



**AGRICULTURE AND NUTRITION: TRENDS IN HOUSEHOLD PRODUCTION
AND RETENTION OF NUTRIENTS AND ANALYSIS OF PATTERNS IN
NUTRITIONAL OUTCOMES**

Rui Benfica
Cynthia Donovan
Jaqueline Massingue

Michigan State University
Mozambique Policy Analysis and Planning Capacity for Improved
Food Security and Nutrition Outcomes (MOZCAPAN)



OUTLINE

- Objectives
- Data Sources
- Trends in Household production and retention of basic staple crops
 - Production and retention trends
 - Trends in retention of energy, proteins and lipids from crops
- Analysis of patterns in nutritional outcomes and household cash dependency
 - Nutritional outcomes
 - Cash dependency and nutritional outcomes
- Policy Implications and further research



OBJECTIVES

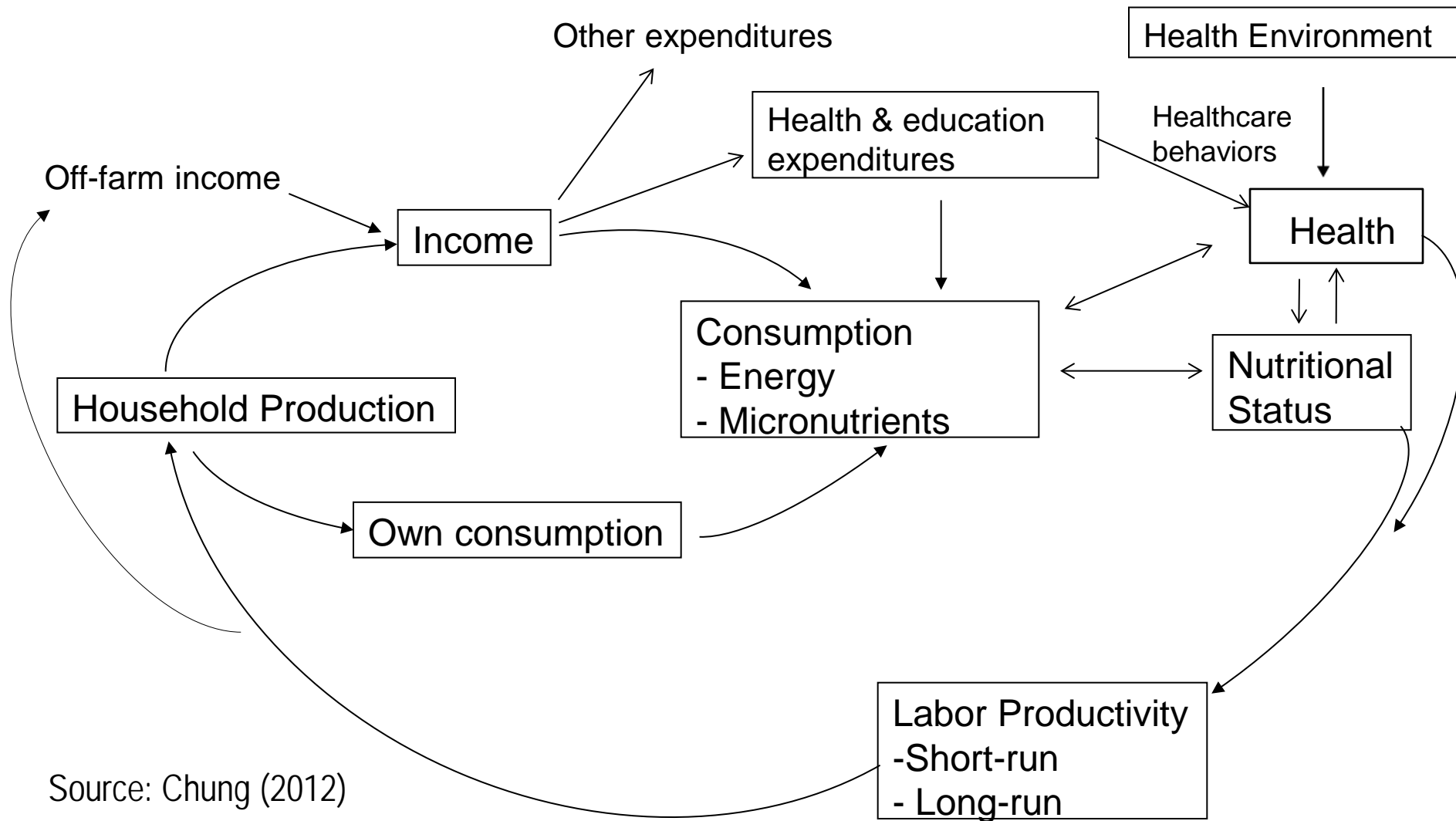
- Evaluate spatial trends in production and retention of macronutrients of basic staple crops
- Evaluate spatial distribution of calorie intake deficiency, structure, and dietary diversity
- Explore the relationship between own production (vs. cash) dependency in consumption and nutritional outcomes
- Derive programmatic and policy implications



DATA SOURCES

- TIA2002-2008 and IAI2012 Agricultural Household Surveys for household production and retention analysis of 13 basic staple crops
- IOF2008/9 Consumption Expenditure Survey for analysis of household nutritional outcomes

FRAMEWORK FOR ANALYZING AGRICULTURE NUTRITION LINKAGES





TRENDS IN HOUSEHOLD PRODUCTION AND RETENTION OF BASIC STAPLE CROPS

- Trends in production and retention for the selected 13 basic crops in rural areas (national)
- Trends in selected crops by region
 - Common beans
 - Pigeon pea
- Retained energy and proteins from crops by region

PRODUCTION AND RETENTION TRENDS FOR BASIC STAPLE CROPS

--- ALL RURAL AREAS ---

| Commodity | Production 2012 (metric tons) | Trends | |
|-------------------------------|----------------------------------|------------|-----------|
| | | Production | Retention |
| Maize | 1,170,651 | ↑ | — |
| Rice | 101,548 | — | — |
| Sorghum | 139,261 | ↑ | — |
| Millet | 21,945 | ↓ | — |
| Groundnut -Large | 24,731 | — | — |
| Groundnut - Small | 85,303 | ↑ | — |
| Common bean | 55,297 | ↑ | ↓↑ |
| Cowpea | 85,484 | — | — |
| Bambara nut | 19,351 | — | — |
| Pigeon pea | 113,452 | ↑↑ | ↓ |
| Cassava | 4,098,997 | ↓ | na |
| Sweet Potato (orange fleshed) | 133,162 | ↑ | na |
| Sweet Potato (white fleshed) | 453,537 | — | na |

