

Economic Growth, Structural Transformation and the Evolving Food Security Challenge

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Professor

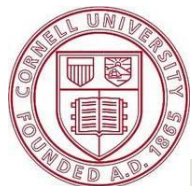
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Nutrition

Cornell University

Environment Change Institute's "Big Ideas" Seminar
Oxford University. June 1st, 2016

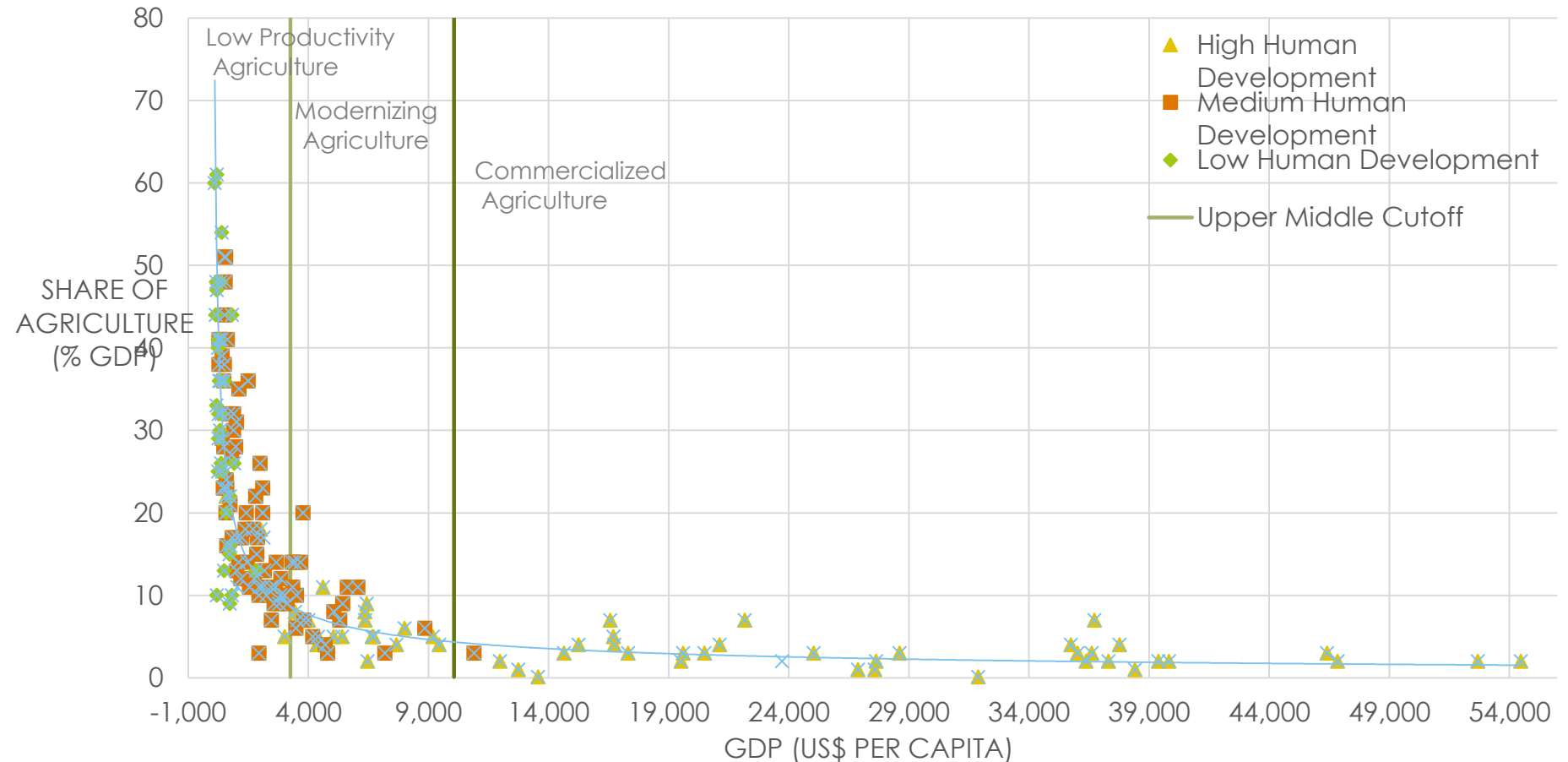


Tata-Cornell Agriculture and Nutrition Initiative (TCi)
College of Agriculture and Life Sciences

Outline

- Economic Growth & Structural Transformation
- Agricultural & Food System Transformation
- Evolving Food & Nutrition Security Challenges
- Agriculture-Environment Challenges (Trade-offs)
- Towards food system renewal – its all about enhancing system diversity and quality

