

# Agriculture Can Improve Nutrition



Jess Fanzo, PhD

Center on Globalization and Sustainable Development

Columbia University

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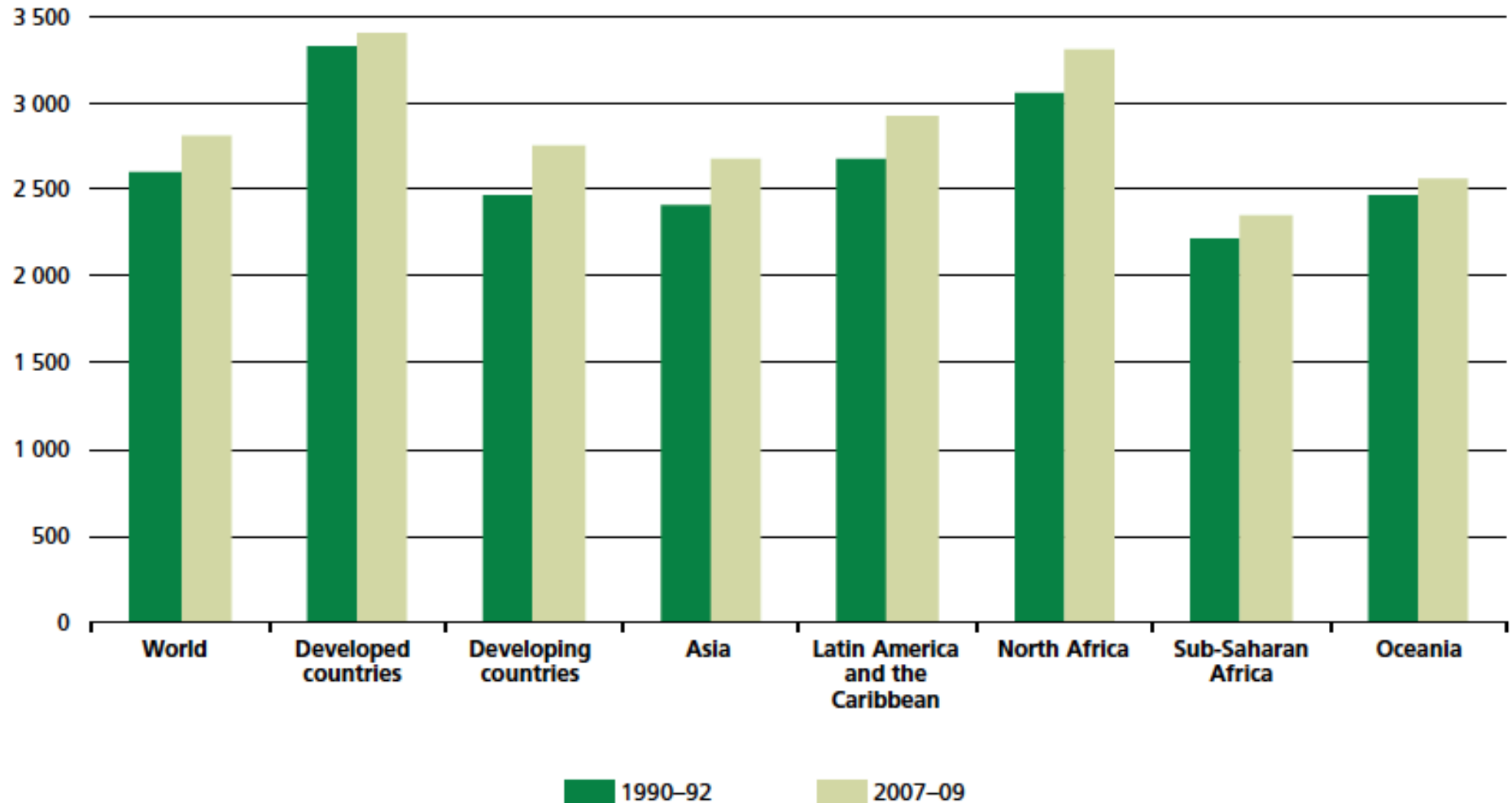
# Global Dietary Shifts



Momentum was produced by the United Nations Integrated Mission in Timor-Leste (UNMIT) in 2012

# Total Calories is increasing

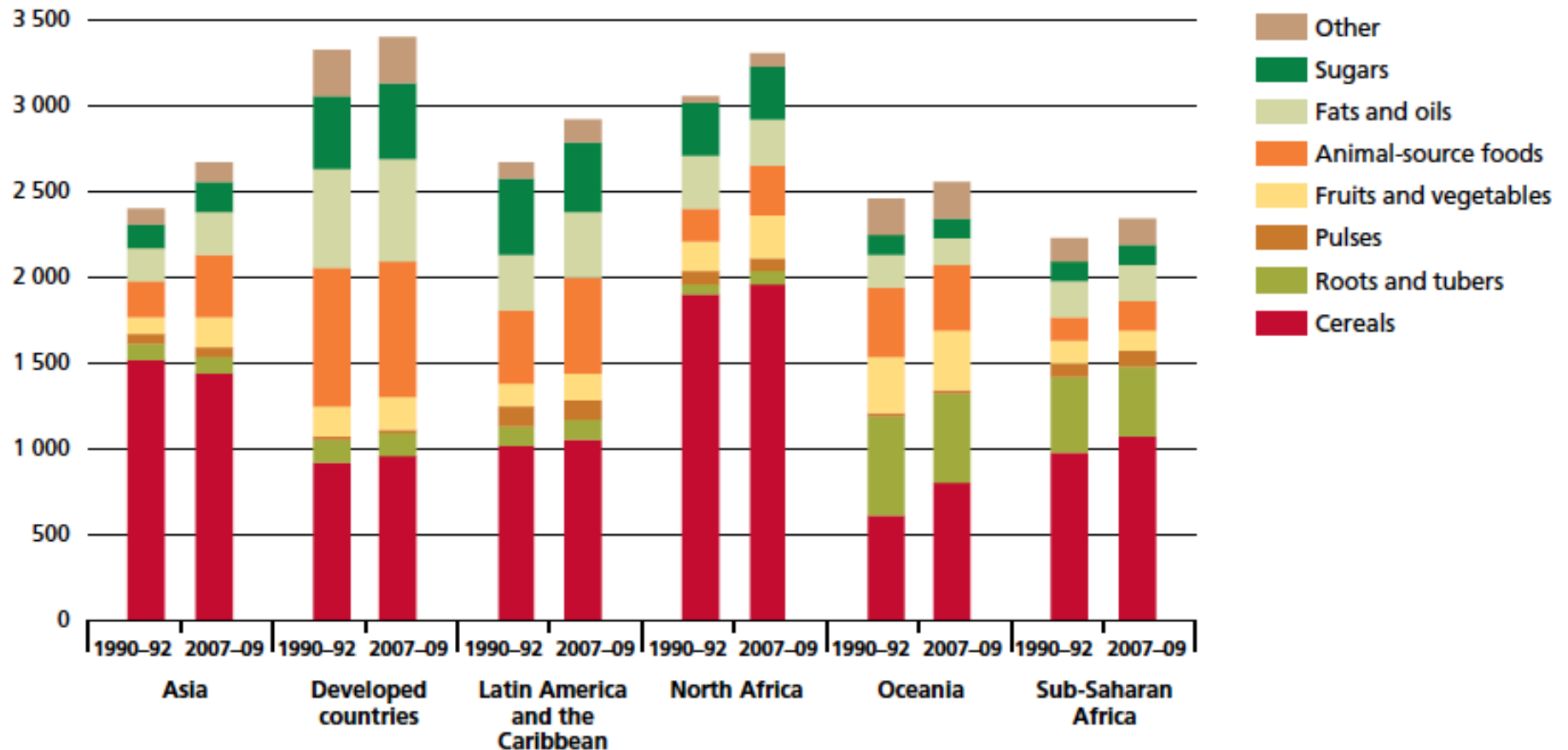
Dietary energy supplies (kcal/person/day)



Source: FAO.

# Diets are becoming more diverse everywhere

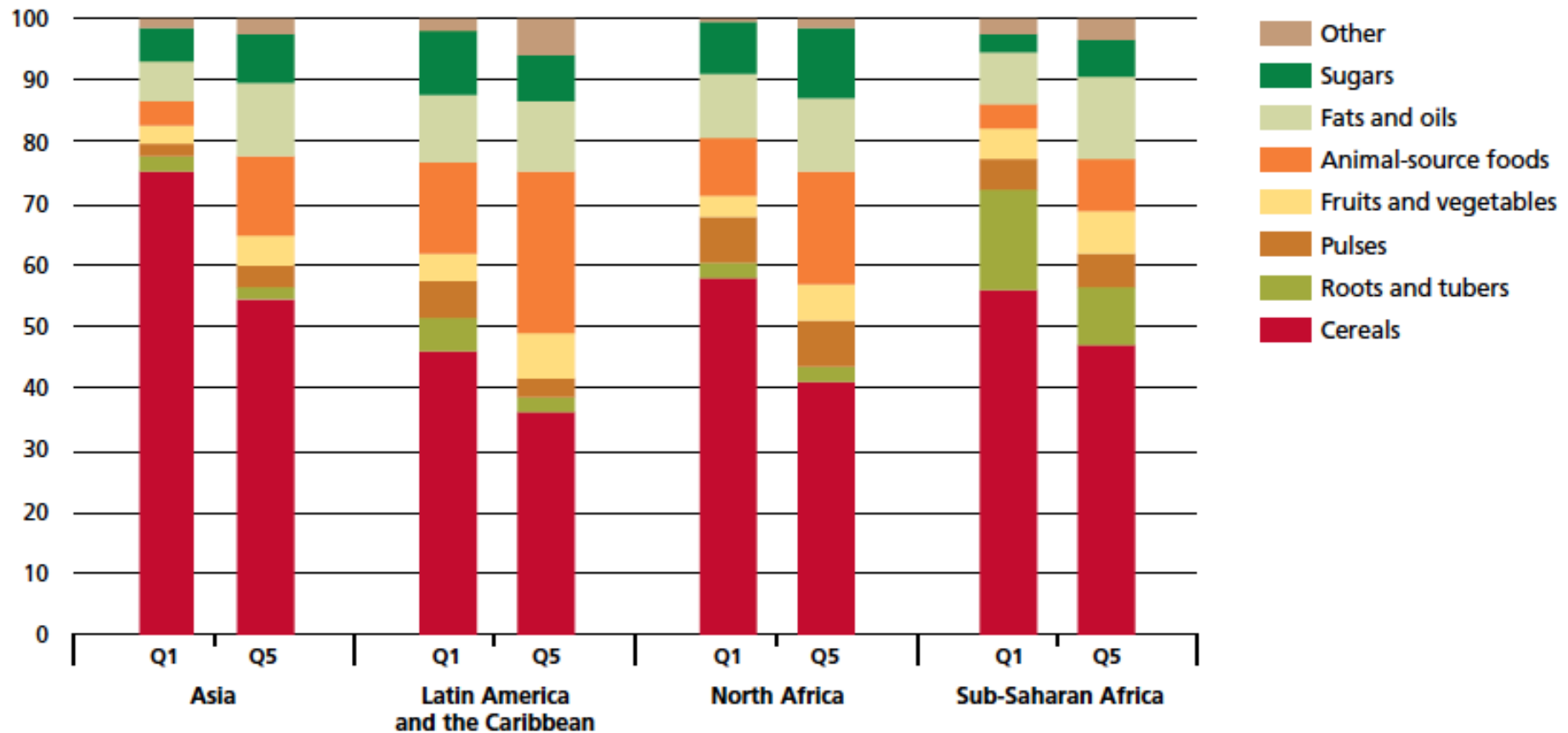
Contributions to total dietary energy supplies (kcal)



