

Agricultural Transformation and Human Nutrition in Africa: What Has Changed?

Will Masters

Friedman School of Nutrition Science & Policy, Tufts University

www.nutrition.tufts.edu | <http://sites.tufts.edu/willmasters>



Organized Symposium on Frontiers of Agricultural Transformation
at the annual meetings of the AAEA, August 1st 2016



Typical news from Africa:

Hunger

'It's a disaster': children bear brunt of southern Africa's devastating drought

In southern Malawi and Zimbabwe, drought is overwhelming communities, forcing families to rely on meals of leaves and watermelon soup



Lucy Lamble in Harare and Lilongwe

Thursday 21 April 2016 05.27 EDT

theguardian



Shares 652
Comment 226

Chidyamakondo high school, near Masvingo in southern Zimbabwe, has won the national girls' football championships three years in a row. But that cherished record - and far, far more - is now at risk.

"Students are fainting, struggling to concentrate in lessons, dropping out of school ... we're having to shorten our assemblies and cut back on sport," says headteacher Morrison Musorowegomo.

"Some of our players would rather leave the school and get married, or they will simply stay in the villages because they have no food."

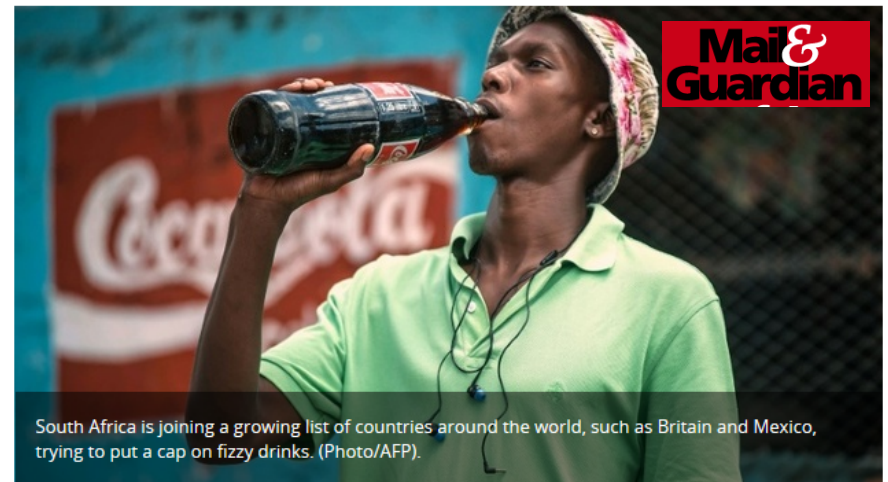
Also, this:

South Africa plans a new 'fat tax' on sugary drinks to combat an obesity epidemic

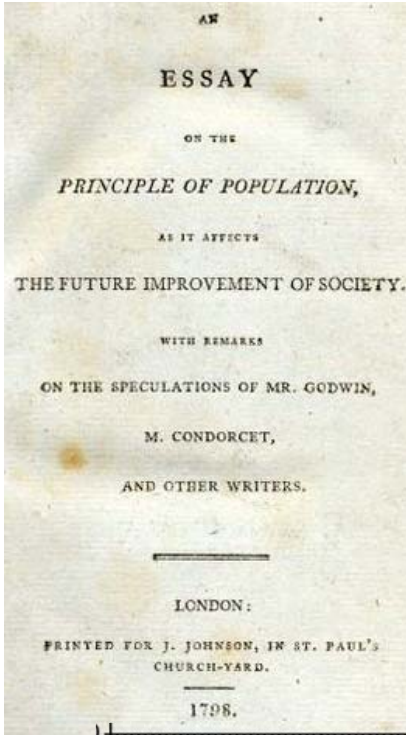
17 APR 2016 12:50 | AFP



“These are epidemic proportions,” says an expert. Half of adult women and a third of adult men in South Africa are “overweight”