Structural Transformation, Human Development, and Agricultural Performance

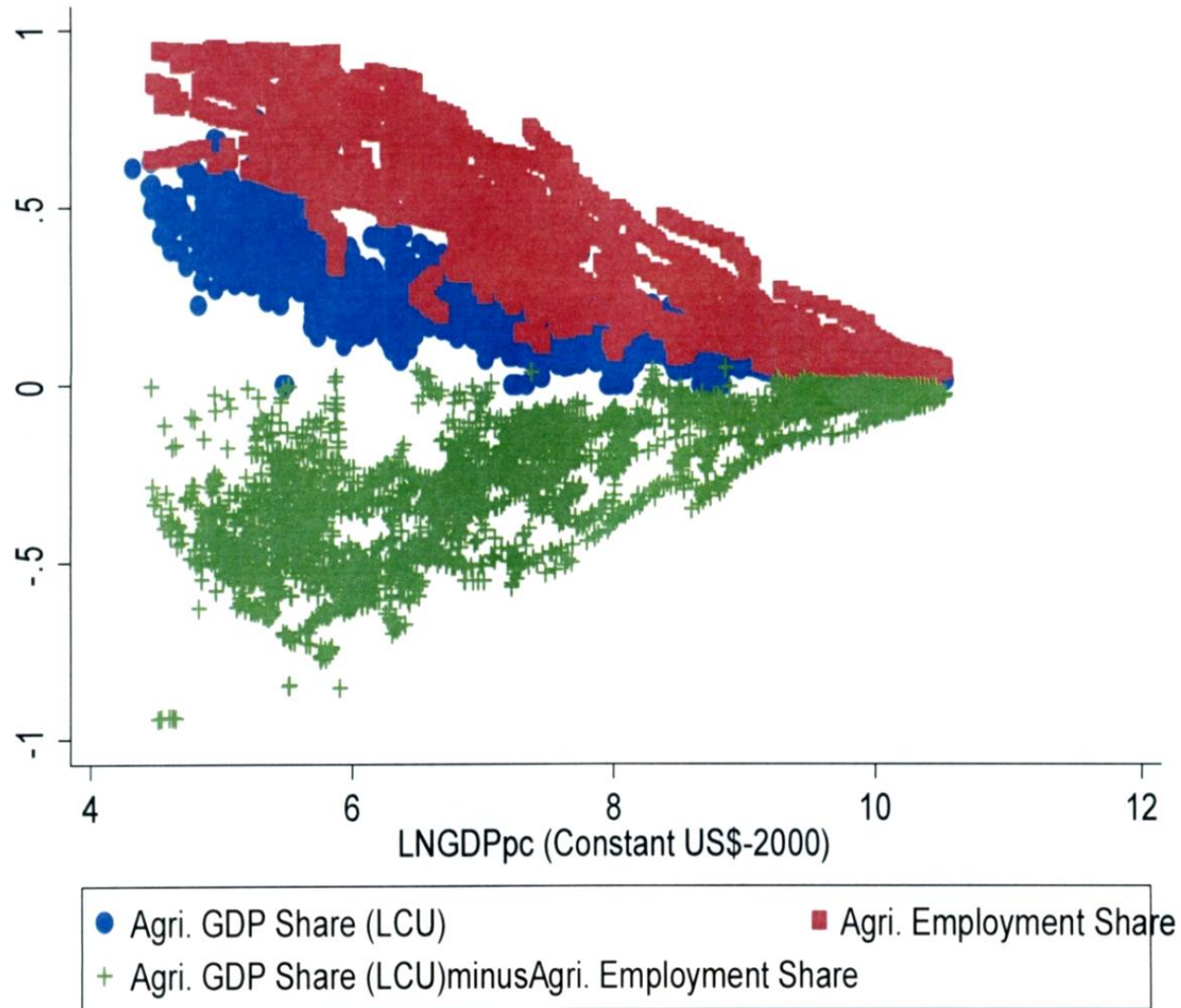


Structural Transformation: what is it?

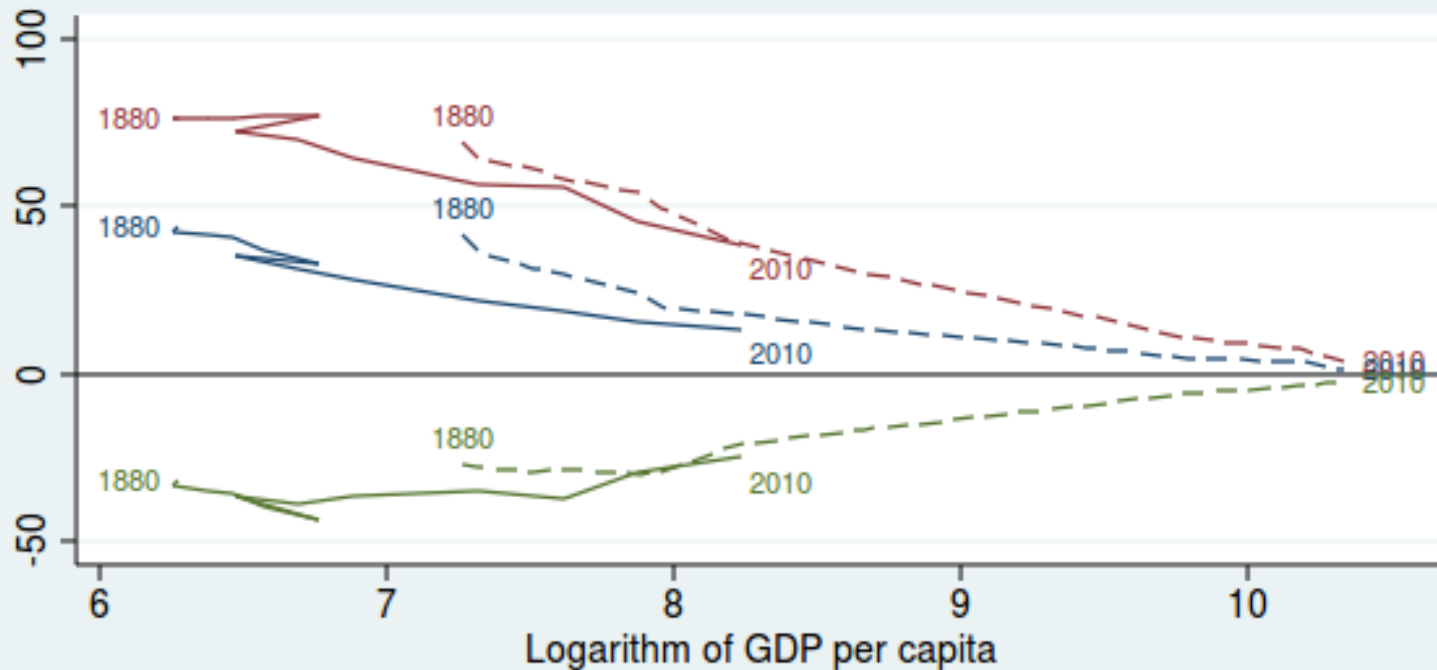
Four inter-related processes define structural transformation:

- A declining share of agriculture in GDP and employment
- A rural to urban migration that stimulates the process of urbanization
- The rise of a modern industrial and service sector
- A demographic transition from high to low rates of births and deaths

Structural Transformation is a Historical and Universal Phenomenon (1965-2000)



Structural Transformation in Japan and Indonesia 1880-2010



- Employment in agriculture (% of total employment)
- Agriculture, value added (% of GDP)
- Agriculture share of GDP minus share of employment

Dashed lines indicate Japan's trajectory; solid lines show Indonesia's.

Why do we see slow progress or stalling of structural transformation

- Low agricultural productivity growth
- Slow growth in non-agricultural employment opportunities, especially in labor-intensive jobs
- Inadequate rural public good investments, including in education and public health

The Four Transformations in Food Systems

- Structural Transformation & Rising Rural Wages
- Agricultural Commercialization
- Diet Diversification
- Modernization of the Urban Food Supply System