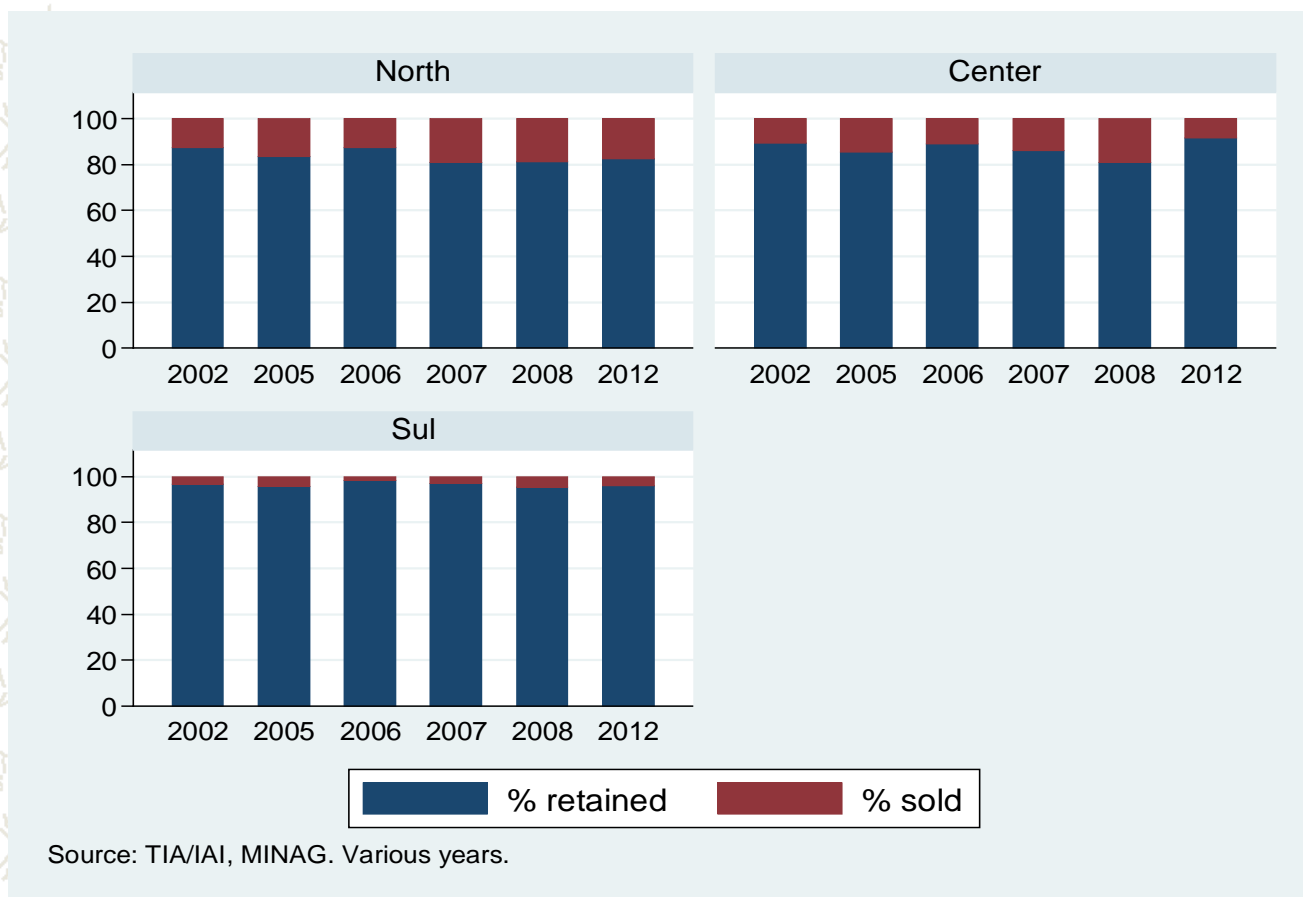
Note: na= information not available on sales.

Source: TIA/IAI, MINAG. Various years.