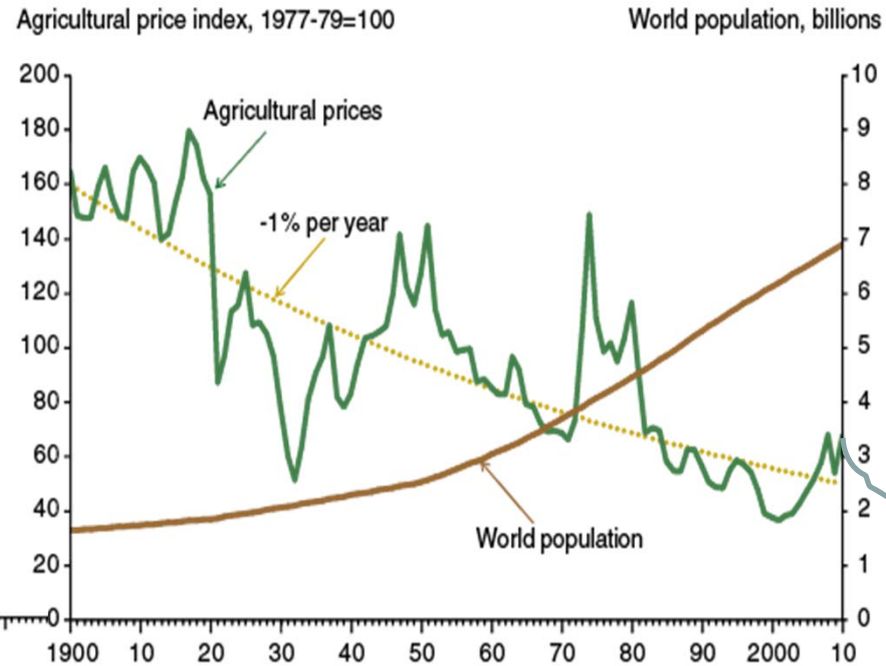


Globally, we are still winning the race against Malthus, with more food & lower fertility



1800

1850



We are here (approx.)

Source: USDA, Economic Research Service using Fuglie, Wang, and Ball (2012). Depicted in the chart is the Grilli-Yang agricultural price index adjusted for inflation by the U.S. Gross Domestic Product implicit price index. The Grilli-Yang price index is a composite of 18 crop and livestock prices, each weighted by its share of global agricultural trade (Pfaffenzeller et al., 2007). World population estimates are from the United Nations.