From Subsistence Systems to Agricultural Commercialization

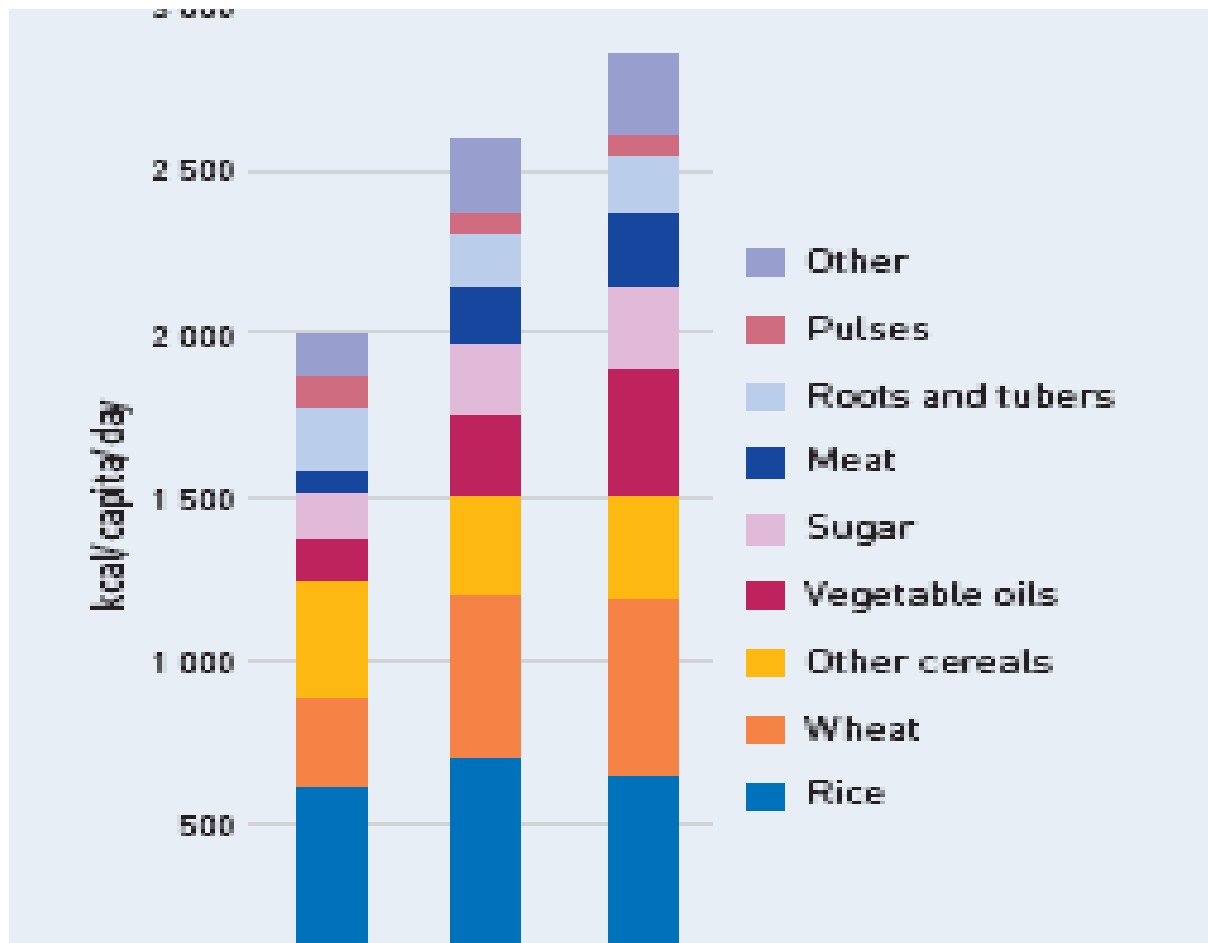
The gradual movement away from
agriculture as a way of life to
agriculture as a business.

Characteristics of Food Production Systems with Increasing Commercialization

Level of market orientation	Farmer's objective	Sources of inputs	Product mix	Household income sources
Subsistence systems	Food self-sufficiency	Household generated (non-traded)	Wide range	Predominantly agricultural
Semi-commercial systems	Surplus generation	Mix of traded and non-traded inputs	Moderately specialized	Agricultural and non-agricultural
Commercial systems	Profit maximization	Predominantly traded inputs	Highly specialized	Predominantly non-agricultural

Source: Pingali, P.L. and Rosegrant, M.W., 1995. Agricultural commercialization and diversification: Processes and policies. *Food Policy* 20(3): 171-185.

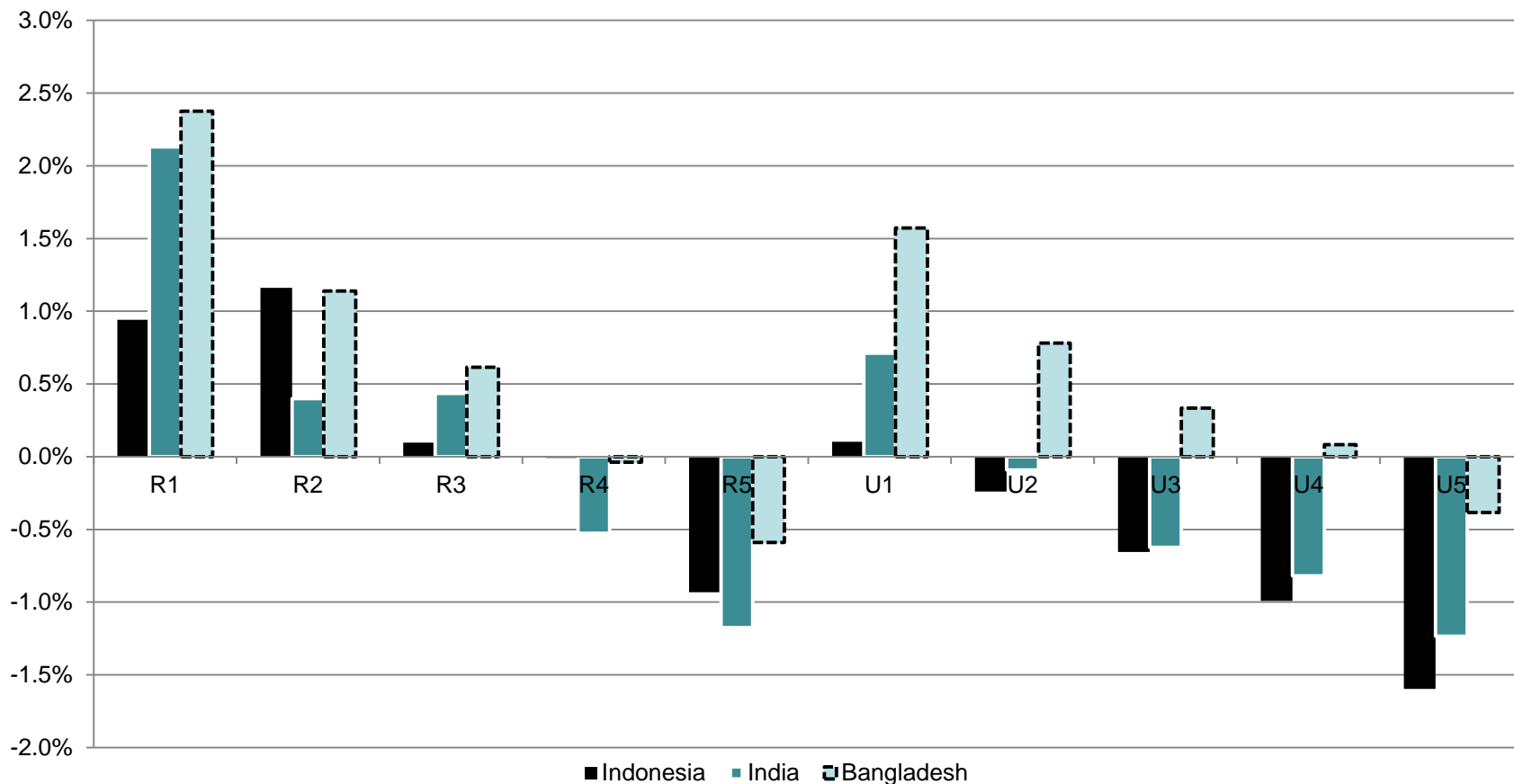
Diet Diversification in Developing Countries, 1964 to 2030