TRENDS IN RETENTION AND SALES OF SELECTED CROPS

--- BY RURAL REGION ---

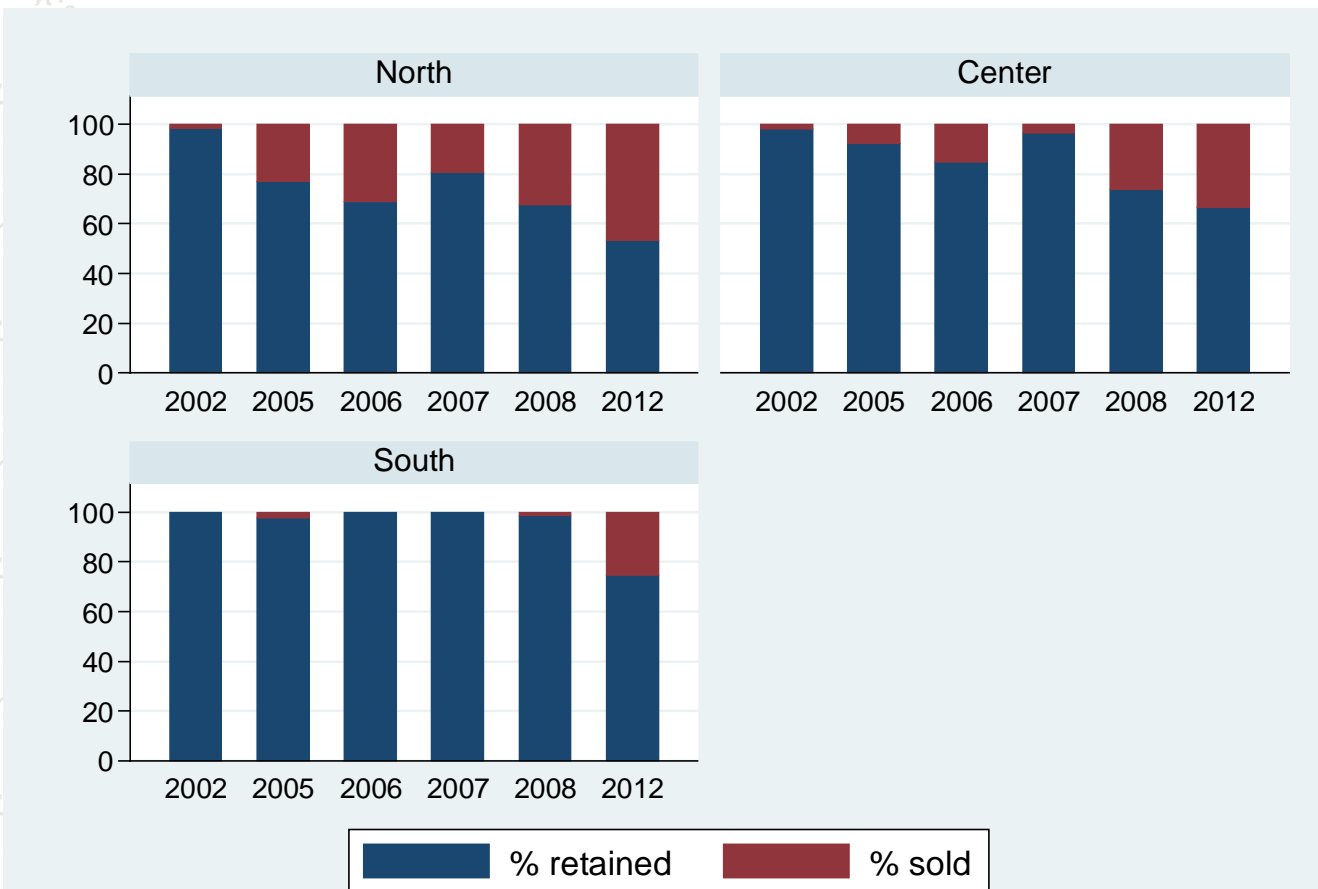
Maize



TRENDS IN RETENTION AND SALES OF SELECTED CROPS

--- BY RURAL REGION ---

Pigeon Pea

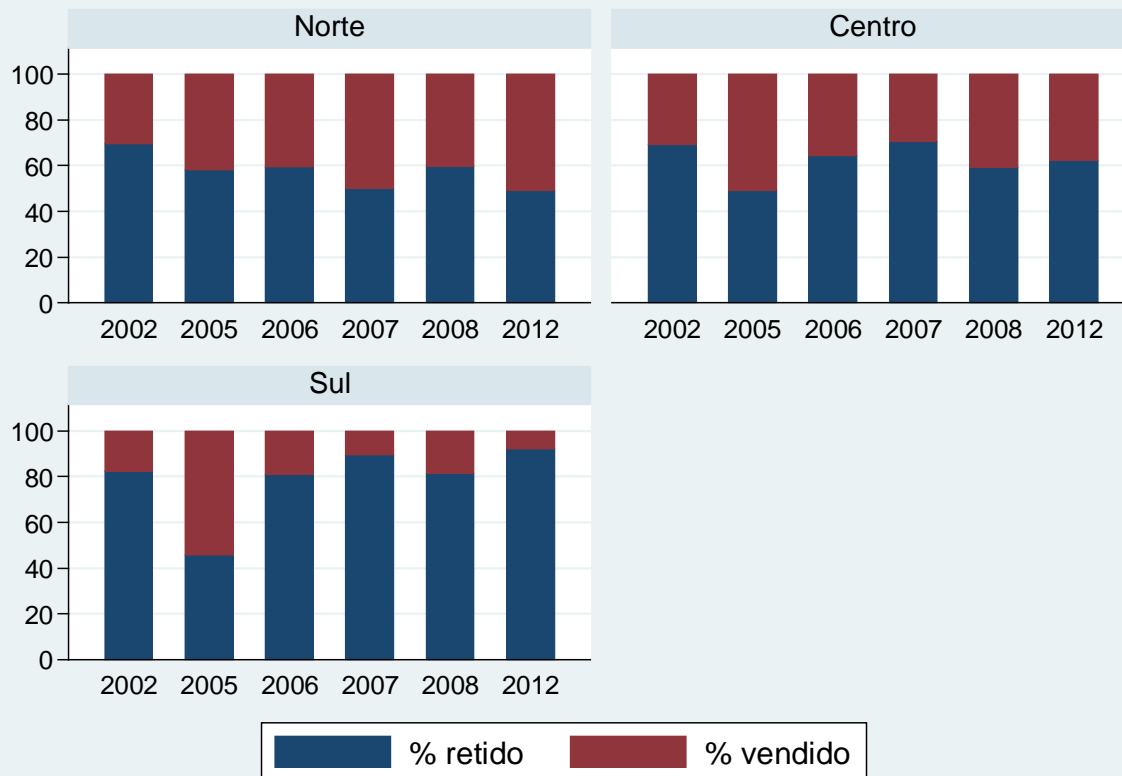


Source: TIA/IAI, MINAG. Various years.