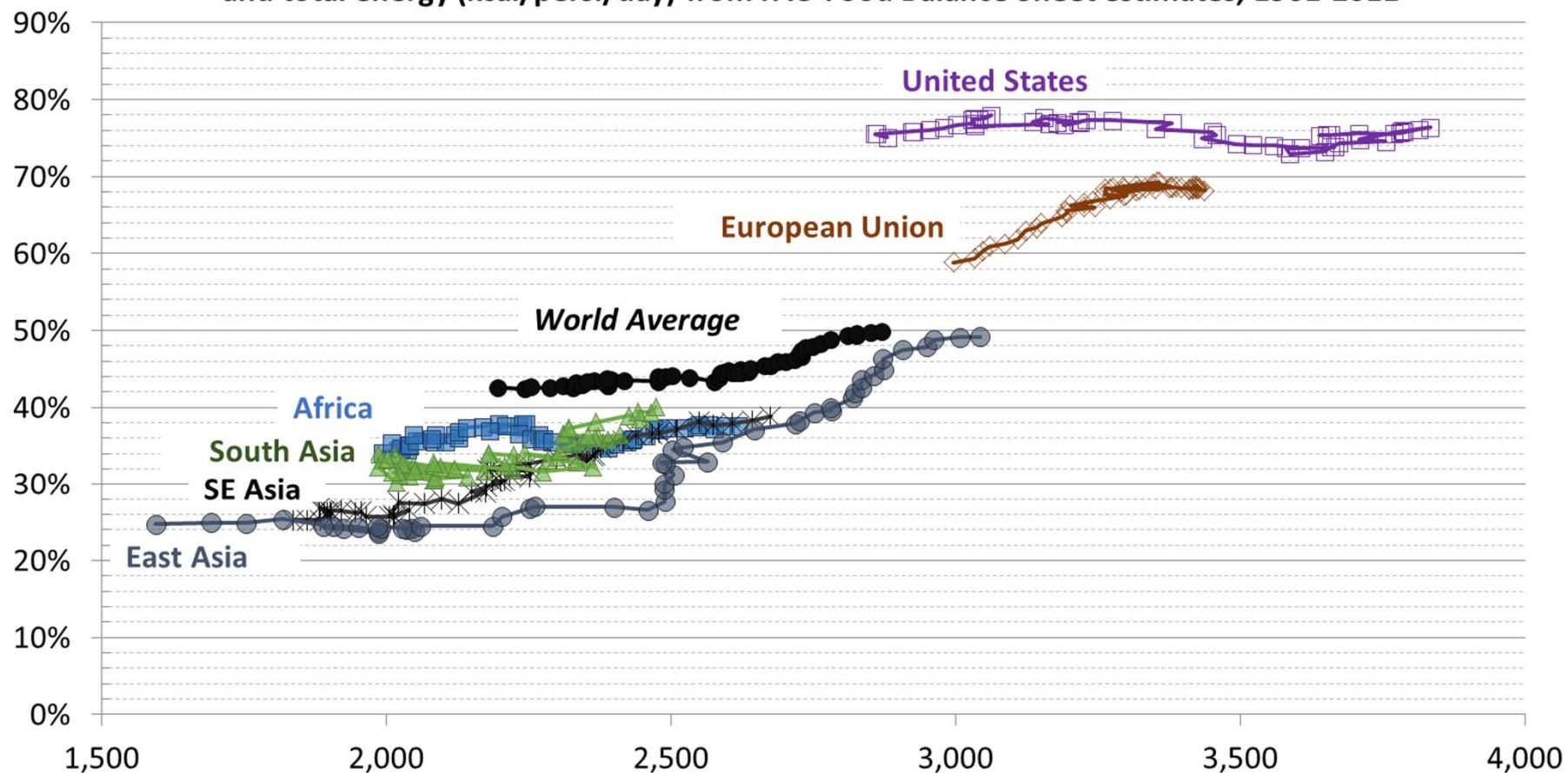


Tufts
UNIVERSITY

Gerald J. and Dorothy R.
Friedman School of
Nutrition Science and Policy

Globally, the race against Malthus is shifting from *more food* to *more diverse foods*

Percent of energy from foods other than starchy staple roots and cereal grains and total energy (kcal/pers./day) from FAO Food Balance Sheet estimates, 1961-2011



Source: Calculated from FAO Food Balance Sheet data, faostat3.fao.org/download/FB/FBS/E