Source: FAO,
World Agriculture
to 2015/2030

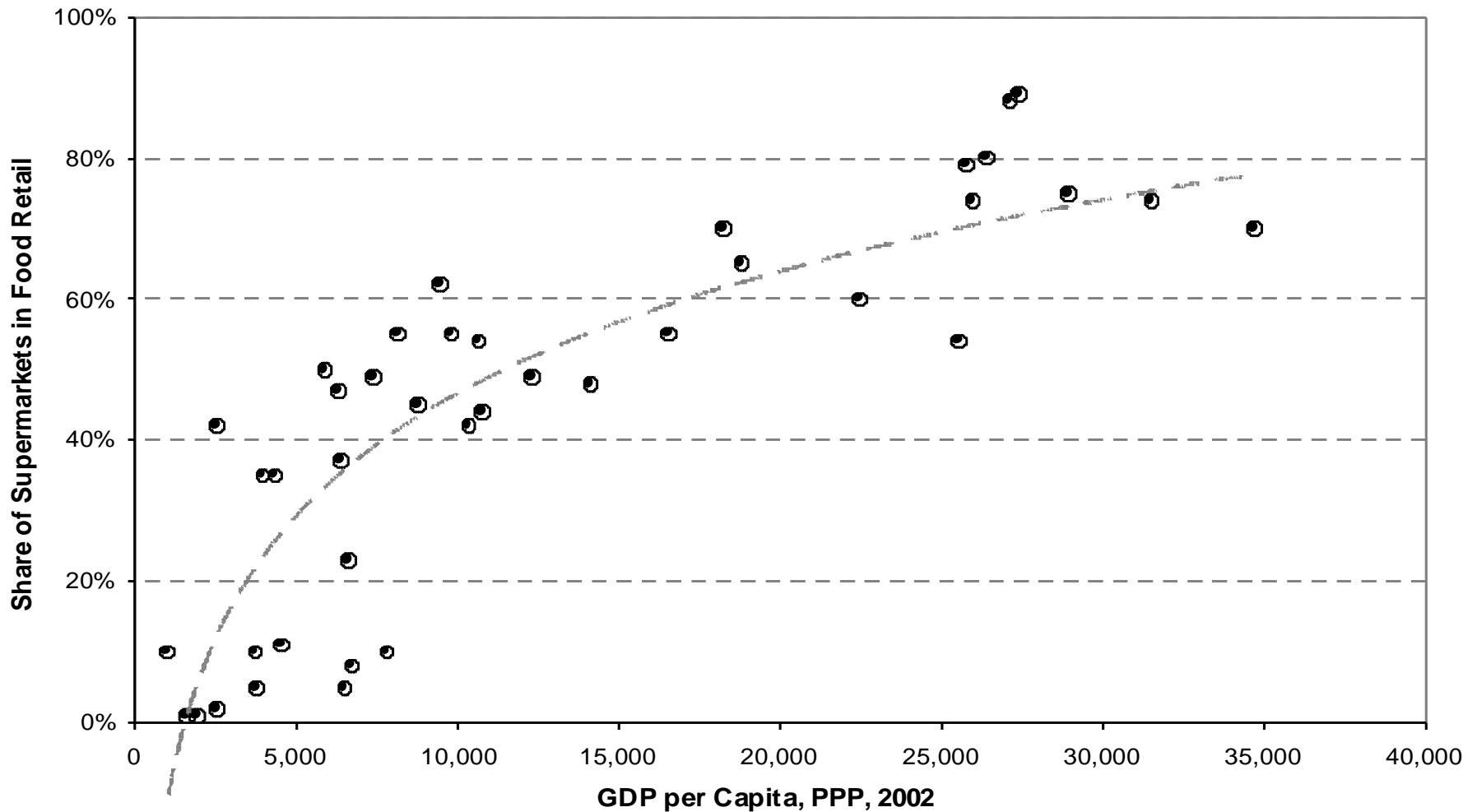
Annualized percentage change in rice consumption by quintile and location, Indonesia, India, and Bangladesh.

R refers to rural quintiles, U to urban quintiles. Period over which changes are calculated are 1967-2006 for Indonesia, 1983-2005 for India and 1983-2005 for Bangladesh.



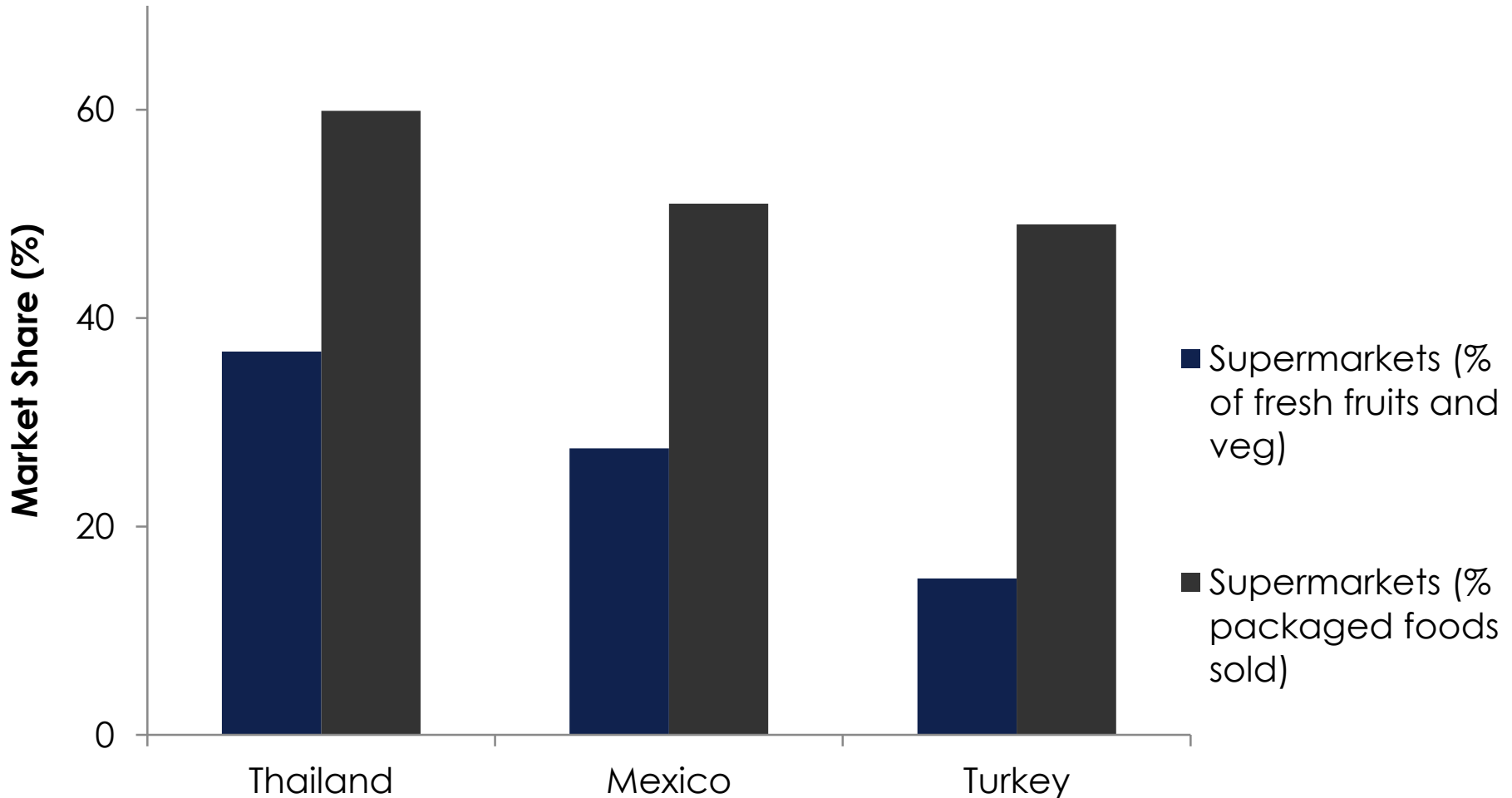
Modernization of the Urban Food Supply System