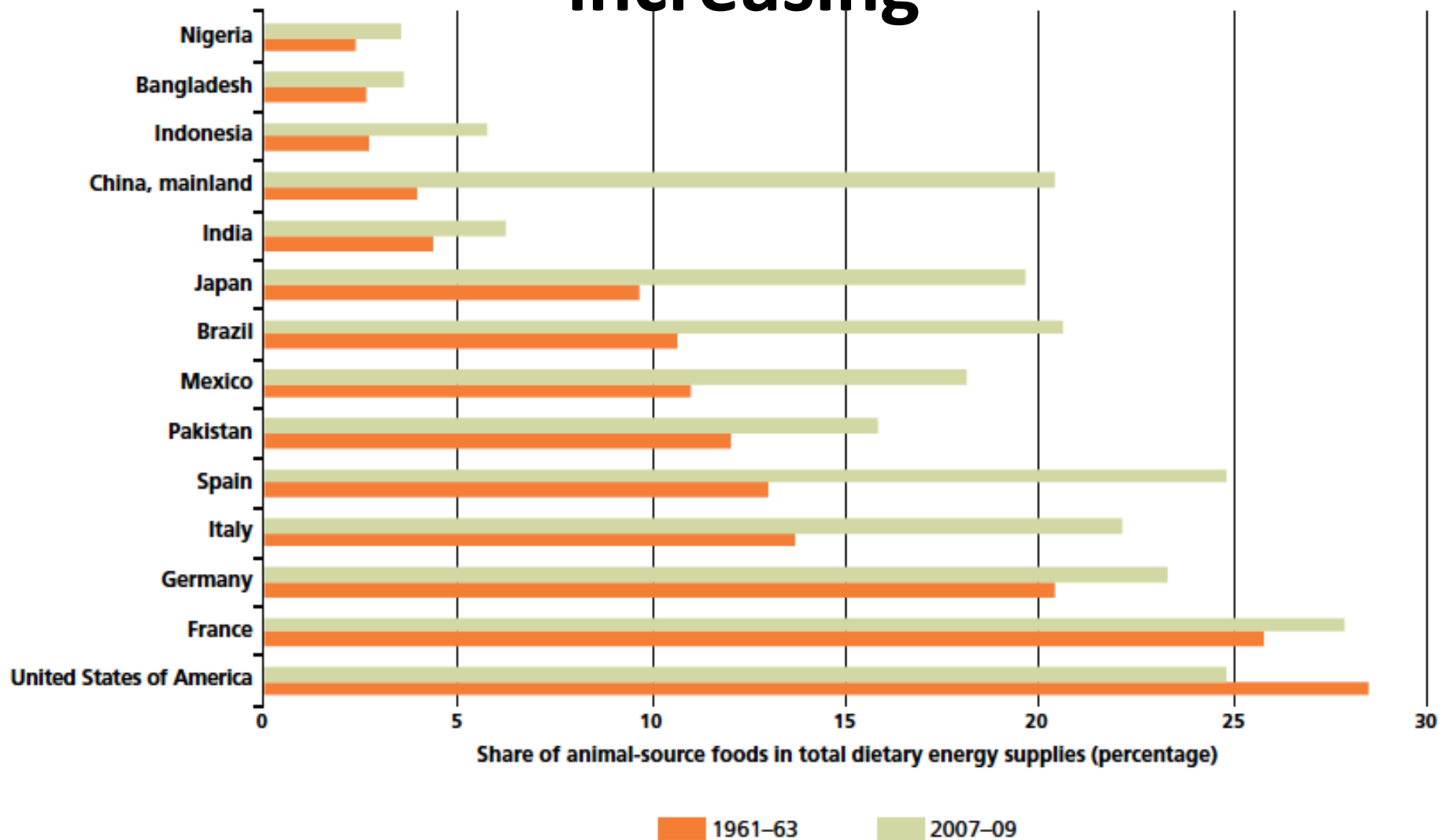


# With increased income, fat and animal source food consumption increases

Share of food groups in total dietary energy supplies (percentage)