TRENDS IN RETENTION AND SALES OF SELECTED CROPS

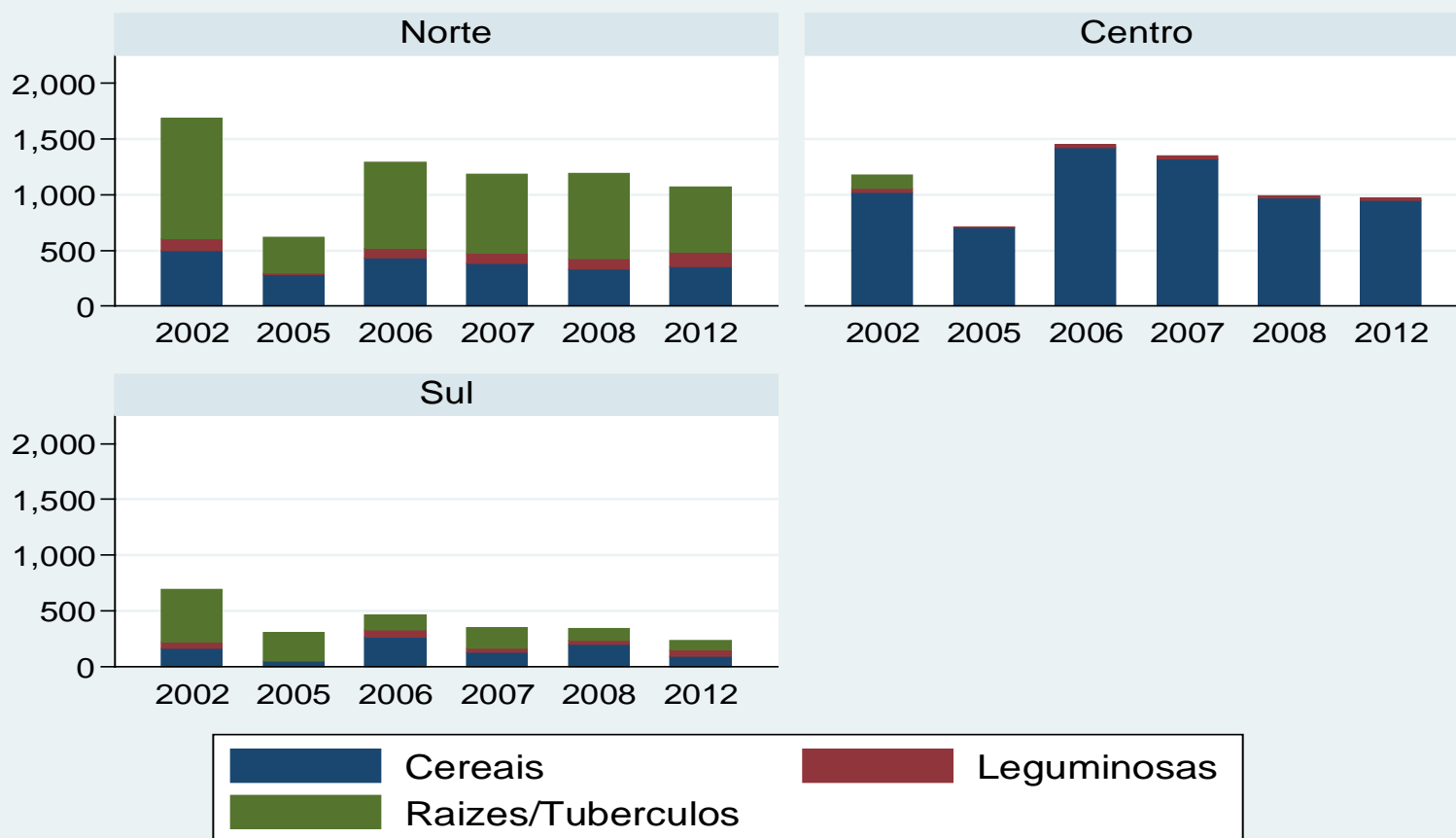
--- BY RURAL REGION ---

Common Beans



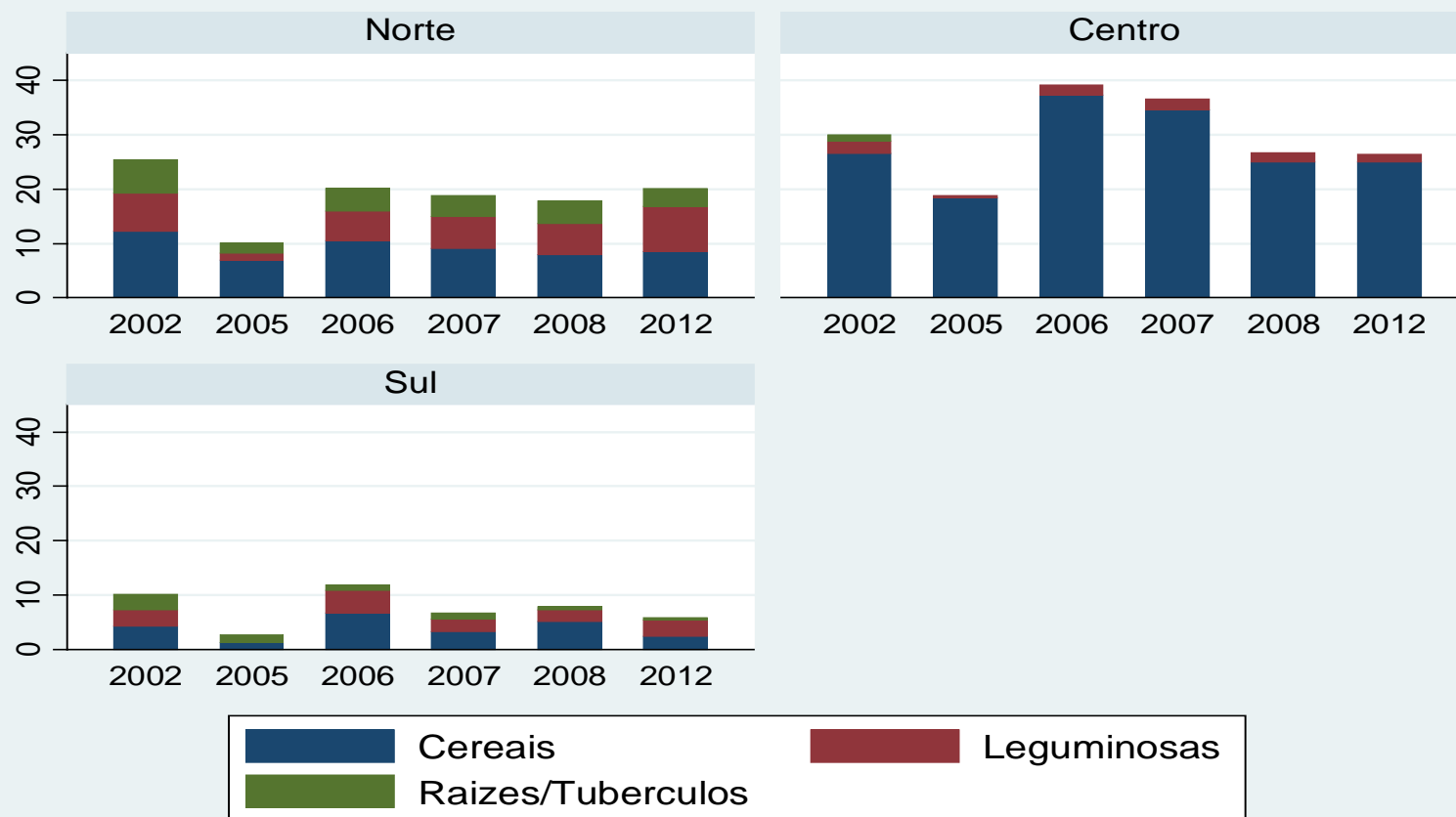
Fonte: TIA/IAI, MINAG. Varios anos.