Rising GDP per capita is associated with a larger share of supermarkets in food retail



Source: data from Traill (2006) and World Bank World Development Indicators (2006)

Market share of supermarket sale of fresh and packaged foods



Source: Euromonitor (2012a), Gorton et al. (2012)

Why has the supply of food diversity not kept up with rising demand?

- Persistence of Green Revolution focus on staple grains
- Poor support for coarse grains, legumes, lentils, etc
- Lack of attention to high relative prices of micro-nutrient dense food – horticulture, livestock products
- High costs of smallholder linkage to organized food chains
- Increasing access to processed food

Pingali (2015): Agricultural Policy and Nutrition Outcomes - Getting Beyond the Preoccupation with Staple Grains. **Food Security**

The nature and magnitude of the food security & nutrition challenge varies by the stage of **structural transformation** of a country

Pingali, Ricketts & Sahn (2015)

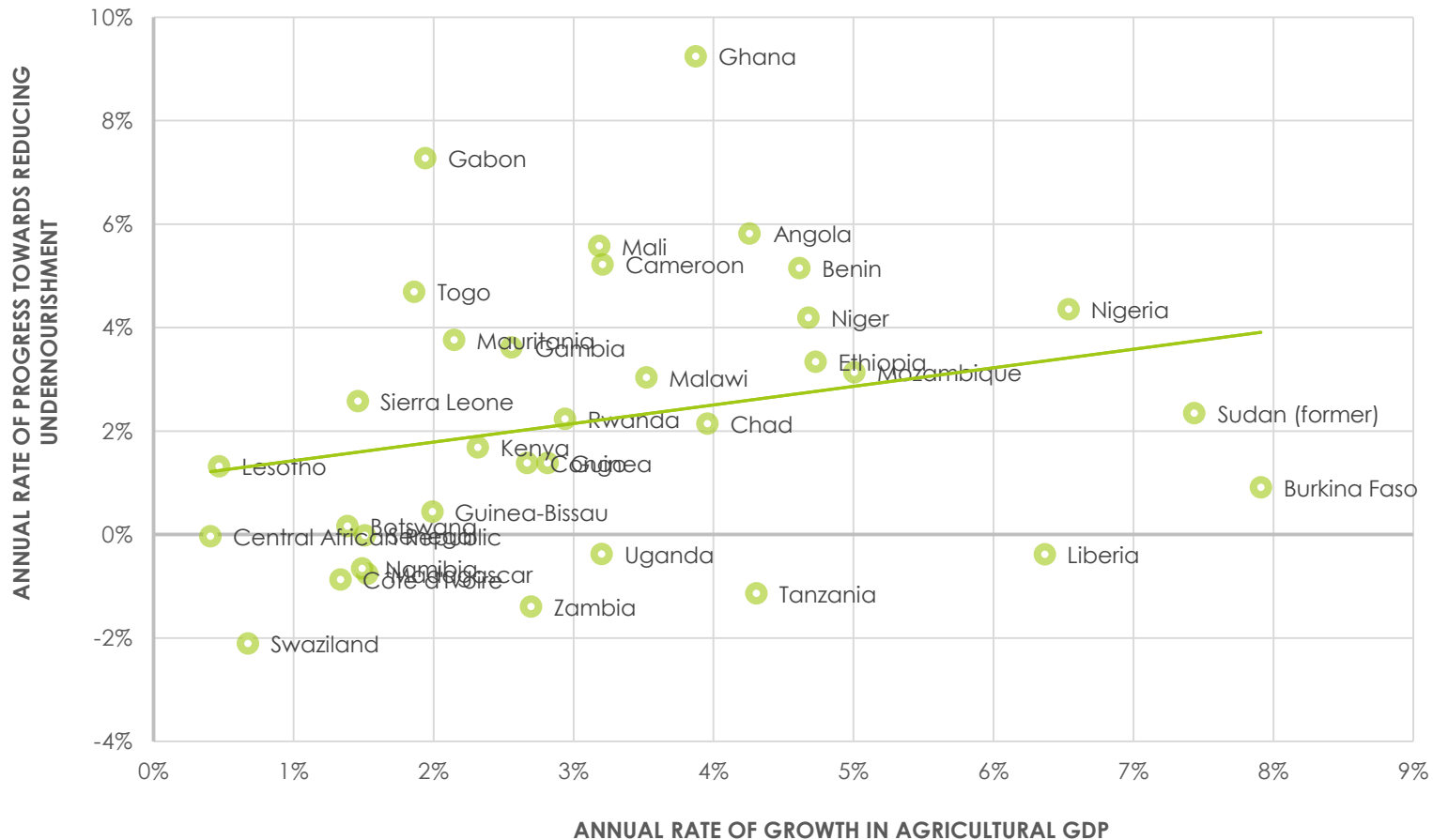


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The Triple Burden of Malnutrition