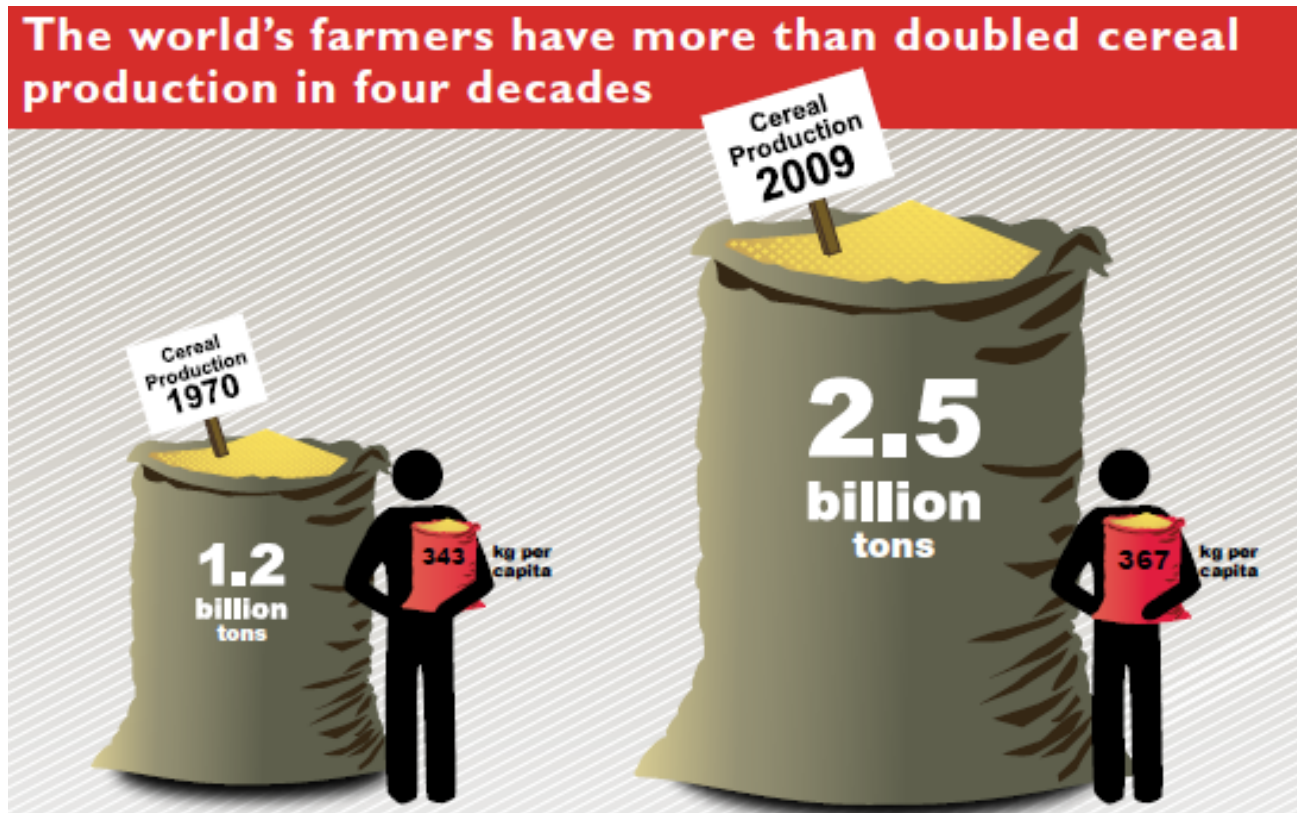
# Demand for animal foods is increasing



# A call for “nutrition sensitive” agriculture

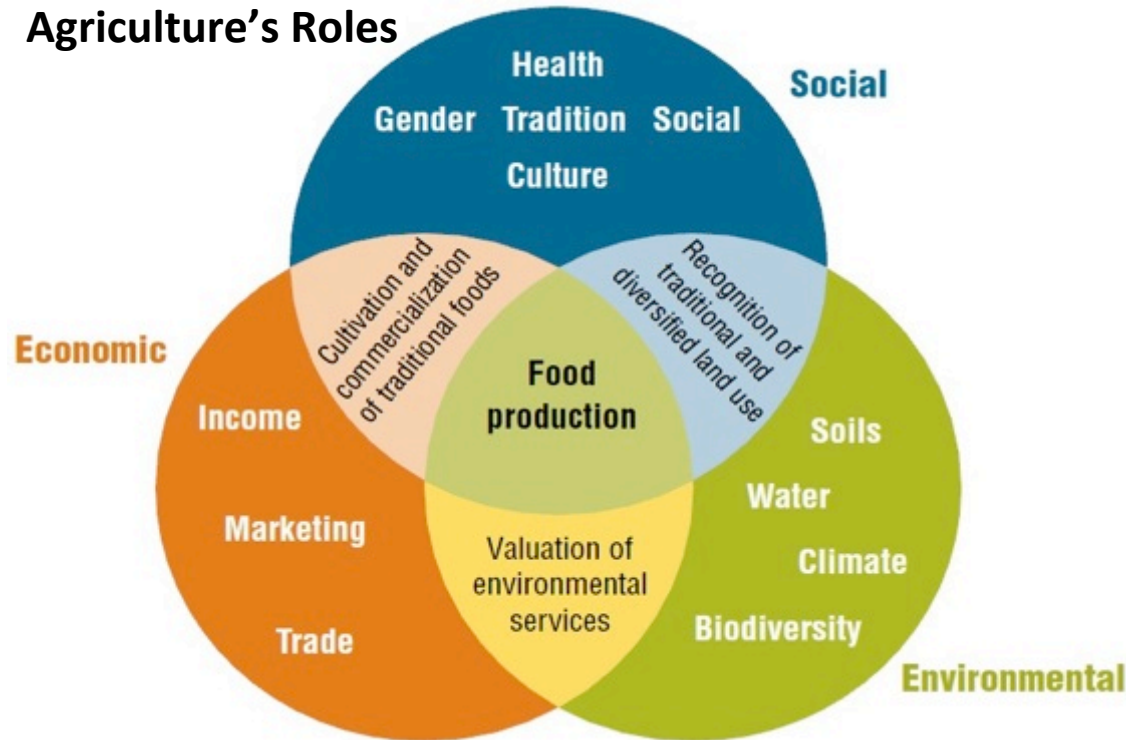


# Up to now, agriculture, for the most part, has forgotten about nutrition and health



Source: IFPRI

# But Agriculture plays many roles, often, competing



Bread for the world, 2010

# What is nutrition sensitive agriculture?

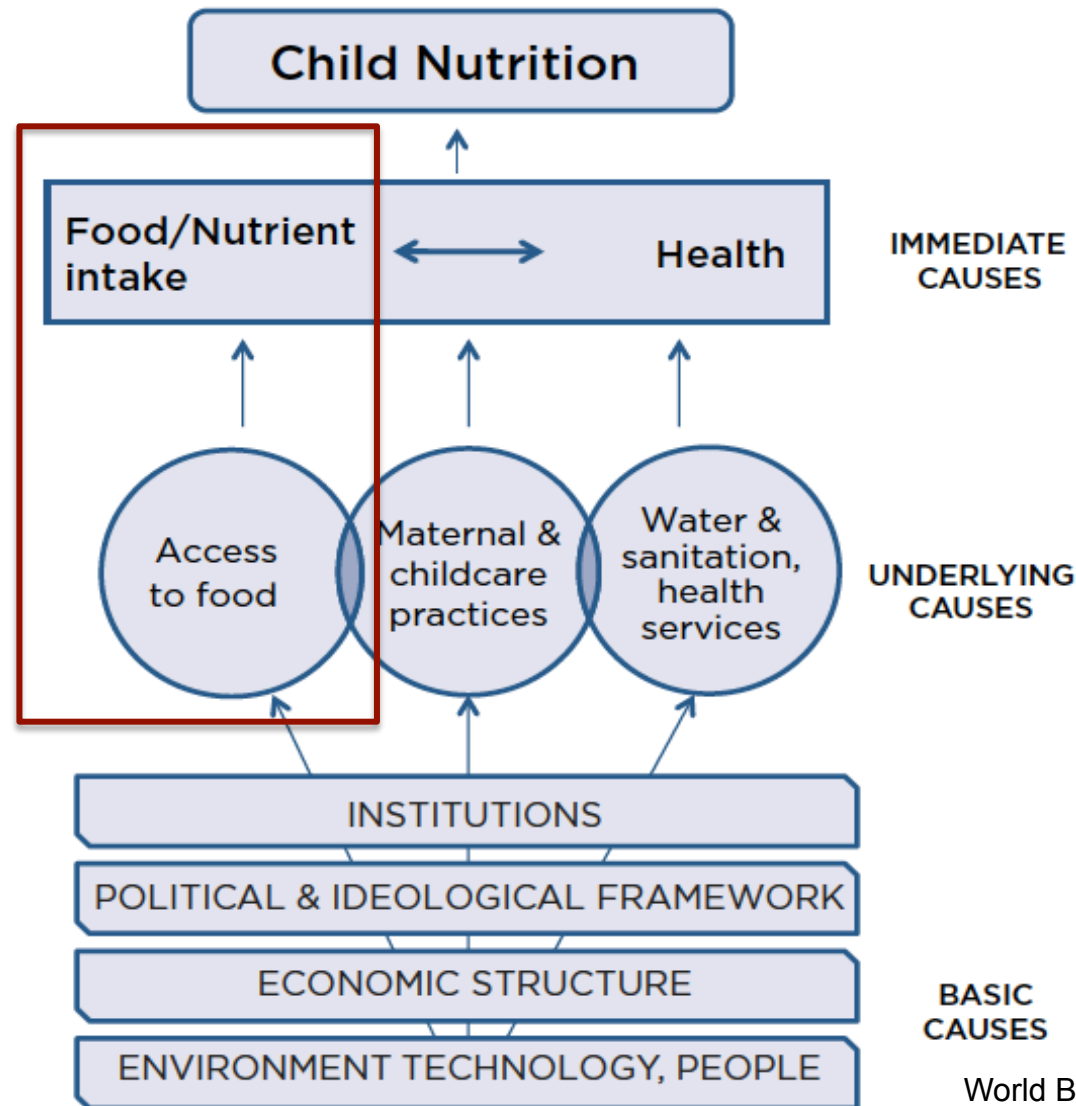
- Aims to maximize the impact of nutrition outcomes for the poor, while minimizing the unintended negative nutritional consequences of agricultural interventions and policies on the poor, especially women and young children.
- It is agriculture with a nutrition *lens*, and should not detract from the sector's own goals.



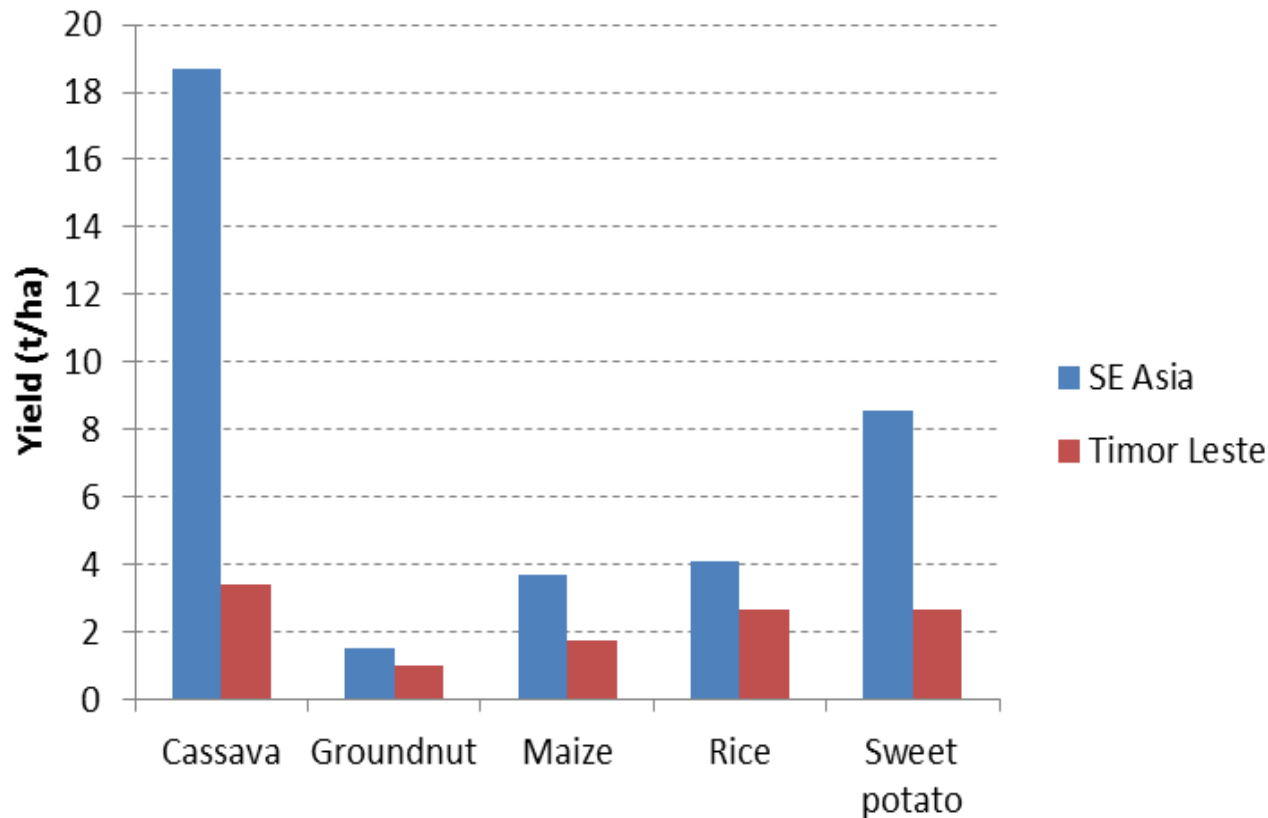
# Why agriculture?

- Agriculture is the sector best placed to affect food production and consumption of nutritious foods needed for healthy and active lives.
- Agriculture has the most direct influence and contact with the majority of households in the world where undernourished individuals reside.
- Agricultural-led growth is more pro-poor than non-agricultural-led growth; thereby increasing agriculture's potential to improve nutrition.
- A large percentage of rural women are employed in the formal or informal agriculture sector.