RETAINED ENERGY (KILOCALORIES) FROM BASIC CROPS, 2002-2012, BY REGION (median, gr kcal/Adult Equivalent/day)



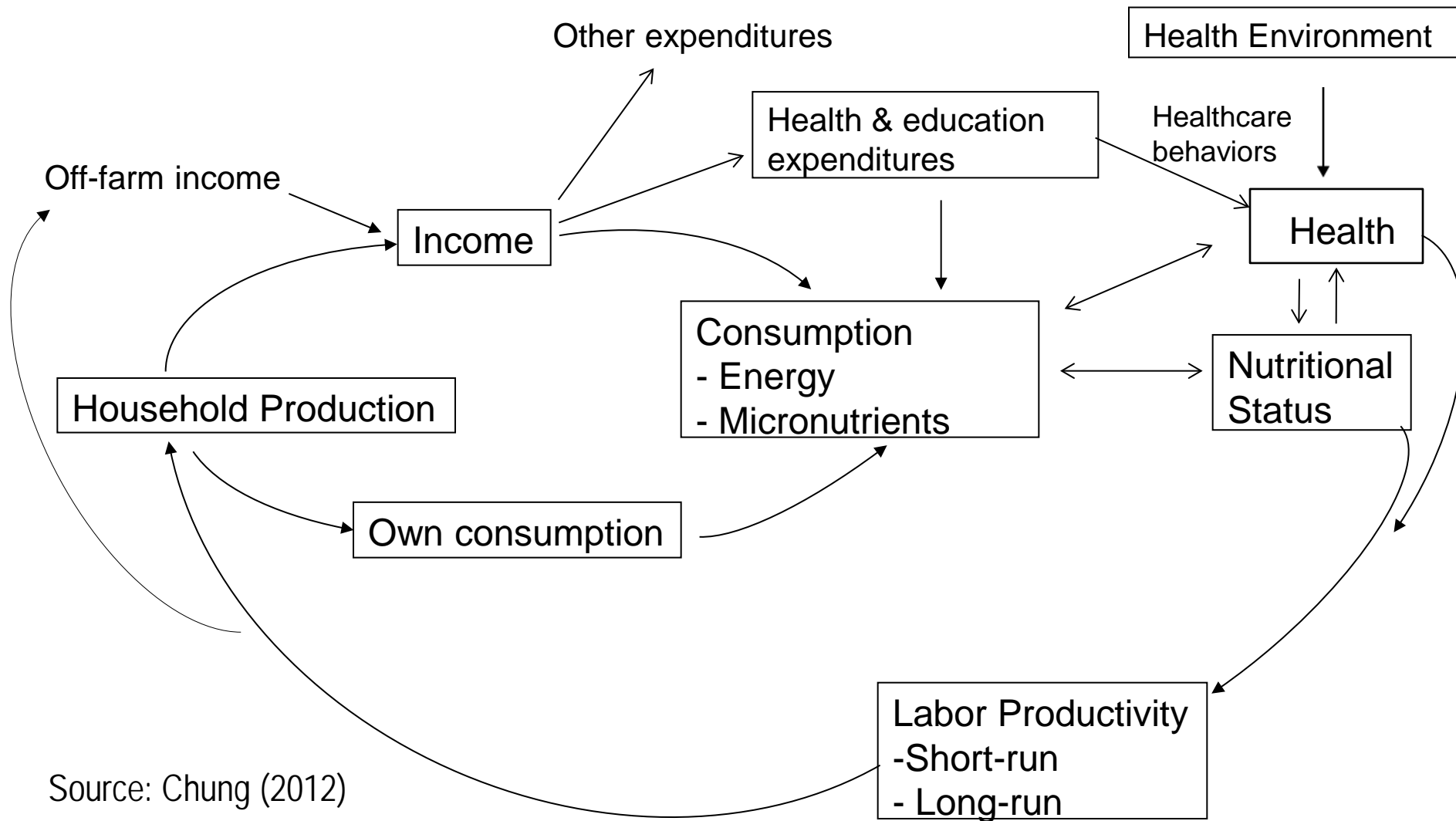
Fonte: TIA/IAI, MINAG. Varios anos.

RETAINED PROTEIN FROM BASIC CROPS, 2002-2012, BY REGION (median, gr prot/Adult Equivalent/day)



Fonte: TIA/IAI, MINAG. Varios anos.

FRAMEWORK FOR ANALYZING AGRICULTURE NUTRITION LINKAGES





ANALYSIS OF PATTERNS IN NUTRITIONAL OUTCOMES AND OWN PRODUCTION DEPENDENCY

- Defining nutritional outcomes
- Nutritional outcomes by province and poverty status
- Own production versus cash dependency and nutritional outcomes

DEFINING NUTRITIONAL OUTCOMES

- Calorie insufficiency rate : share of households with calorie intake per capita per day below defined requirement thresholds for 13 spatial domain
- Simpson dietary diversity index (SDI)

$$SDI_h = 1 - \sum_{i=1}^n ShCal_{hi}^2$$

Ranges from “0” (not diversified, all calorie intake from only one commodity) to “1” (very diversified)