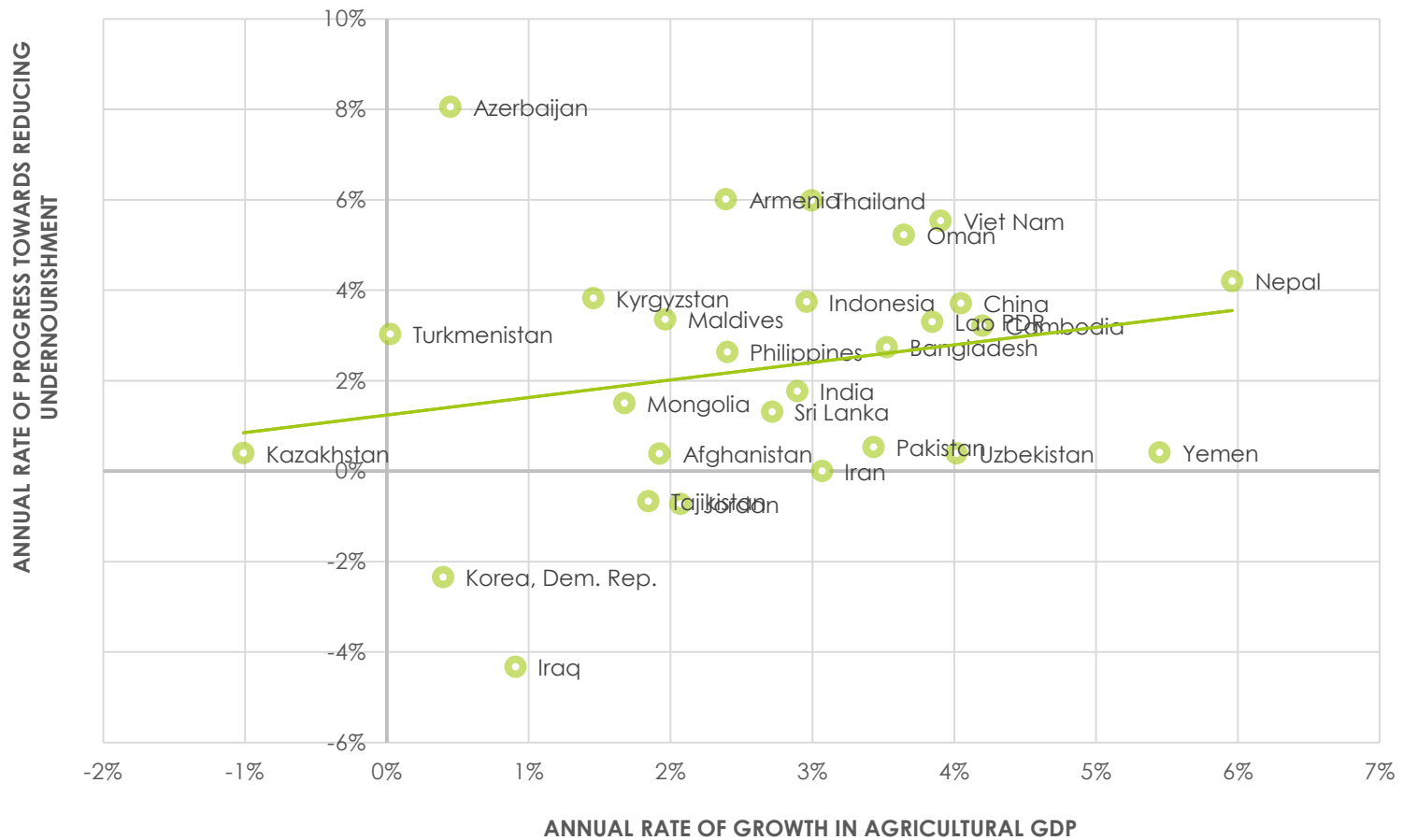
- ❑ Energy and protein deficiencies: *Hunger*
- ❑ Specific nutrient deficiencies: *Hidden Hunger*
- ❑ Excessive net energy intake: *Overweight and Obesity*

Growth in Agricultural GDP and hunger reduction in Sub-Saharan Africa (1990-2014)