# Nutrition is a multi-dimensional Issue but one where agriculture is central



# Food Production in Timor Leste is lower as compared to SE Asia overall



Yields (Mt/ha) have fallen – by 12% and 63% for rice and maize respectively (comparing 2011 yields with the 2009 peak).

# Food Insecurity Coping Strategies exist in Timor-Leste

STRATEGIES	Covalima					Oecusse				
	N	Daily	1-2 times/week	3-5 times/week	Did not use	N	Daily	1-2 times/week	3-5 times/week	Did not use
<b>Reversible strategies</b>										
Ate cheap foods	82	33	49	17	1	59	7	70	20	3
Reduced meal size	82	26	40	32	2	59	2	44	34	20
Reduced number of meals	82	16	41	27	16	59	5	35	37	24
Skipped days with out eating	82	1	16	7	76	59	3	24	19	54
Sought assistance from relatives	82	2	33	12	53	59	2	37	19	42
Food loans/credits from local shops	82	2	26	11	61	59	2	14	14	70
Ate wild foods from bush/forest	82	6	36	18	40	59	5	19	22	54
Ate pawpaw and pumpkin leaves	82	37	34	24	5	59	3	31	17	49
<b>Irreversible strategies</b>										
Ate seeds kept for next planting	82	10	28	6	56	59	2	34	3	61
Bartered household items for food	82	4	23	13	60	59	-	15	9	76
Sold chickens/duck to buy food	82	5	50	27	18	59	-	59	14	27
Sold goats/sheep to buy food	82	2	39	10	49	59	-	39	12	49

# Staple Crop Consumption Dominates

- **Wheat, rice and maize supplies more than ½ of the world's food energy**
- Edible seeds of domesticated grasses: maize, sorghum, millets, wheat, rice, oats, teff, barley, quinoa, triticale are the major staple crops of the world
- These staple crops form the basis of most diets – up to 70% of energy intake in typical diet
- High in energy; some have moderate amounts of protein and B vitamins; low in vitamins A, C

# Consumption of Self Grown Crops by Farmers in Timor-Leste

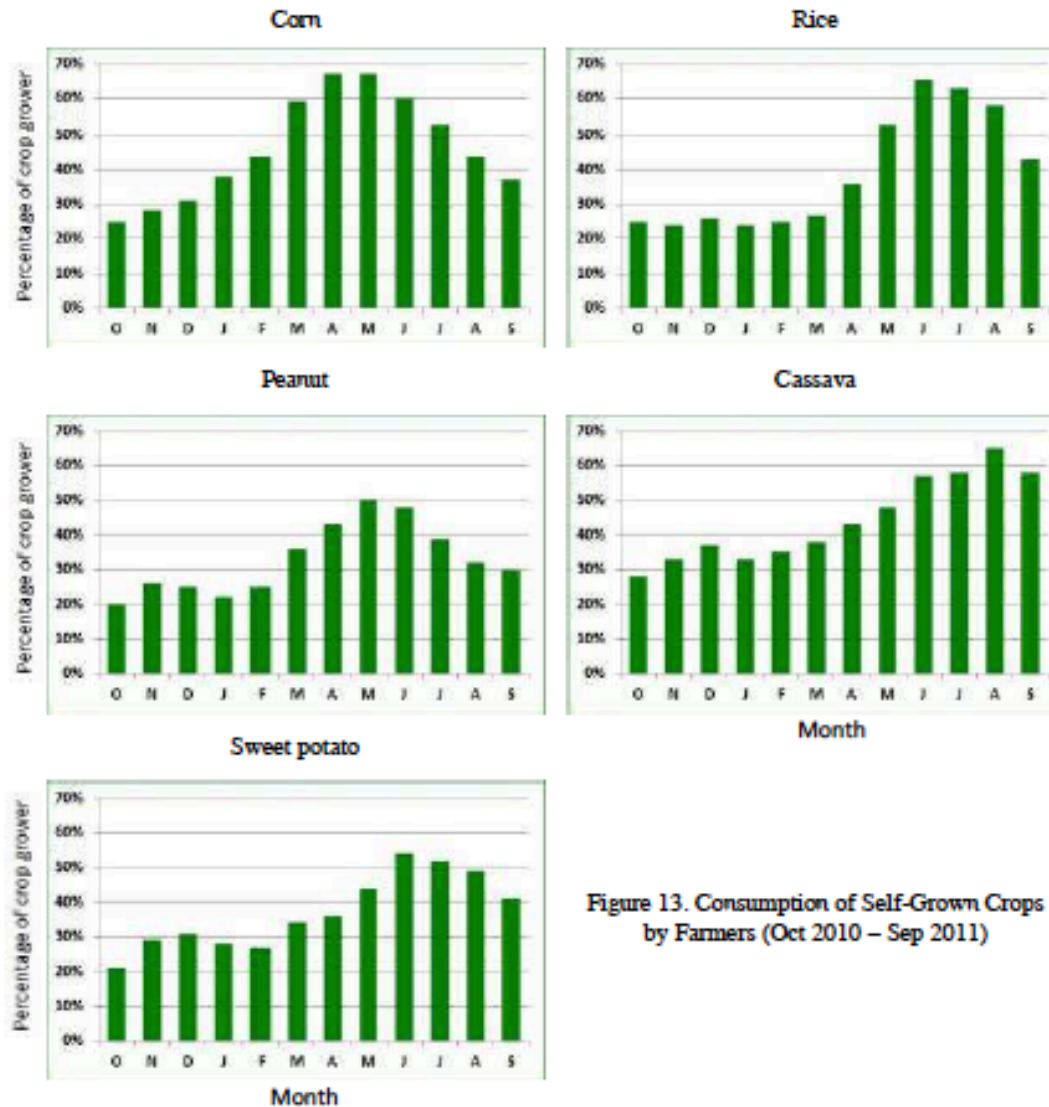
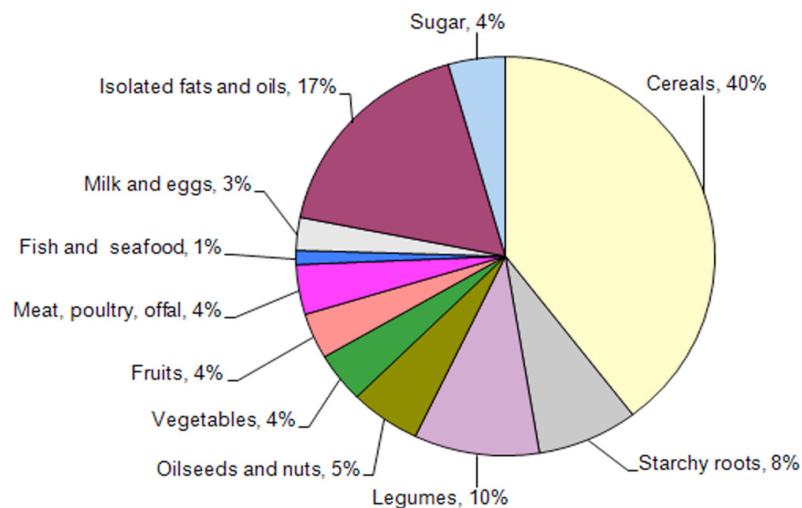


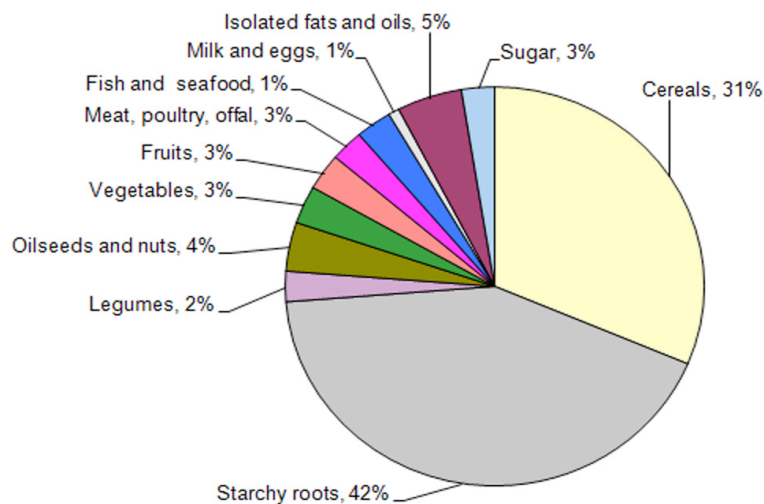
Figure 13. Consumption of Self-Grown Crops by Farmers (Oct 2010 – Sep 2011)



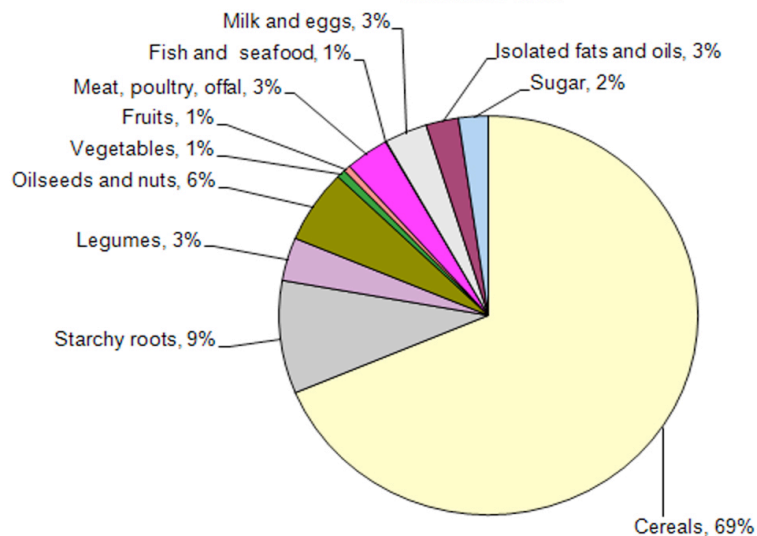
**Example of Optimised Food Intake: Food and Nutrition Secure**  
**Percentage of DES by major food groups**  
**Total 2230 kcal**