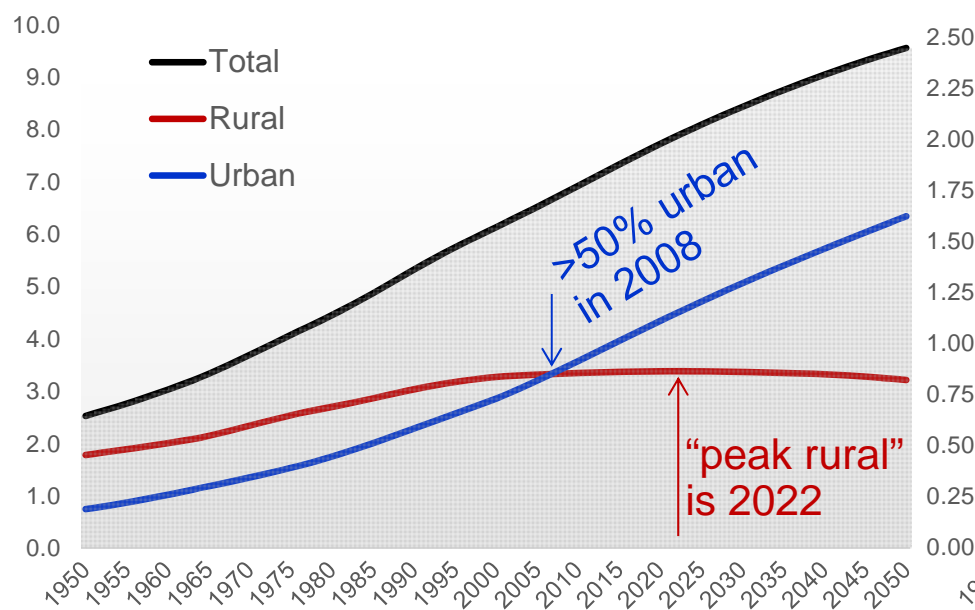
Tufts
UNIVERSITY

Gerald J. and Dorothy R.
Friedman School of
Nutrition Science and Policy

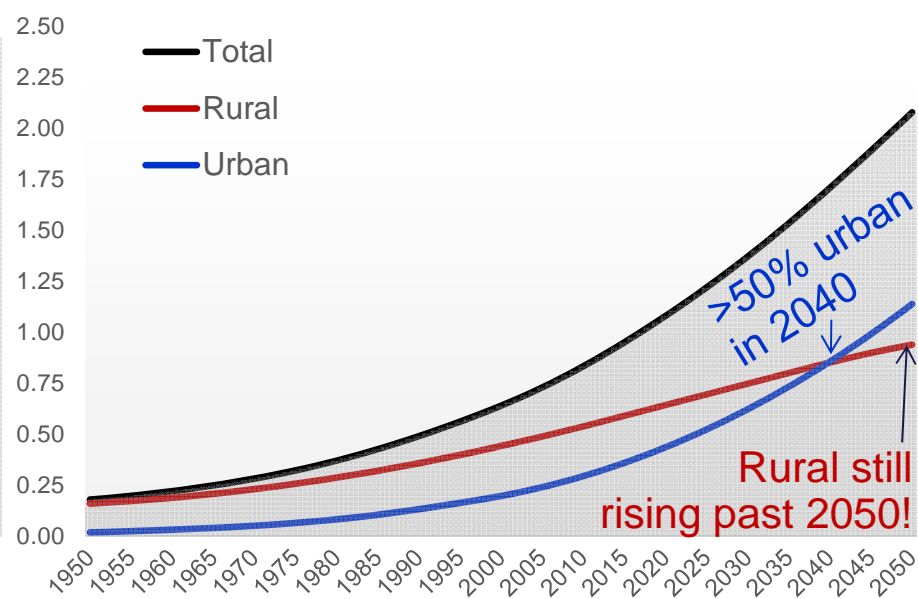
Agricultural transformation is closely tied to urbanization and rural population growth

Regions differ greatly in timing and speed of change

Globally, the world's rural population is near its peak and will soon decline



Sub-Saharan Africa's rural population will keep growing past 2050, despite rapid urbanization



Source: Calculated from UN World Urbanization Prospects, 2014 Revision. Released July 2014 at <http://esa.un.org/unpd/wup>.



Tufts
UNIVERSITY

Gerald J. and Dorothy R.
Friedman School of
Nutrition Science and Policy

Our aim is to distinguish between *more of the same* and *structural shifts*

▪ **Strategy**

- test for shifts in the global average *at each level of national income*
- this generalizes the Preston curve, first applied to life expectancy (Preston 1975, Bloom & Canning 2007),

▪ **Data**

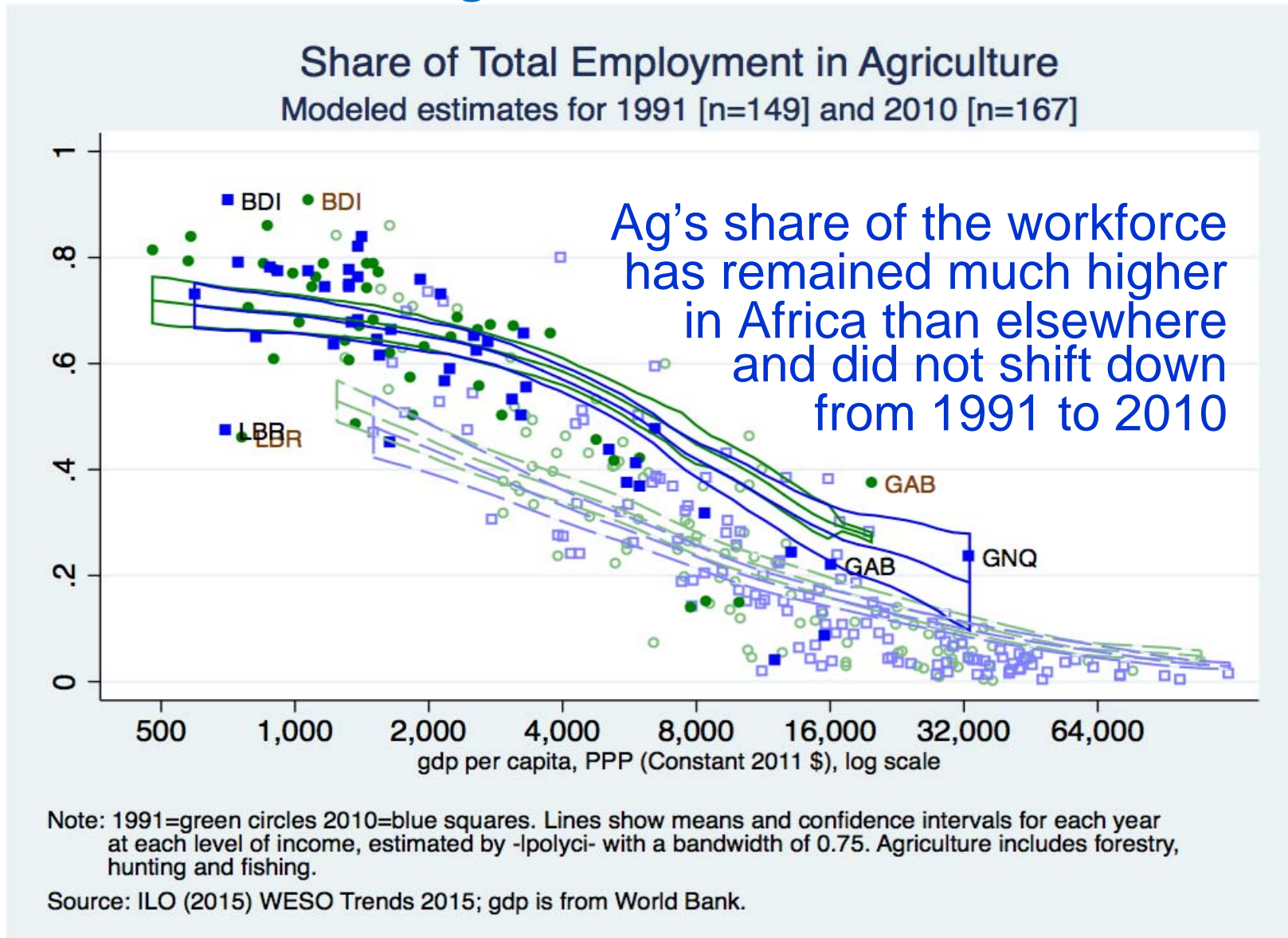
- national income: purchasing power per capita (*not household income!*)
- agriculture: rural pop. growth, ag. employment and earnings
- nutrition: child height, adult obesity, diet quality
- policy choices: price effects of agricultural policies