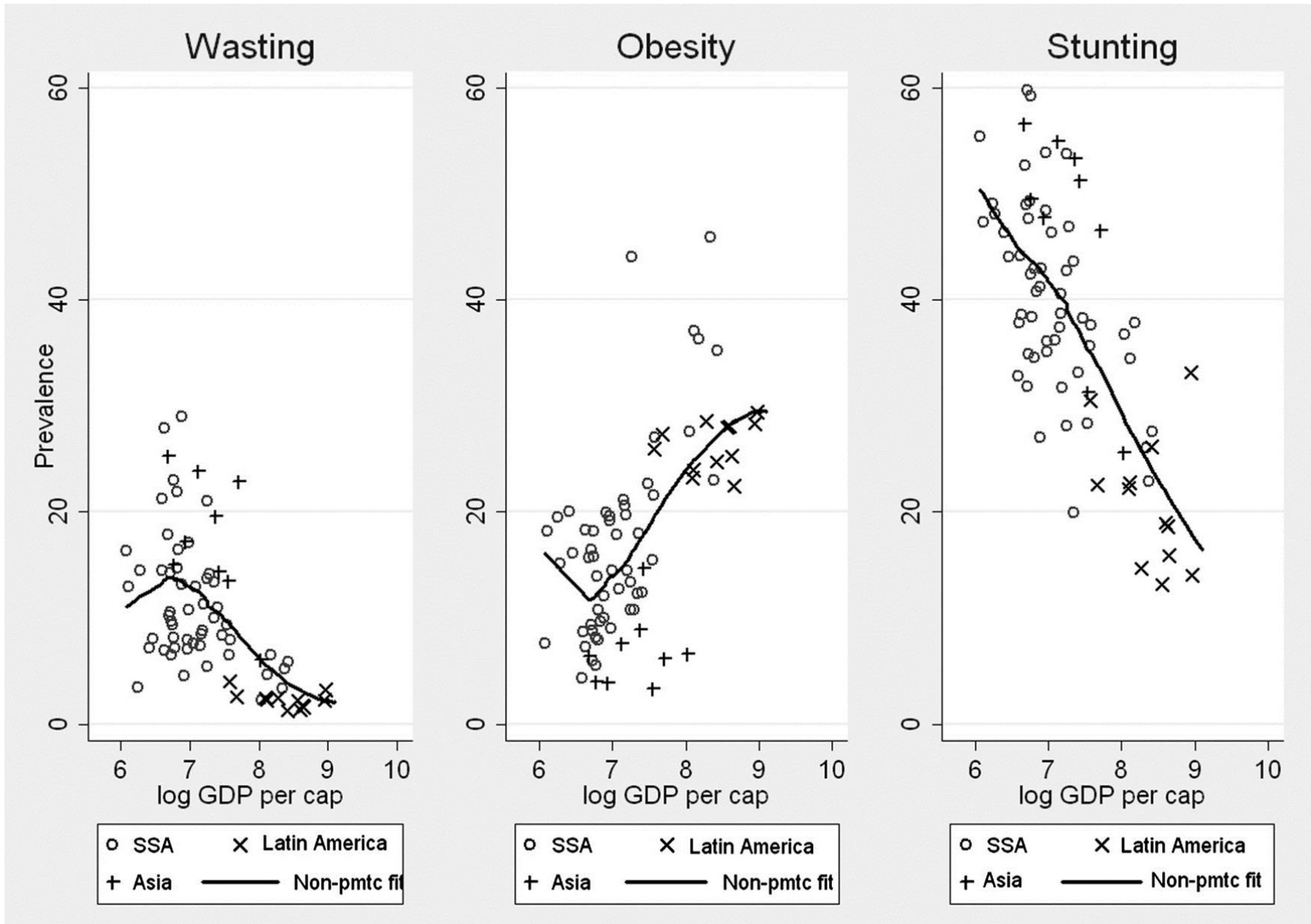
Data Source: FAO

Growth in Agricultural GDP and Hunger Reduction in Asia (1990-2014)



Data Source: FAO

Structural Transformation and Nutrition



**We have made progress on
hunger reduction.....but
LIMITED PROGRESS in
reducing micro-nutrient
malnutrition.**

**We have NOT YET STARTED to
address the problem of
over-nutrition in the
developing world.**

The solution to Hidden Hunger and rising Obesity trends is the same –

Improving the supply and affordability of diets that are rich in protein and micronutrients – especially vegetables and horticulture products.

Diversification of food systems is the priority for addressing the emerging food security challenges.

Agriculture and environment trade-offs

- ❑ Agricultural production can impact or exhaust ecosystem services critical for sustaining productivity:
 - ❑ Forest cover
 - ❑ Soil health
 - ❑ Water
 - ❑ Biodiversity
 - ❑ Climate

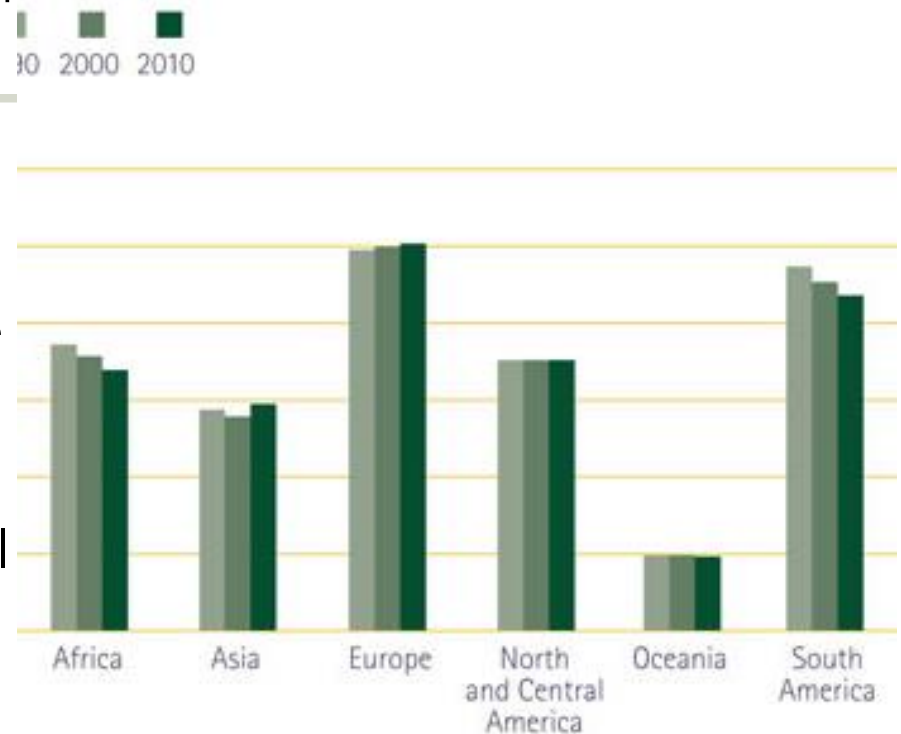
Propositions on sustainable intensification of agriculture systems

- Structural transformation of agriculture could have a net positive impact on the sustainability of agricultural landscapes.
- Future food requirements can be met by further intensification of existing land under cultivation rather than expanding cultivated area.
- Although (better) technologies and management practices are available, sustainable intensification has been constrained by a poor policy environment.
- Growing consumer preferences for food diversity, quality, and safety could drive the demand for more sustainable production practices.
- Actions needed for dealing with climate change are compatible with those needed for sustainable intensification of agriculture.

Positive effect of structural transformation on agricultural landscapes

- Re-orientation of agriculture landscapes – concentration of production on lands with high returns to intensification;
- Release of lands with intrinsically lower returns to intensification from agriculture production;
- Rising demand for non-agricultural uses of agricultural landscapes (Forest cover, biodiversity preserves, agro-tourism, etc)

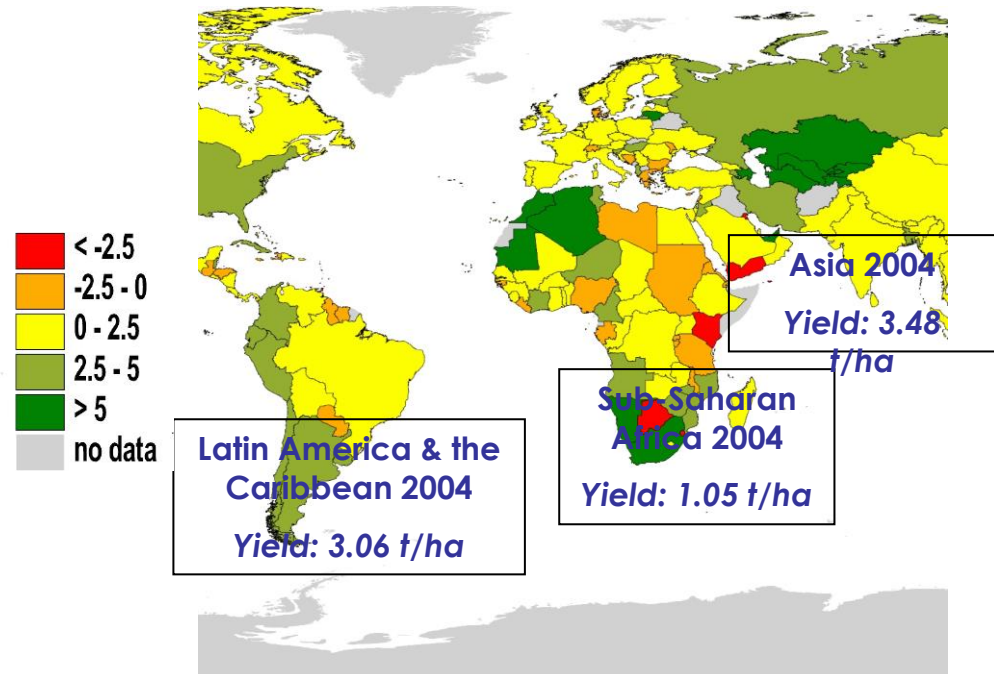
Trends in forest area, 1990–2010 (million ha)



Intensification of currently cultivated land can meet future food needs

- Current productivity gap can be bridged by investments in infrastructure and improved producer incentives.
- Intensification of high potential environments is a proven mechanism for meeting food needs while reducing the pressure on marginal production environments.
- Getting trade policy right is an integral part of managing food security sustainably.