**Food Intake, Ghana: Food Secure, Nutrition Insecure**  
**Percentage of DES by major food groups**  
**Total 2923 kcal**



**Food Intake, Ethiopia: Food and Nutrition Insecure**  
**Percentage of DES by major food groups**  
**Total 2058 kcal**



# Meeting Nutrients: Diet Types

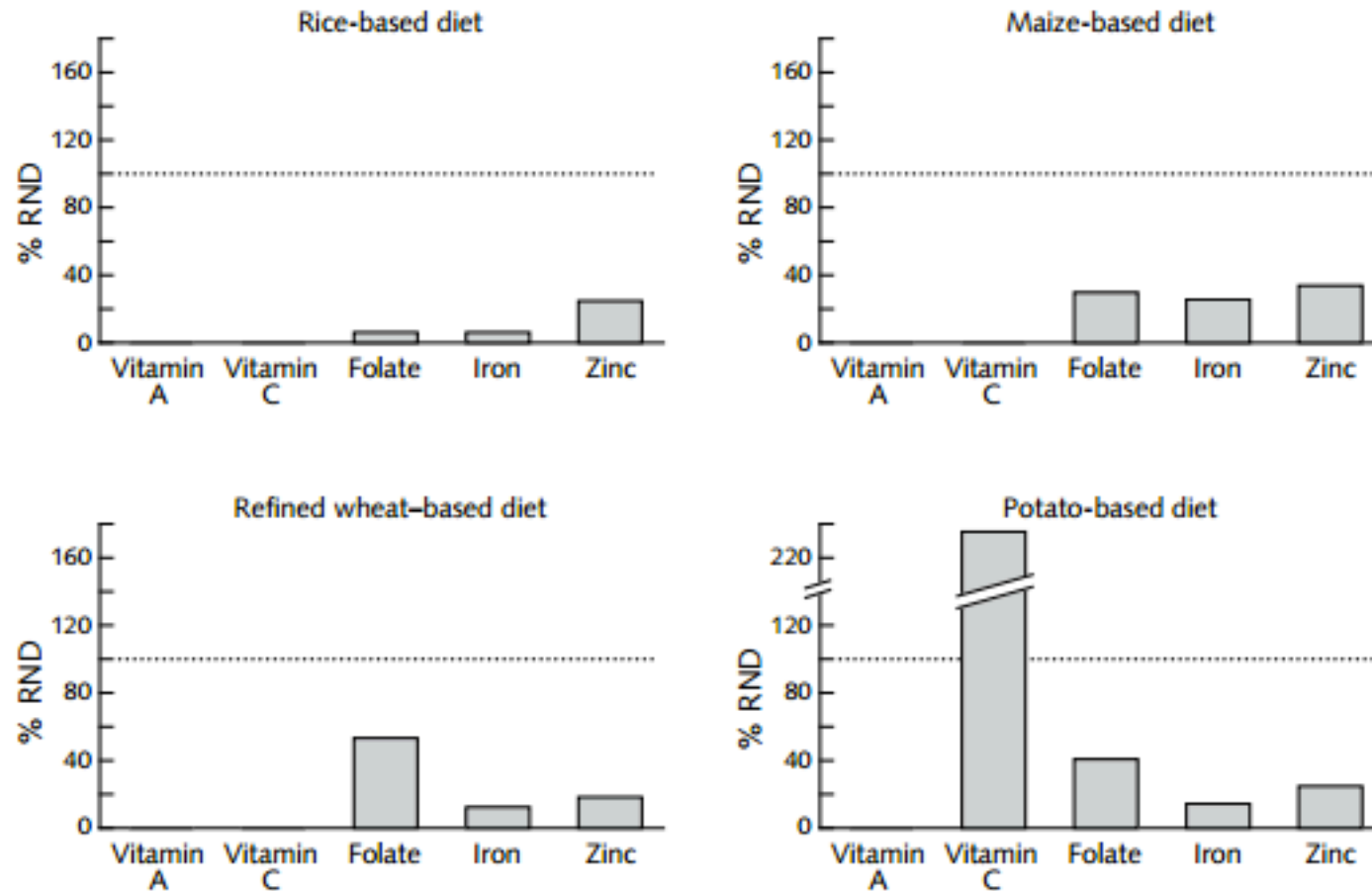


FIG. 4. The insufficiency of common staple foods to meet critical micronutrient needs, expressed as percentages of required nutrient density (RND). Adapted from Uauy-Dagach and Hertrampf [18]

# Interventions: What has worked?



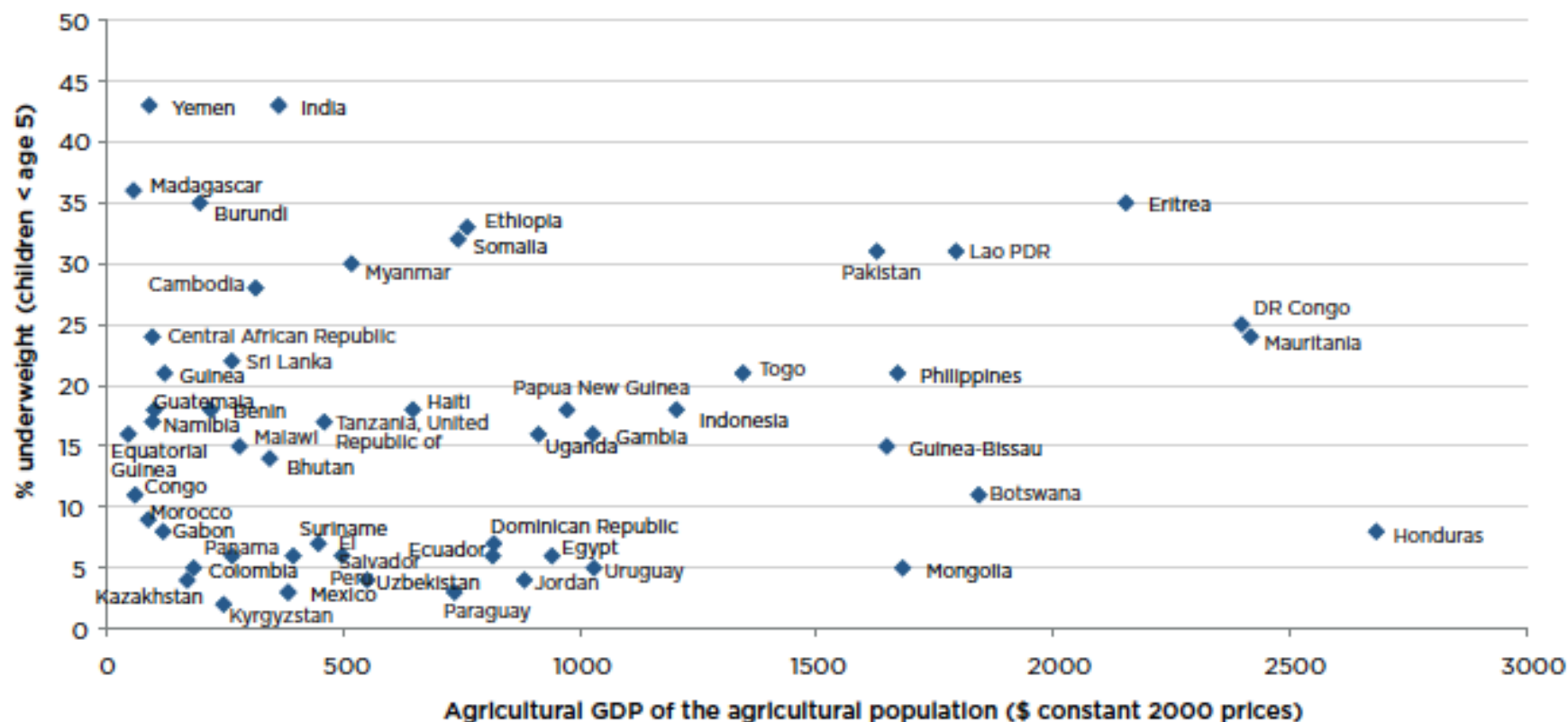
Source: SoL

# Pathways linking agriculture to nutrition

Pathway	Strength of pathway
1) Increasing overall macroeconomic growth	modest effect
2) Increasing access to food by higher production and decreased food prices	modest effect
3) Increasing household income through the sale of agricultural products	variable effects
4) Increasing nutrient dense food production for household consumption	some evidence
5) Empowering women through targeted agricultural interventions	strong evidence

Source: Adapted from World Bank 2007.

# Agriculture GDP Growth has modest effect on undernutrition



Source: State of the World's Children, UNICEF 2009; FAO Statistical Yearbook 2009.

# Examples of *nutrition sensitive* agriculture

- Diversifying Homestead Food Production
- Utilizing biodiversity
- Fortifying staple crops: Biofortification
- Fortifying major foods post harvest
- Processing foods post-harvest
- Sensitizing value chains for nutrition
- Focusing on women



THERE ARE **4**  
PRIMARY WAYS A  
PERSON CAN GET  
MICRONUTRIENTS  
INTO THEIR SYSTEM:

● DIETARY DIVERSITY:  
eating a balanced diet



● BIOFORTIFICATION:  
eating foods that have  
been engineered to  
have greater amounts  
of nutrients



● SUPPLEMENTATION:  
taking a vitamin tablet



● FOOD FORTIFICATION:  
through the addition of  
micronutrients to already  
consumed staple products