▪ **Method**

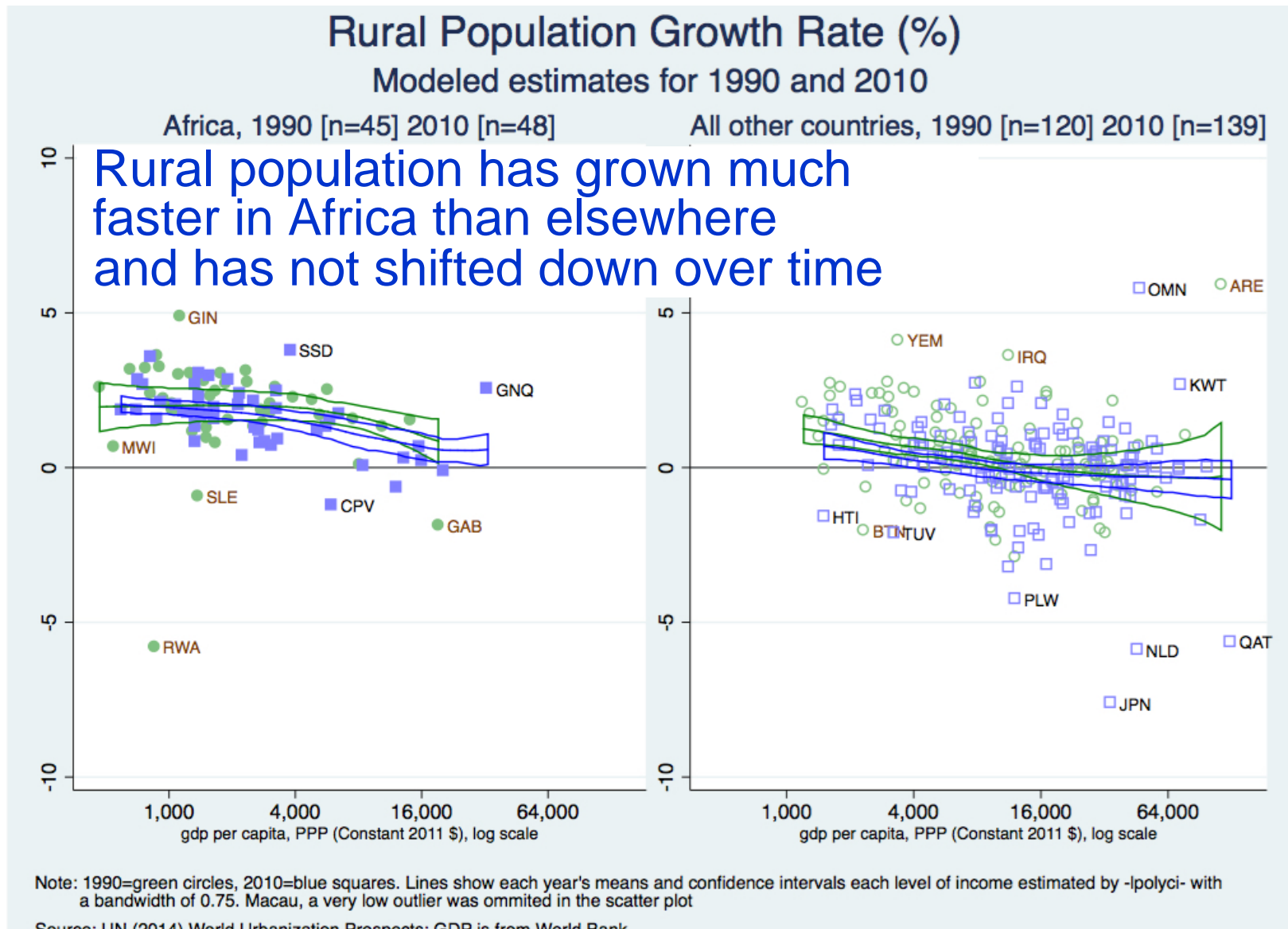
- all data are nationally representative
- each test compares African countries to all others, and 1990s to 2010s