- Structure of calorie consumption by food groups

CALORIC INSUFFICIENCY AND DIETARY DIVERSITY

--- by province and poverty status ---

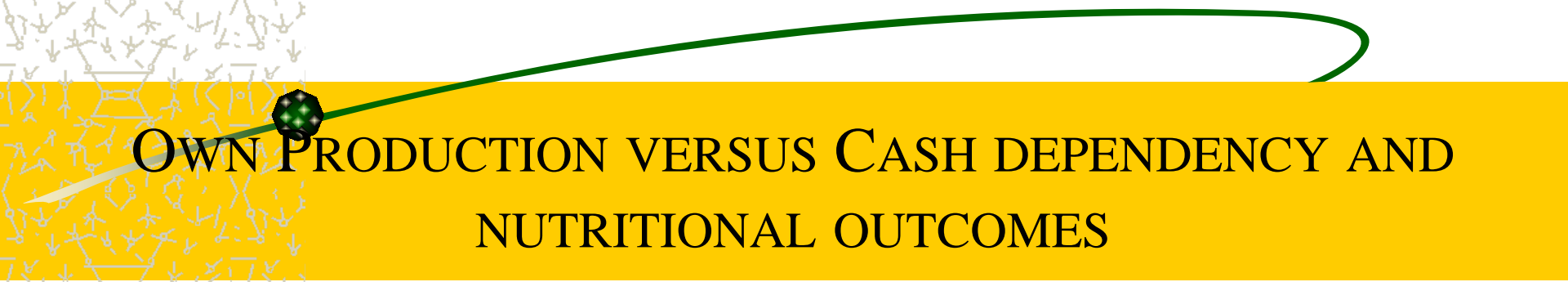
| Location and Poverty Status | Household Level Outcomes | |
|-----------------------------|---|-------------------------|
| | % Not Meeting Calorie per capita Requirements | Simpson Diversity Index |
| Rural Mozambique | 56.4 | 0.51 |
| Rural Provinces | | |
| Niassa | 48.0 | 0.50 |
| Cabo Delgado | 43.4 | 0.62 |
| Nampula | 50.0 | 0.56 |
| Zambezia | 61.2 | 0.52 |
| Tete | 65.8 | 0.35 |
| Manica | 54.6 | 0.50 |
| Sofala | 61.7 | 0.48 |
| Inhambane | 46.8 | 0.56 |
| Gaza | 74.1 | 0.50 |
| Maputo | 62.7 | 0.44 |
| Rural Poverty Status | | |
| Poor | 75.5 | 0.50 |
| Non-Poor | 28.8 | 0.53 |

STRUCTURE OF CALORIE INTAKE BY FOOD GROUPS

--- by province and poverty status ---

| Location and Poverty Status | Disaggregated Caloric Consumption: Share of Calorie Consumption per person per day by Food Groups (%) | | | | | | |
|-----------------------------|--|------------------|-----------------------|--------------|------------------|---------------|---------------------------|
| | Cereals | Roots and Tubers | Fruits and Vegetables | Nuts, pulses | Meat, Fish, Milk | Oils and Fats | Sugars, spices and others |
| Rural Mozambique | 59.0 | 8.5 | 5.5 | 15.0 | 5.2 | 3.3 | 1.5 |
| Rural Provinces | | | | | | | |
| Niassa | 63.7 | 4.6 | 5.2 | 9.3 | 7.2 | 6.0 | 2.5 |
| Cabo Delgado | 66.7 | 4.9 | 2.9 | 14.6 | 3.6 | 4.1 | 1.2 |
| Nampula | 57.3 | 12.0 | 2.9 | 18.0 | 5.0 | 1.6 | 1.1 |
| Zambezia | 66.4 | 11.1 | 2.3 | 13.0 | 5.3 | 1.0 | 0.6 |
| Tete | 68.1 | 4.4 | 7.1 | 8.6 | 2.8 | 4.4 | 1.2 |
| Manica | 59.4 | 3.8 | 7.0 | 5.3 | 10.5 | 8.8 | 2.4 |
| Sofala | 47.0 | 7.0 | 14.1 | 10.1 | 10.6 | 8.7 | 1.1 |
| Inhambane | 31.0 | 10.4 | 4.3 | 44.2 | 1.0 | 0.3 | 3.1 |
| Gaza | 45.9 | 10.9 | 14.2 | 18.4 | 3.1 | 2.1 | 3.6 |
| Mapulo | 70.0 | 4.3 | 7.7 | 9.8 | 3.1 | 2.4 | 2.5 |
| Poverty Status | | | | | | | |
| Poor | 55.2 | 9.4 | 7.3 | 16.2 | 5.6 | 3.0 | 1.4 |
| Non-Poor | 64.5 | 7.2 | 2.8 | 13.2 | 4.7 | 3.8 | 1.7 |

Source: Mozambique IOF Survey (2008/2009).

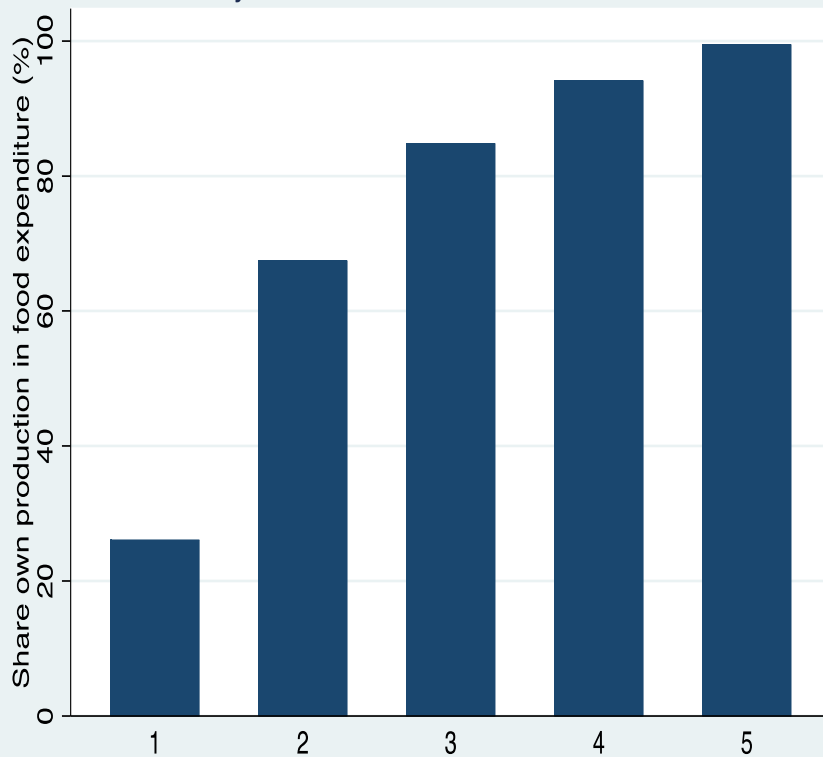


OWN PRODUCTION VERSUS CASH DEPENDENCY AND NUTRITIONAL OUTCOMES

- Cash dependency represents the degree of reliance of a household on cash in sourcing food consumption.
 - Flip Side: Own production dependency (used here)
- Alternative indicators:
 - Share of retained production in household income
 - Share of own production in food consumption expenditure

OWN PRODUCTION VERSUS CASH DEPENDENCY FOR HOUSEHOLD FOOD CONSUMPTION EXPENDITURE

Share of Own Production (SOP) in Food Expenditure
by Quintiles of SOP in Rural Areas