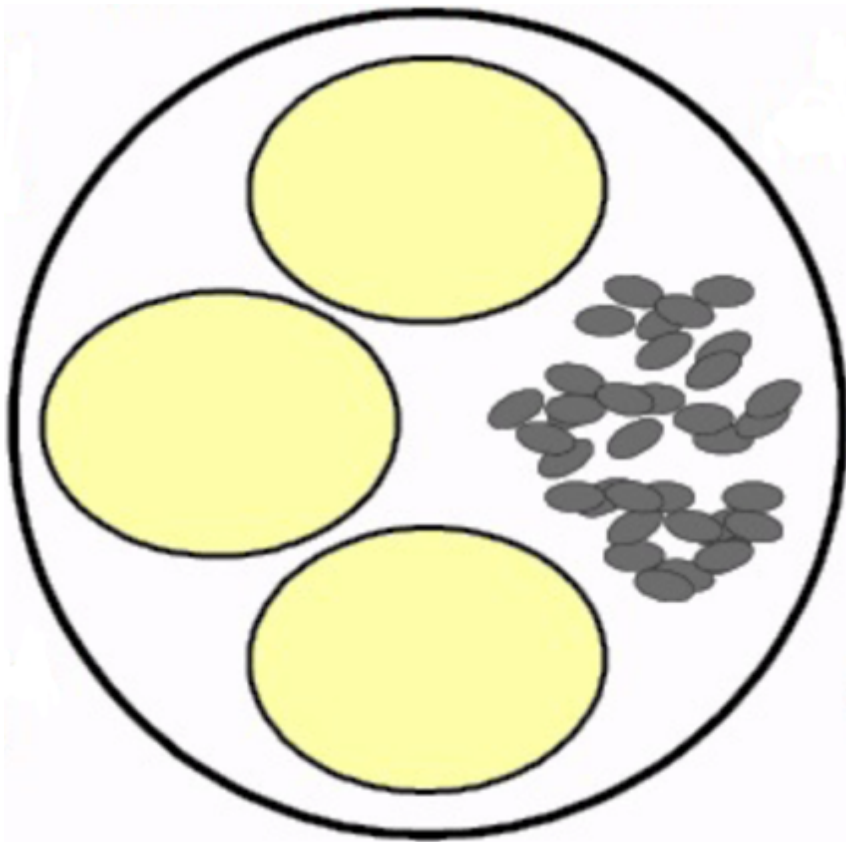
# Homestead Food Production

**WHY DIVERSIFY HOMESTEAD FOOD PRODUCTION? IMPROVE DIETARY DIVERSITY AT THE HOUSEHOLD AND IN SOME CASES, INCREASE INCOME**

- Nutrition and income has improved in some cases but more biological data is needed
- Done in Asia mainly and usually have an education component
- Usually focused on vitamin A or iron
- When livestock and small animal rearing and fish farming are incorporated, increased income generation and nutrition improvements

# Changing the Staple Ratio

The Usual Meal



A Better Meal



# Where local diets often fall short

- Access to the appropriate quality and quantity of foods are essential for optimal nutrition for infants ages 6 and 24 mo.
- During the period of complementary feeding, most households may be able to provide their young children with sufficient energy and protein from home-produced complementary foods, but many do not feed foods with an adequate energy density or a sufficient number of meals per day.
- Inadequate micronutrient intakes and resulting deficiencies are common because of a lack of sufficient animal source foods, and have been associated with delayed child development.

# In Timor-Leste

- Major consumed crops include maize, sweet potato, banana, soy, peanut.
- Rich in energy and protein.
- Not sufficient to fill nutrient gap, particularly for growing children.
- Need to fill the gap with tropical fruits, dark leafy greens, fish, eggs and meats that are rich in micronutrients for immunity and cellular function and essential fatty acids for brain development and skeletal growth.

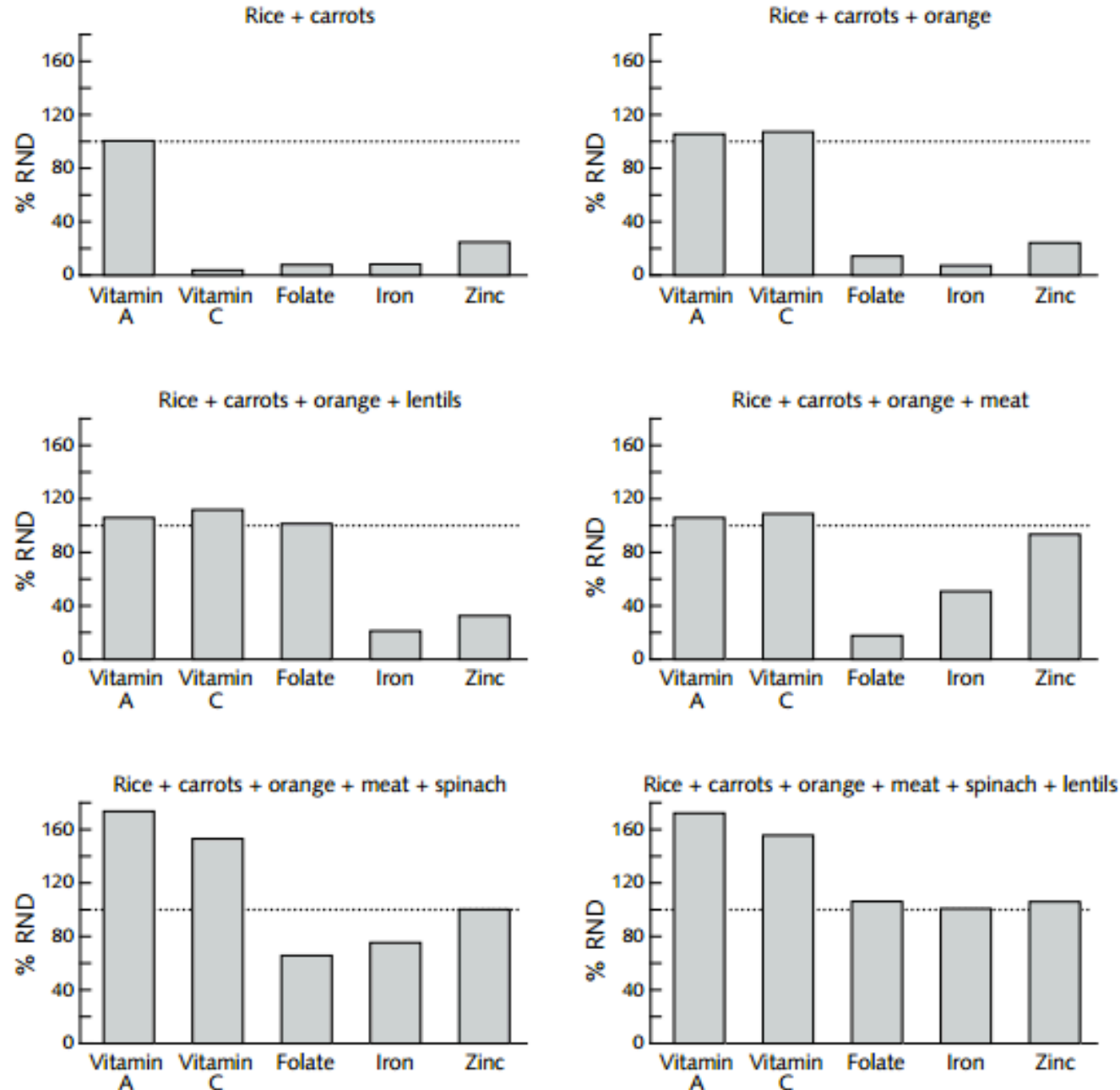


FIG. 5. The effect on micronutrient adequacy of sequentially adding small amounts of nutrient-dense foods, with rice as an example of a staple food. Dietary adequacy is expressed as percentage of required nutrient density (RND). Adapted from Uauy-Dagach and Hertrampf [18]



# Dietary Diversity in Timor-Leste

**Table 8: Household diet diversity previous 30 days, % households**

Food groups	Covalima					Oecusse				
	N	Ate Rarely	Ate Sometimes	Ate Often	Did not eat	N	Ate rarely	Ate Sometimes	Ate often	Did not eat
Cereals	159	2	1	96	1	149	7	34	59	-
Vitamin-A vegetables	159	31	46	14	9	150	8	51	2	39
Roots/tubers	159	28	35	16	21	150	10	35	1	54
Green leaves	159	1	7	92	-	150	9	64	8	19
Other vegetables	159	9	16	75	-	150	11	56	10	23
Pulses/legumes	157	28	26	10	36	149	15	24	2	59
Vitamin-A fruits	159	25	49	25	1	150	12	48	3	37
Other fruits	158	47	35	3	15	150	7	48	1	44
Meat/poultry	159	40	43	2	15	150	9	72	2	17
Eggs	158	40	42	4	13	150	14	35	-	51
Sea foods	157	33	33	19	15	150	9	26	8	57
Milk/ milk products	157	38	17	2	43	150	10	8	-	82
Oils/fats	158	11	22	65	3	150	5	39	17	39