Structural transformation involves shifting workers from agriculture to other sectors



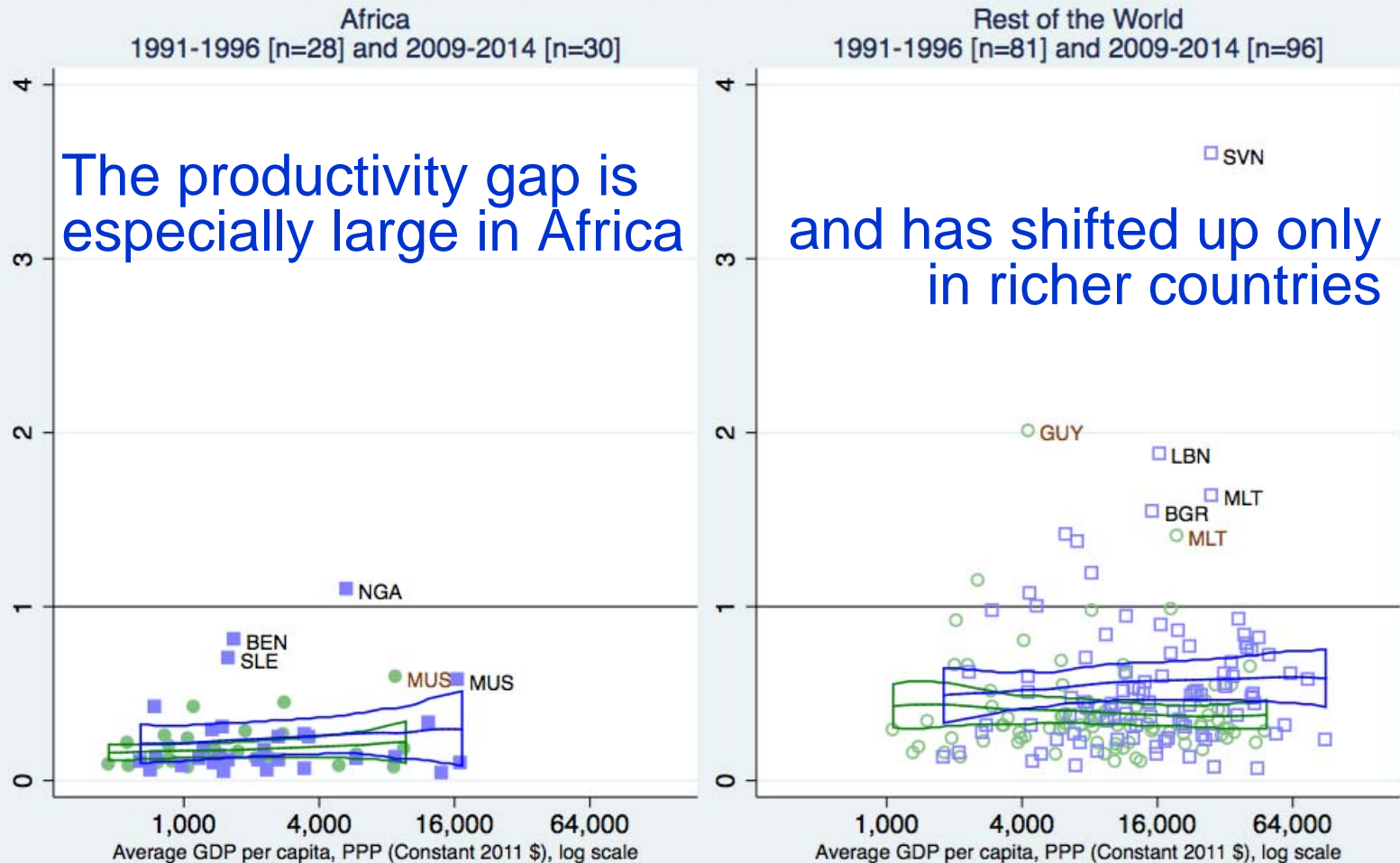
Rural population growth leaves many people no choice but to keep farming