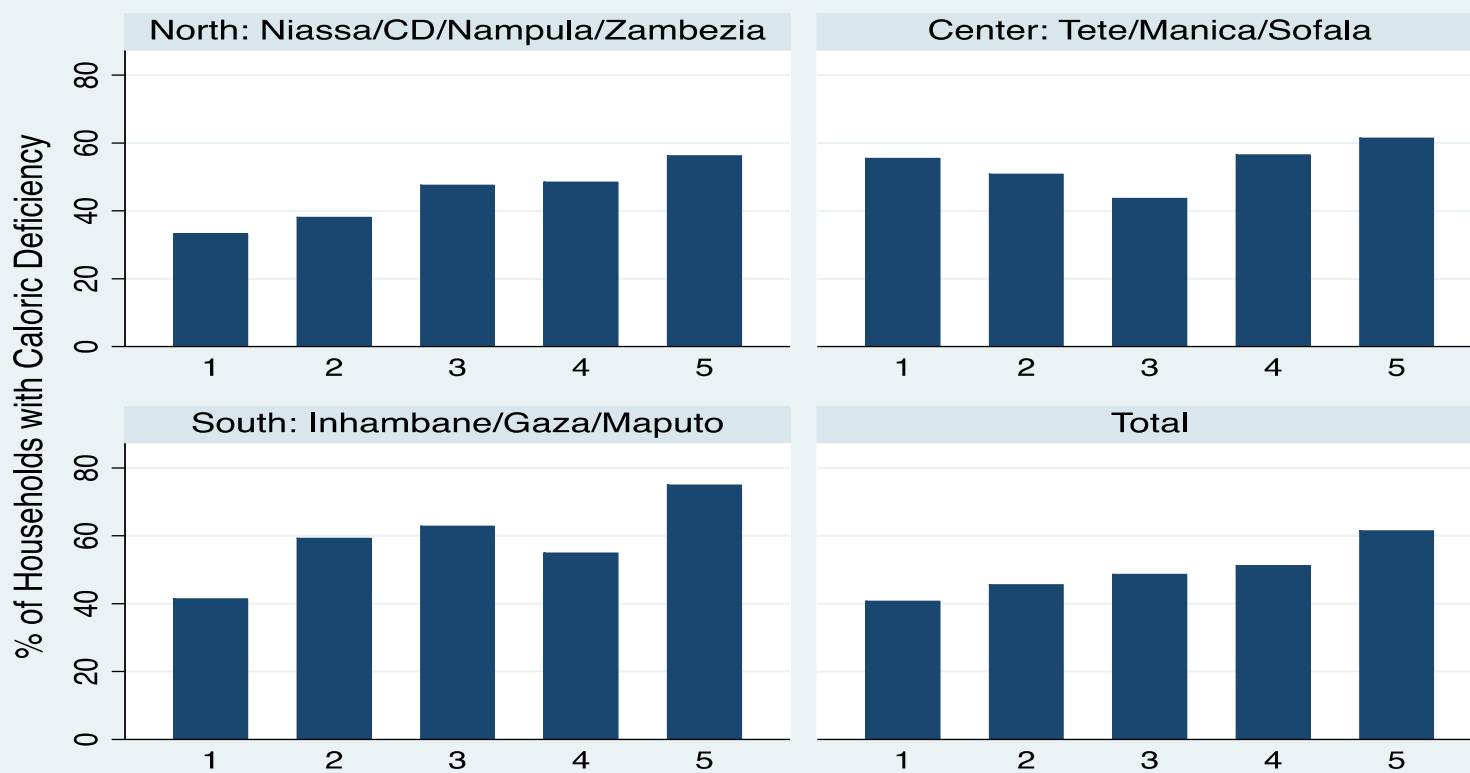
--- by province and poverty status ---

| Location and poverty status | Household own and cash reliance for consumption expenditure | |
|-----------------------------|---|---|
| | Share of own in Food Consumption expenditure | Share of cash expenditure in Food Consumption |
| Rural Mozambique | 74.8 | 25.2 |
| Rural Provinces | | |
| Niassa | 70.8 | 29.2 |
| Cabo Delgado | 77.2 | 22.8 |
| Nampula | 76.5 | 23.5 |
| Zambezia | 77.4 | 22.6 |
| Tete | 86.5 | 13.5 |
| Manica | 71.2 | 28.8 |
| Sofala | 66.2 | 33.8 |
| Inhambane | 72.0 | 28.0 |
| Gaza | 67.0 | 33.0 |
| Maputo | 52.9 | 47.1 |
| Rural Poverty Status | | |
| Poor | 74.7 | 25.3 |
| Non-Poor | 75.1 | 24.9 |

