size	0.024***	0.030***	0.016	0.018**	0.015	0.013
Beans Cropped	0.092***	0.140**	0.114**	0.139**	0.093*	0.119***
Maize Cropped	-0.026*	-0.013	-0.028	-0.032	-0.035	-0.107***
SPotato Cropped	-0.023**	-0.002	0.003	-0.014	-0.033	-0.127***
Poultry	0.056***	0.056*	0.059**	0.050	0.048	0.056*
Cattle	0.092***	0.130***	0.062**	0.113***	0.048	0.066**
Fertilizer	0.013	0.011	0.004	0.054*	0.067**	-0.001
Irrigation	0.100***	0.101*	0.106*	0.092**	0.073	0.104
Constant	2.949***	4.261***	3.357***	2.903***	2.792***	3.033***
Observations	3,587	563	586	612	499	406
R-squared	0.348	0.355	0.287	0.313	0.380	0.505

Food Prices and Expenditure

VARIABLES	All	Poorest	2nd Poorest	Middle	2nd Richest	Richest
Ln(Cereal Price)	0.055***	0.004	0.013	0.091***	0.096***	0.017
Ln(Root Price)	0.004	0.047	-0.036	-0.069	0.017	0.089
Ln(Banana Price)	-0.034***	-0.072**	-0.023	-0.042	-0.033	-0.032
Ln(Meat Price)	0.157***	0.154***	0.194***	0.173***	0.172***	0.122***
Ln(Bean Price)	-0.225***	-0.379***	-0.283***	-0.224**	-0.222**	-0.253**
Ln(Milk Price)	-0.079***	-0.087*	-0.081	-0.027	-0.150***	-0.074
Ln(Total Exp)	0.119***	0.114***	0.117***	0.090***	0.128***	0.143***

- 1% increase in the price of Cereals leads to a .05% increase in FCS, impacts middle to 2nd Richest groups
- 1% increase in expenditures leads to a .11% increase in FCS for the poor

Production

VARIABLES	All	Poorest	2nd Poorest	Middle	2nd Richest	Richest
Own Land	0.027**	0.018	0.050*	0.027	-0.005	0.003
Land Size	0.024***	0.030***	0.016	0.018**	0.015	0.013
Beans Cropped	0.092***	0.140**	0.114**	0.139**	0.093*	0.119***
Maize Cropped	-0.026*	-0.013	-0.028	-0.032	-0.035	-0.107***
SPotato Cropped	-0.023**	-0.002	0.003	-0.014	-0.033	-0.127***
Poultry	0.056***	0.056*	0.059**	0.050	0.048	0.056*
Cattle	0.092***	0.130***	0.062**	0.113***	0.048	0.066**
Irrigation	0.100***	0.101*	0.106*	0.092**	0.073	0.104


Ownland, leads to a 2.7% increase in FCS score

Policy

VARIABLES	All	Poorest	2nd Poorest	Middle	2nd Richest	Richest
Land Husbandry	0.013	-0.050	0.015	-0.019	-0.004	0.030
Milk Supply Chain Project	-0.066***	-0.112**	-0.089**	0.004	0.067	-0.102*
VUP	-0.009	-0.045	0.006	0.015	-0.039	-0.071*
Land Consolidation	-0.008	-0.030	0.012	0.025	0.005	-0.043
IDP	-0.005	-0.031	0.021	-0.014	-0.003	-0.002
StructuredU	0.010	0.002	-0.024	-0.006	0.059*	0.046
Other Programs	0.025*	-0.016	0.003	0.033	0.027	0.048



Findings

- Rwandan rural households are price and expenditure sensitive.
 - Households rely on own production (both crops and animals) to diversify their diets.
 - Most of the programs analyzed do not improve FCS scores for the households located in the villages they were implemented.
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What will it take to improve FCS of Rural Households

- ▶ How much does household food expenditure have to increase for the poorest rural households to consume similar to highest income group.
- ▶ Pseudo- FCS Expenditure Elasticities

$$\varepsilon_{\text{exp}} = \frac{\% \text{ change in FCS}}{\% \text{ change in total expenditure}}$$

Pseudo- FCS Expenditure Elasticities

Table: Additional Food Expenditure Needed by Income Group to Attain the Highest FCS diet in Rwanda.

	FCS	FCS Total (Food Only) Expend. Elasticity	Average Total Expend.	Average Food Expend.	Extra Food Expenditure Needed for Highest FCS
Poorest	40.6	0.11 (0.08)	RF 18,268	RF 6,849	RF 36,695
2nd Lowest	42.7	0.12 (0.08)	RF 20,964	RF 8,609	RF 36,725
Middle	46.1	0.09 (0.05)	RF 27,972	RF 10,540	RF 51,338
2nd Richest	49.1	0.13 (0.12)	RF 40,514	RF 14,272	RF 21,924
Richest	58	0.14 (0.13)	RF 87,771	RF 21,472	RF 0



Findings

- Rwandans are price and expenditure sensitive on the demand side and thin markets exist on the supply side with distant markets that provide little diversity of foods in the rural markets.
- Animal based protein, which is of high biological value, and important for growth, was found to be the limiting factor for high levels of dietary diversity for the poor.
- Increasing protein in the diet through addressing relative prices will have a small effect on FCS.



Implications for Supply Chain Investments

- ▶ Invest in cold chains
 - ▶ Enhance the availability of animal based food supply chains
- ▶ Invest in small retailer chains
 - ▶ Informal markets do not have the capacity or ability to offer multiple food products (thin markets),
- ▶ Invest in Vitamin and micronutrient Fortification
 - ▶ Fortify grain, cereal and pulses to address stunting and malnutrition



THANK YOU !



Marie Steele

Ph.D. Candidate

Michigan State University

Steele37@msu.edu