**Animal Source  
Proteins make  
huge  
contributions to  
improving  
nutrition**



# Fruits and Vegetables

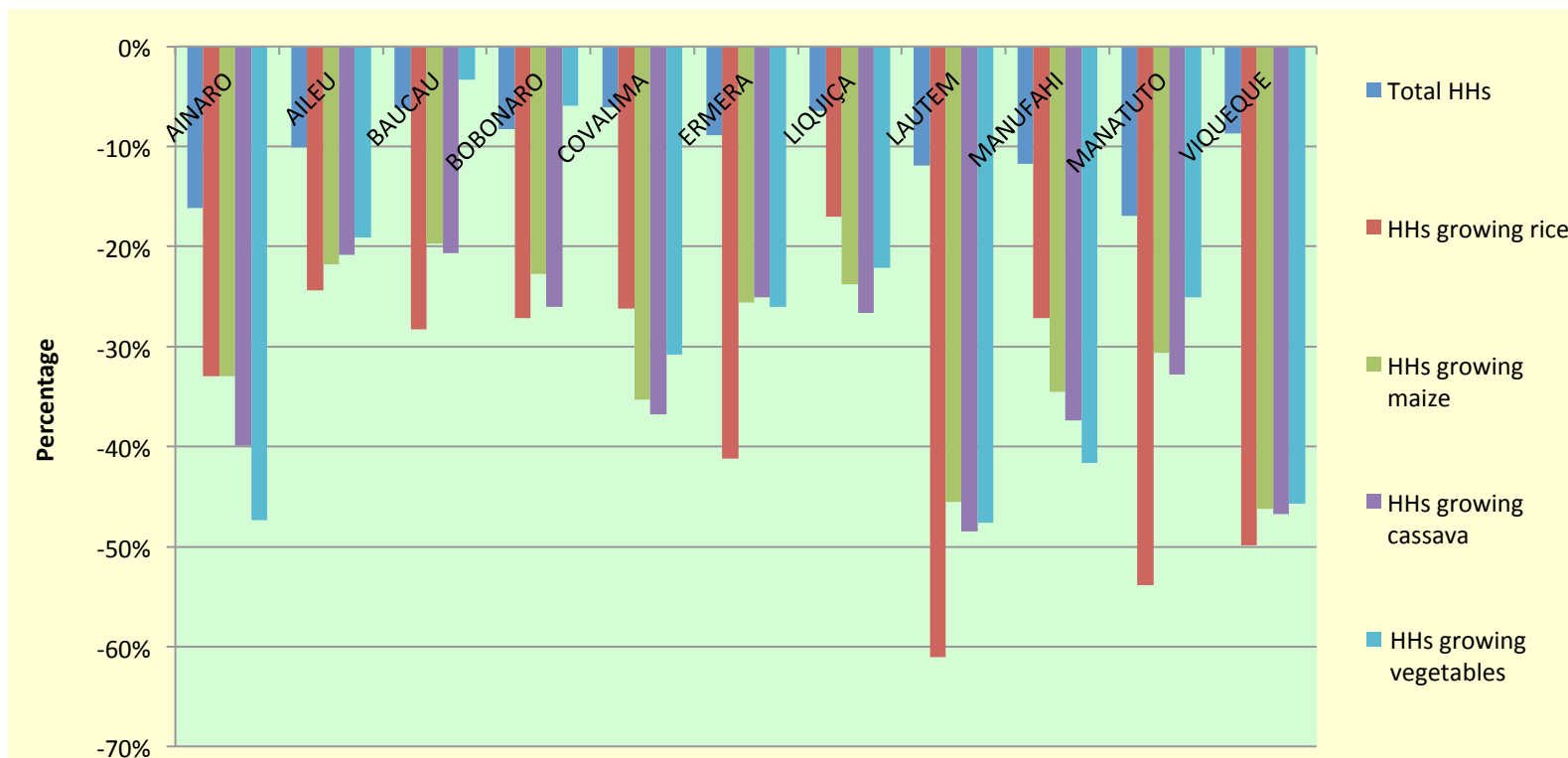


**Rich in micronutrients –  
vitamins and minerals as  
well as health promoting  
properties**

**BUT....**

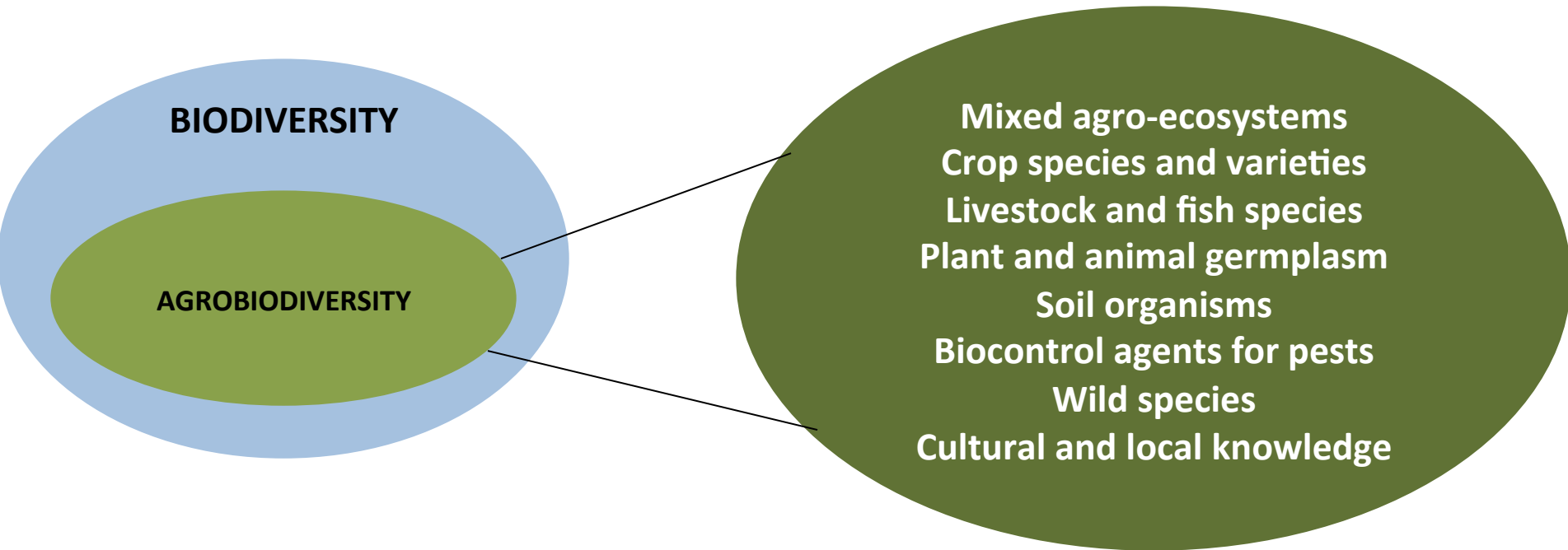
**Need to consume an  
abundance**

# Trends in Percentages of Households Growing Main Food Crops (2004 – 2010)





# Agricultural biodiversity's is one avenue towards dietary diversity



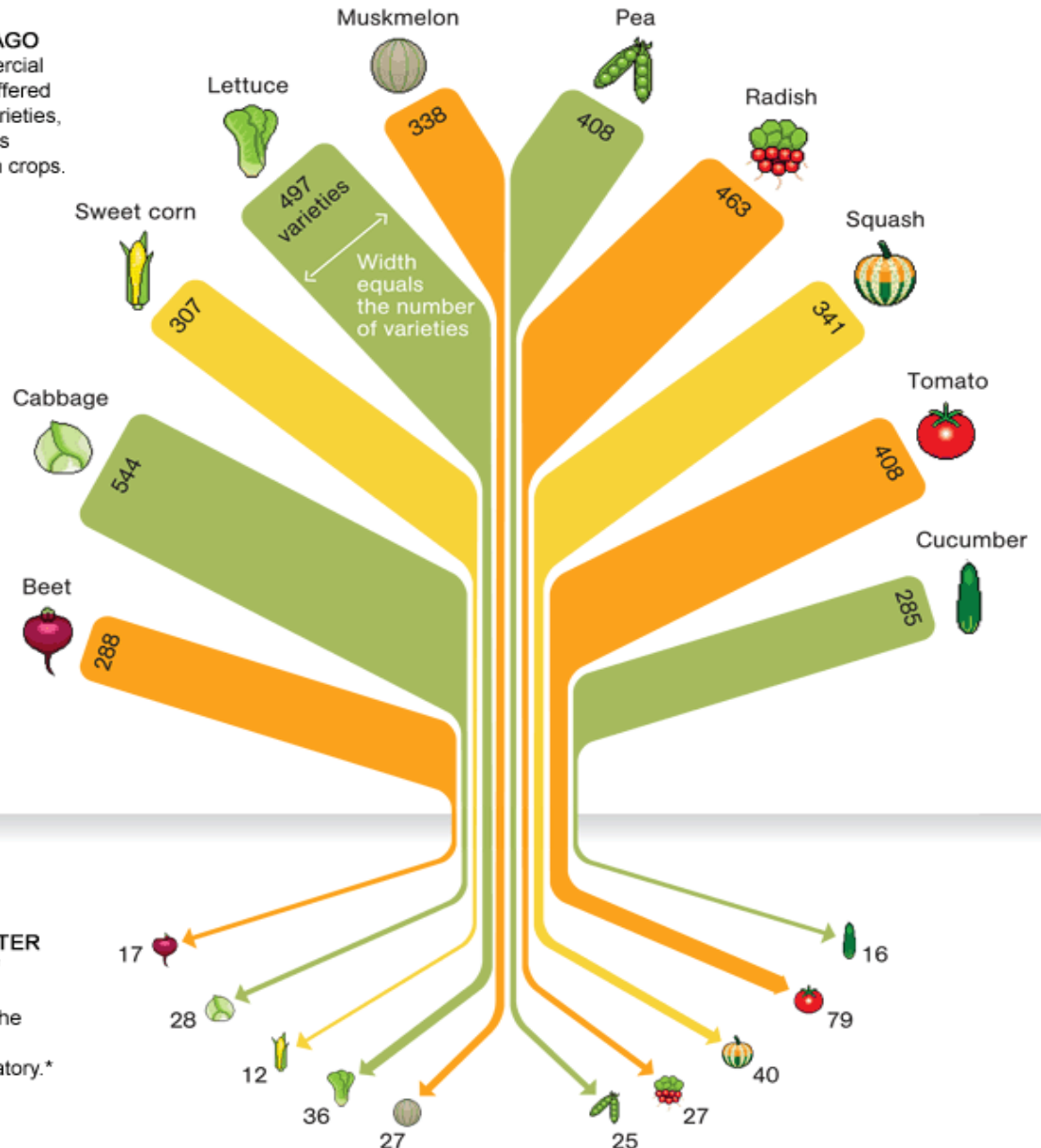
- Agrobiodiversity contain wide varieties of species and within species, diverse varieties that contain different levels of nutrients
- For rural farming populations, can provide diverse foods straight from the source or potentially, additional income to purchase foods (often netbuyers)

Loss of  
agrobiodiversity is  
profound

--

WHAT ABOUT  
TIMOR-LESTE?

**A CENTURY AGO**  
In 1903 commercial  
seed houses offered  
hundreds of varieties,  
as shown in this  
sampling of ten crops.