Preston curves: what has changed in agriculture | nutrition | policy

Worker productivity in agriculture is typically lower than in other sectors

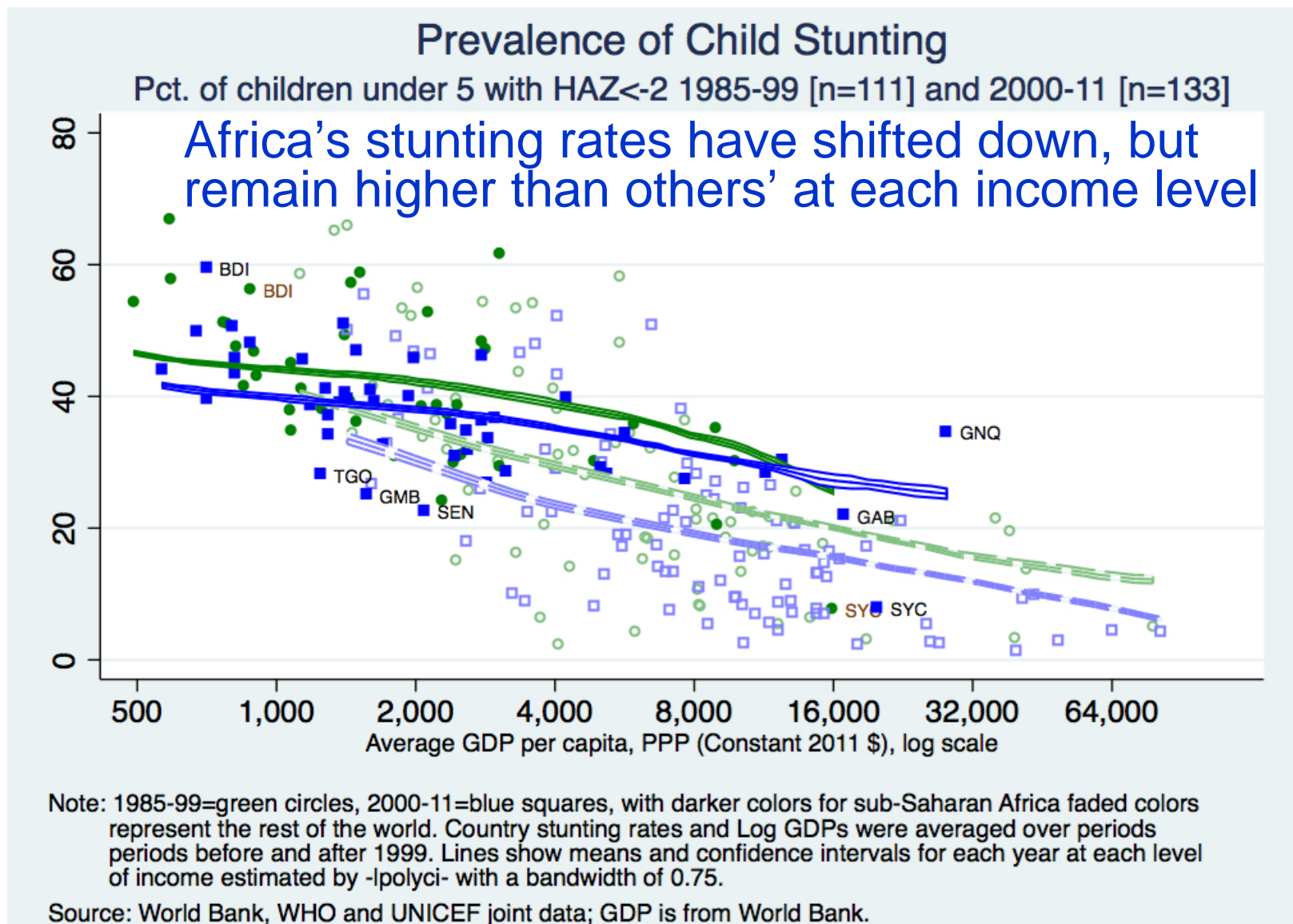
Labor Productivity in Agriculture vs Non-Agriculture