Cereal Crop Yield (tons/ha)



Sustainable intensification is possible where incentives are right

- Distorted incentives have constrained the adoption of efficiency-enhancing/resource conserving practices for fertilizer, water, and power use.
- Sustainable land use and land management have been constrained by a policy bias towards a few staple cereal crops.
- Property rights and tenancy laws that encourage land conservation investments are lacking.

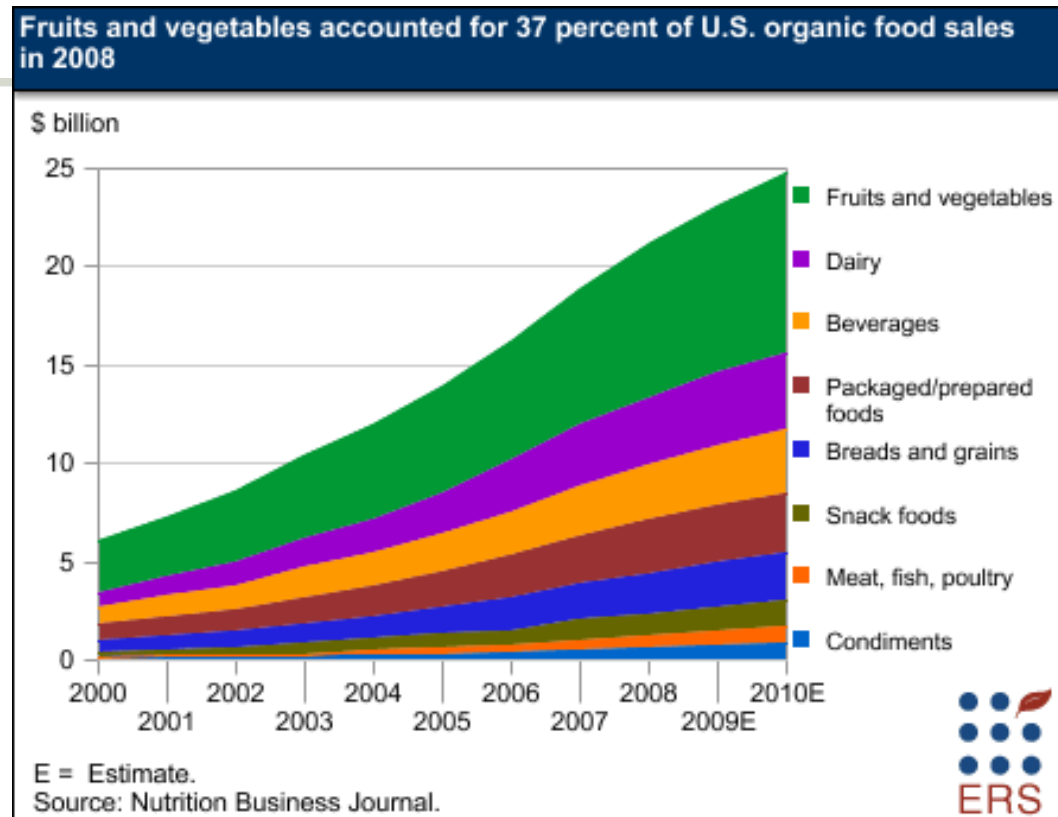
High subsidies on urea are leading to unbalanced use of N, P and K. For example, while the recommended ratio between N, P and K, is 4:2:1, the actual ratio in Punjab was 20:6:1 and in Haryana 30:9:1 in 2005-06, indicating a huge inefficiency in the use of fertilizers.

Ashok Gulati, 2008

Changing consumer preferences drive the adoption of sustainable production practices

For example, the rising demand for organic food in the U.S.

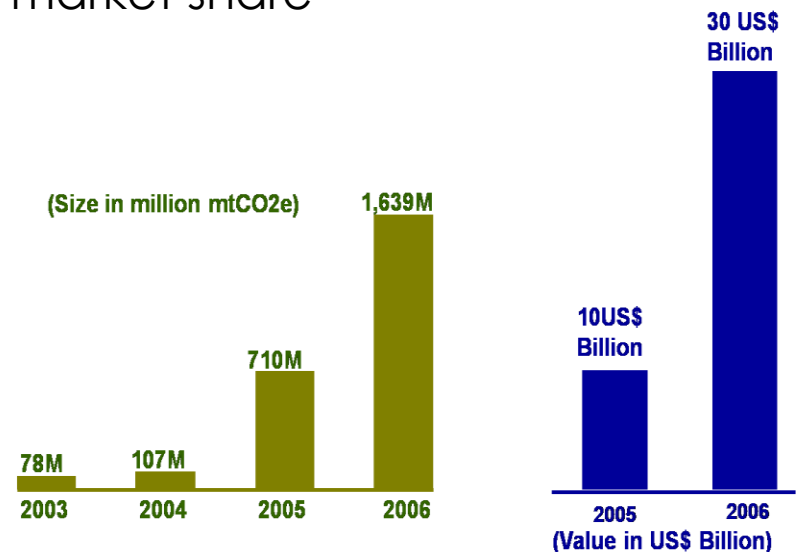
- Rising demand for food diversity & quality
- Consumer value for sustainable production
- Enforcement of quality & safety standards
- Branding & certifying products – Rainforest Alliance, Fair Trade, etc



Climate change adaptation & mitigation practices are compatible with sustainable intensification

- Conservation tillage systems
- Drought and water management practices
- Incentives for moving agriculture out of marginal areas
- Market mechanisms for carbon sequestration

Demand is growing for carbon credits but agriculture is only 3% of market share



Figures from the State and Trends of the Carbon Market, several issues World Bank

So how do we get agriculture to work for sustainable food systems and food security?



Paradigm shift from a focus on quantity to quality and diversity

The way forward

- Promote crop-neutral intensification – a level policy field
- Reduce transactions costs for linking small holders to urban value chains
- Modern science and information technologies for reducing the environmental footprint of intensification
- Invest in health and human capital especially for rural youth
- Expand food security policy beyond the current “staple grain fundamentalism”

Thank you!

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