CALORIE DEFICIENCY BY OWN PRODUCTION DEPENDENCY

--- RURAL REGIONS AND TOTAL ---

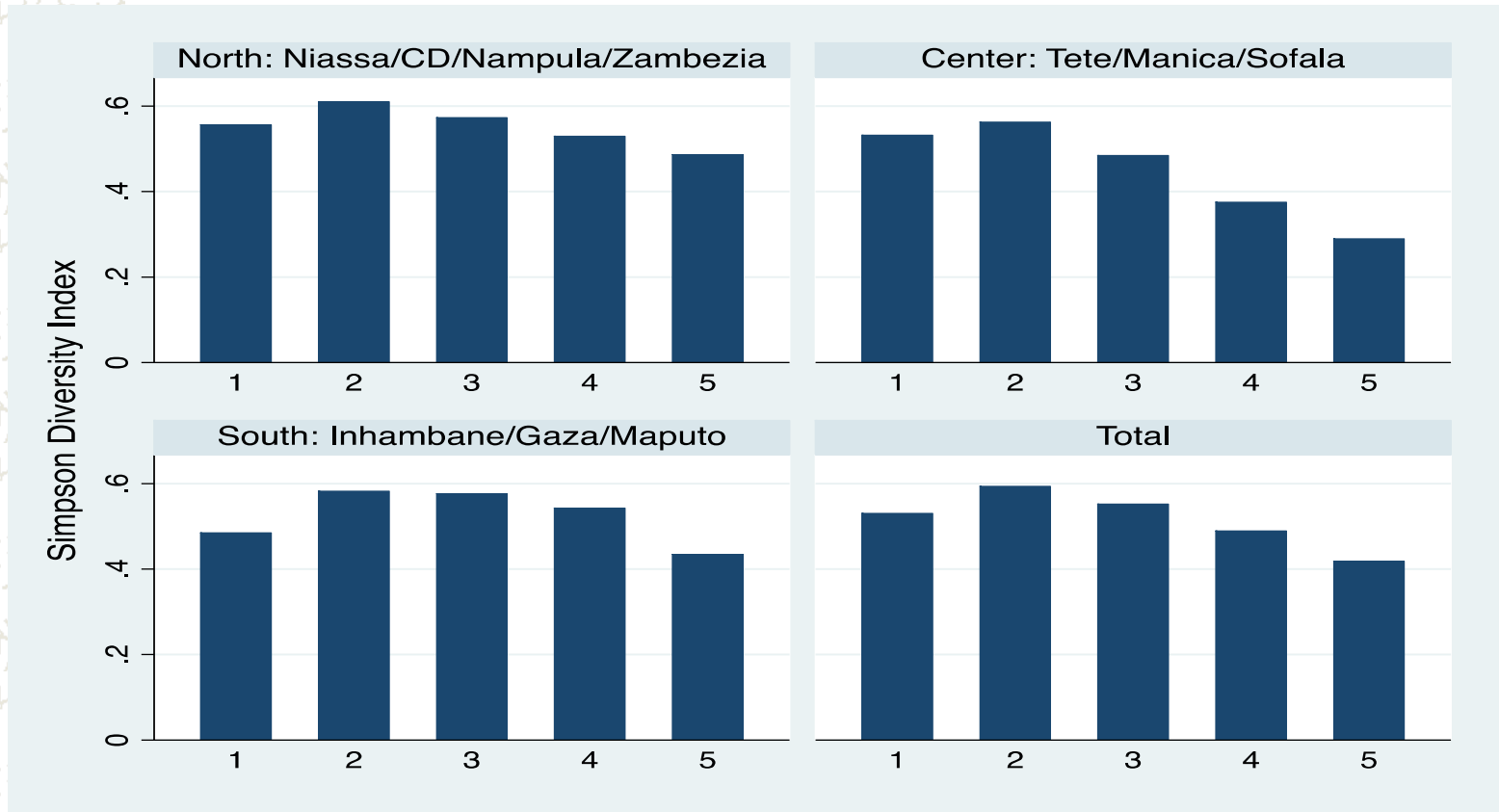
HOUSEHOLDS WITH CALORIC DEFICIENCY (%)
BY QUINTILES OF OWN PRODUCTION DEPENDENCY



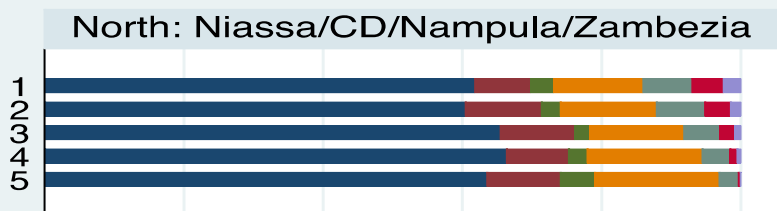
DIETARY DIVERSITY BY OWN PRODUCTION DEPENDENCY

--- RURAL REGIONS AND TOTAL ---

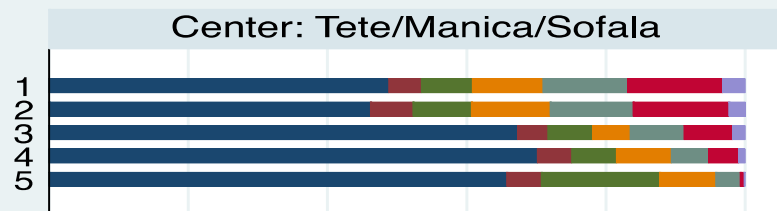
SIMPSON DIETARY DIVERSITY INDEX
BY QUINTILES OF OWN PRODUCTION DEPENDENCY



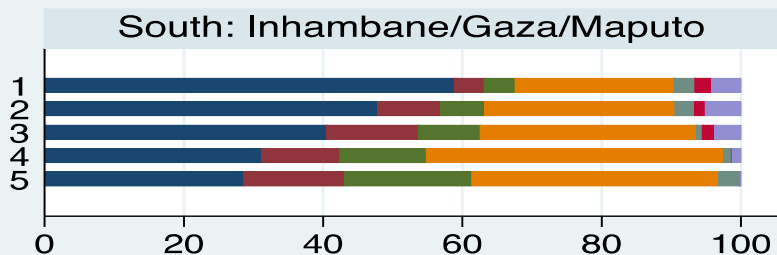
SHARE OF CALORIES (FOOD GROUPS) BY OWN PRODUCTION DEPENDENCY --- RURAL REGIONS AND TOTAL ---



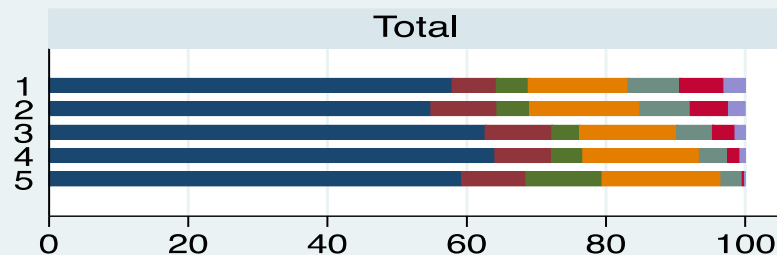
Fonte: IOF2008/9



Fonte: IOF2008/9



Fonte: IOF2008/9



Fonte: IOF2008/9

Share of calories



Graphs by region1



SUMMARY AND IMPLICATIONS FOR POLICY

- Few crops demonstrate positive trends in production since 2006 (exception: pigeon peas, common beans, orange fleshed sweet potatoes, maize and cassava in some provinces)
- Provincial/regional variability in production and retention of crops implies the need for research and extension to be location specific
- Production of legumes in the north provides valuable protein contributions unavailable in the center where production is more concentrated in maize
- A significant number of households does not meet minimum caloric intake requirements



SUMMARY AND IMPLICATIONS FOR POLICY

- There is some degree of diversification of diets but significant differences across regions
- Strong dependency on own production does not necessarily prevent households from adequate dietary energy intake. However, it is associated with lack of dietary diversity. This calls for the need to invest in agricultural marketing, and other non-crop/livestock sources of cash income
- Even those relying on cash experience relatively high calorie deficiency and diversity. This suggests that interventions such as nutrition education maybe important to improve nutritional status