**80 YEARS LATER**  
By 1983 few of  
those varieties  
were found in the  
National Seed  
Storage Laboratory.\*

\* CHANGED ITS NAME IN 2001 TO THE NATIONAL  
CENTER FOR GENETIC RESOURCES PRESERVATION

JOHN TOMANIO, NGM STAFF, FOOD ICONS: QUI  
SOURCE: RURAL ADVANCEMENT FOUNDATION INTER

# Biofortification

- Biofortification is the development of staple crops with increased micronutrient density through crop management, breeding and genetic approaches
- Most successful so far: Orange fleshed sweet potato in Mozambique, Malawi and Uganda
- Next up, Golden Rice in the Phillippines

# Harvest Plus Variety Development

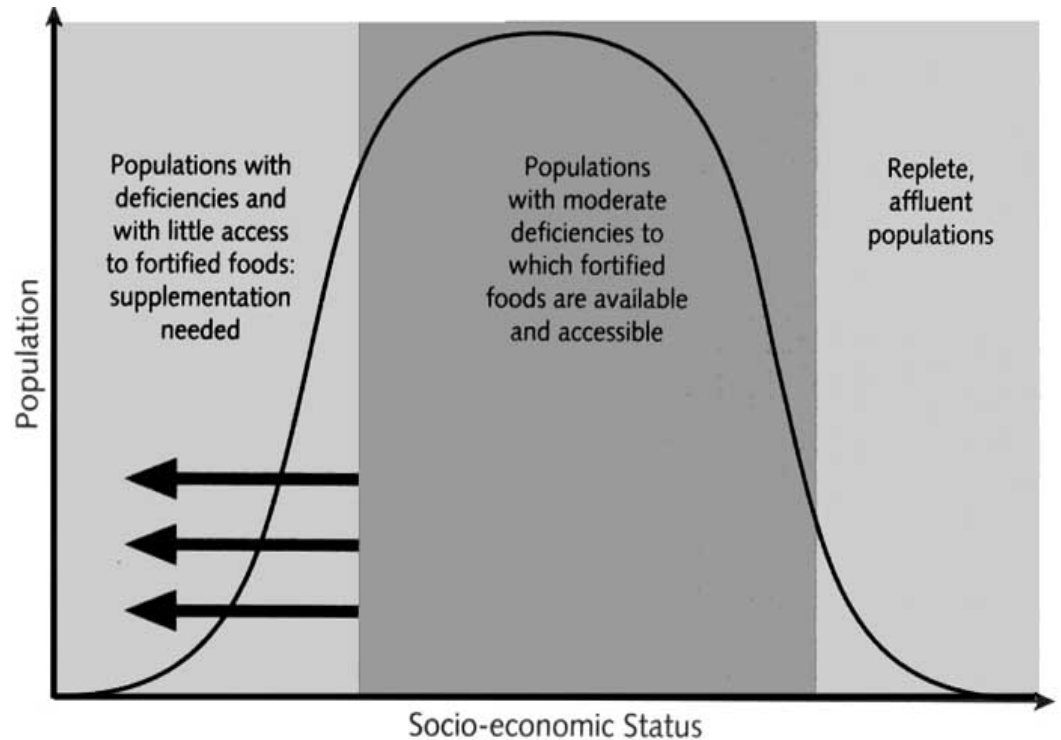
## Target Crops, Nutrients, Countries, & Release Dates

Bean	Iron	DR Congo, Rwanda	2012
Cassava	Vitamin A	DR Congo, Nigeria	2011
Maize	Vitamin A	Nigeria, Zambia	2012
Pearl Millet	Iron	India	2012
Rice	Zinc	Bangladesh, India	2013
Sweet Potato	Vitamin A	Mozambique, Uganda	2007
Wheat	Zinc	India, Pakistan	2013



# Fortification

- Vehicle is something consumed by many  
– milk, flour, noodles, sugar, oil
- Often requires partnership with the private sector



# ONGERA INTUNGAMUBIRI

AGIRE UBUZIMA BWIZA



Igenewe abana bafite amezi  
6 kugera kuri 23 y'amavuko

Uburemere 1 g

Koresha agasashi 1  
incuro 2 cyangwa 3  
buri cyumweru

Vanga n'ifunguro  
rigiye kugaburwa



## BURI GASHASHI GAFITE IGARAMA 1

Vitamin A	400µg	Vitamin B6	0.5mg
Vitamin D	5.0µg	Vitamin B12	0.9µg
Vitamin E	5.0mg	Folic Acid	150.0µg
Vitamin C	30.0mg	Iron/Feri	10.0mg
Vitamin B1	0.5mg	Zinc	4.1mg
Vitamin B2	0.5mg	Copper	0.56mg
Niacin	6.0mg	Selenium	17.0µg
		Iodine	90.0µg

Ntuyikoreshe mu gihe agasashi irimo kagitse cyangwa kangiritse



Yakozwe na

**Piramal Healthcare**

K-1 Addl. MIDC Area, Mahad - 402 302

Dist. Raigad, Maharashtra, India

REPUBLIC OF RWANDA



MINISTRY OF HEALTH

# Improving Nutrient Content and Sometimes, Income Generating

- **COOKING**

- Oil for fat soluble vitamins
- Vitamin C with iron

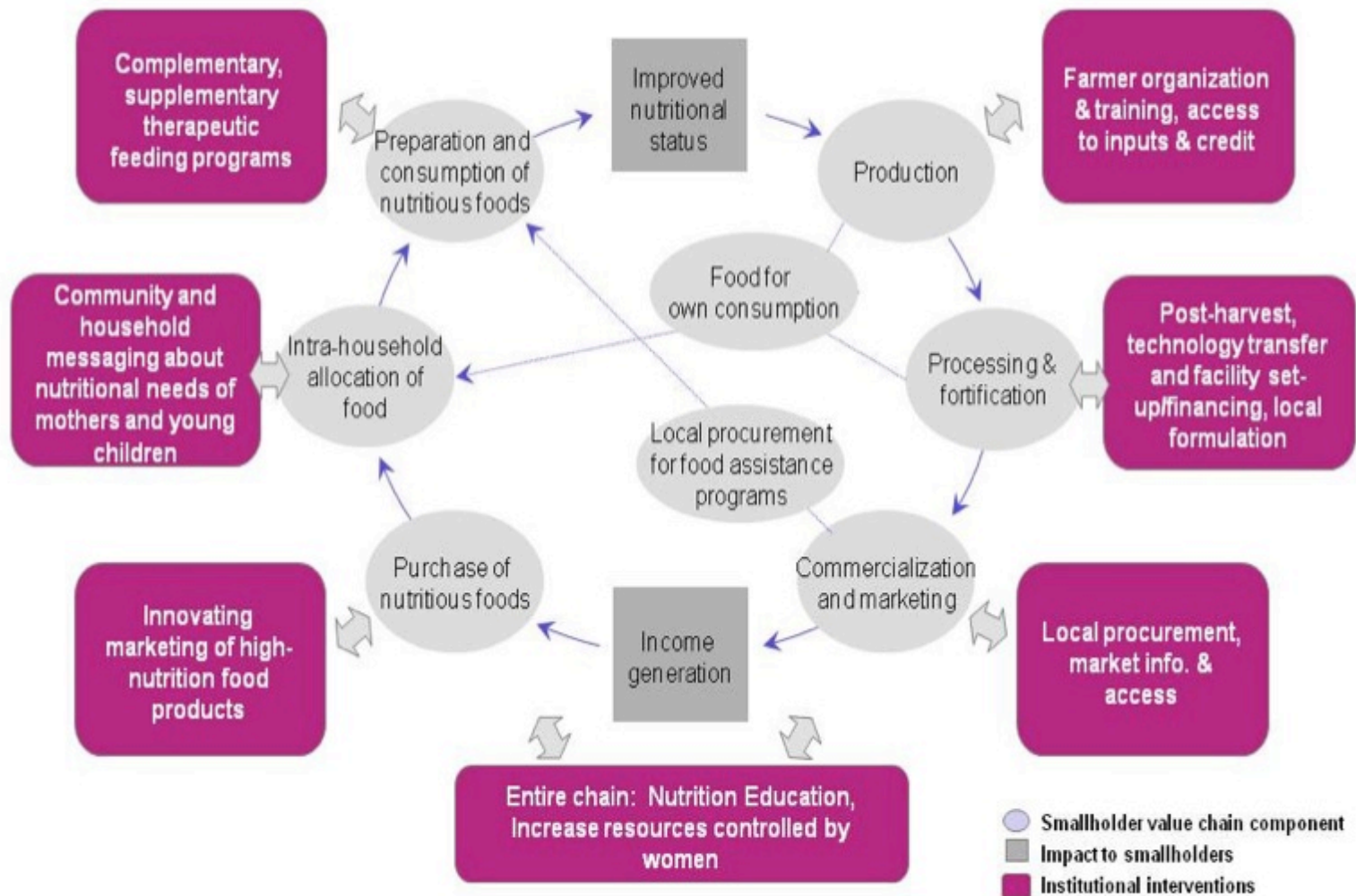
- **PROCESSING**

- Thermal processing, mechanical processing, soaking, fermentation, and germination/malting
- Increase the physicochemical accessibility of micronutrients, decrease the content of antinutrients, such as phytate, or increase the content of compounds that improve bioavailability
- Parboiling
- Yogurt, jams etc

- **STORING**

- Solar drying, sun drying, storing

# Nutrition Sensitive Value Chains



# A Woman's Burden

- Nutritional benefits increase when women can strike a balance between the time they give to agricultural tasks and the time they give to child and family care.
- Child nutrition often improves when income is put in the hands of a woman.

# Approaches for further exploration

- **Integrated agro-forestry systems** that promote the sustainable exploitation of nutrient-rich non-wood forest products
- **Integrated farming systems** exploiting the synergies of horticulture, aquaculture and small livestock rearing
- **Improved microeconomics** of the household for self-consumption, to improve the nutritional quality of the family diet
- **Education and social marketing strategies** that strengthen local food systems and promote cultivation and consumption of local micronutrient-rich foods
- **Breeding programmes** of selected crops and livestock with enhanced nutritional quality
- **Improved post-harvest management** to reduce losses in terms of quantity and nutrients content

# Rural Extension Services for Nutrition

- Great idea, but practical?
- Who should take responsibility?
- Demand driven...

# Education and Engaging Communities

- Dietary diversity strategies are more effective when paired with education and messaging.
- Engage communities through participatory approaches and transferring knowledge
- Breaking social norms and behavior change are challenging but not impossible!



**Thank you!**