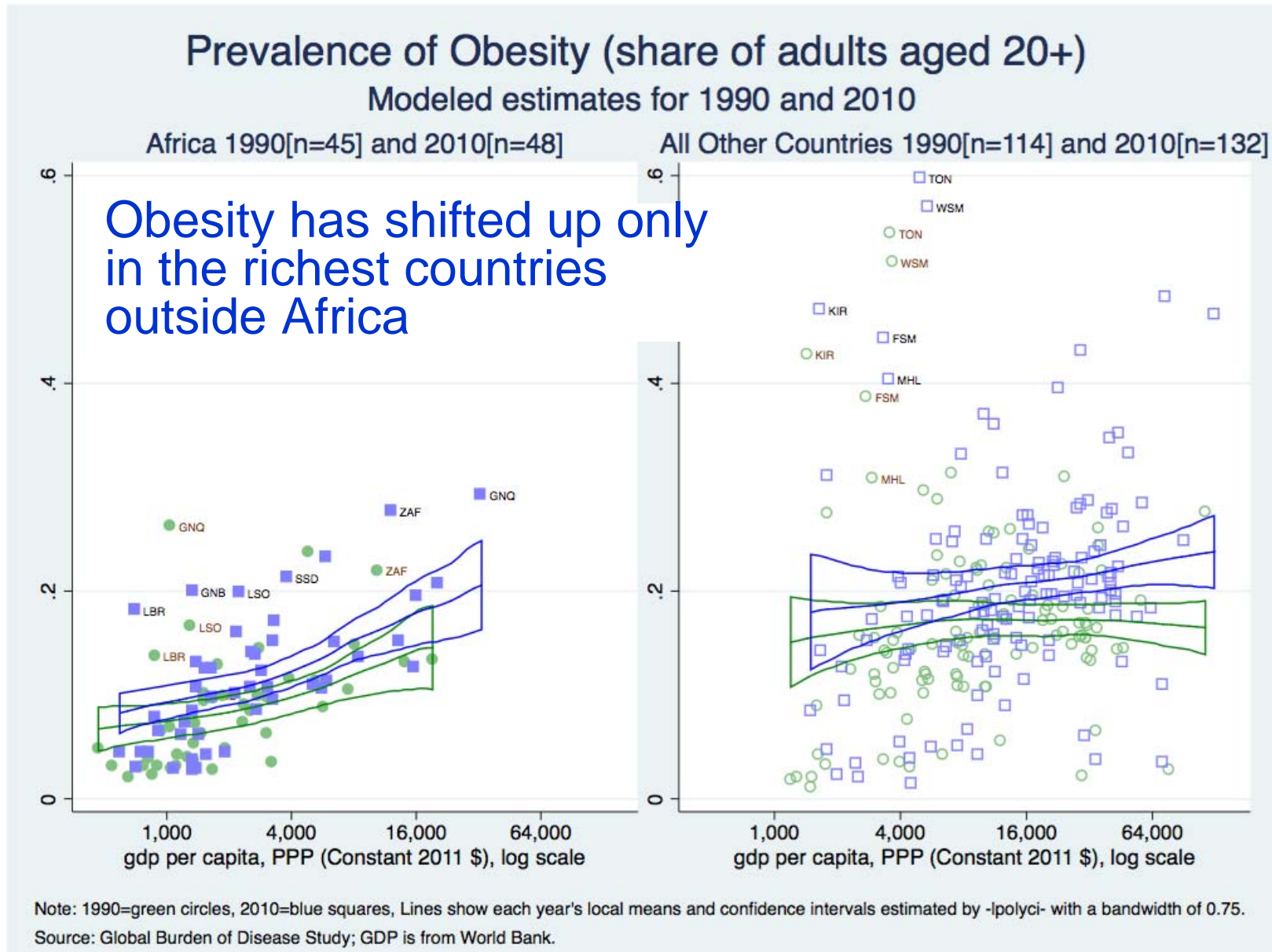
Note: Values over 1 represent ag labor productivity that is higher than non-ag labor productivity. Ratios and log gdp for each country were averaged over time periods. 1991-1995=green and 2009-2014=blue. Lines show means and confidence intervals at each level of income estimated by -lpolyci- with a bandwidth of 0.75. Agriculture includes forestry, hunting and fishing.

Source: World Bank 2015 & ILO WESO Trends 2015; GDP is from World Bank.

Heights are often used to measure child health

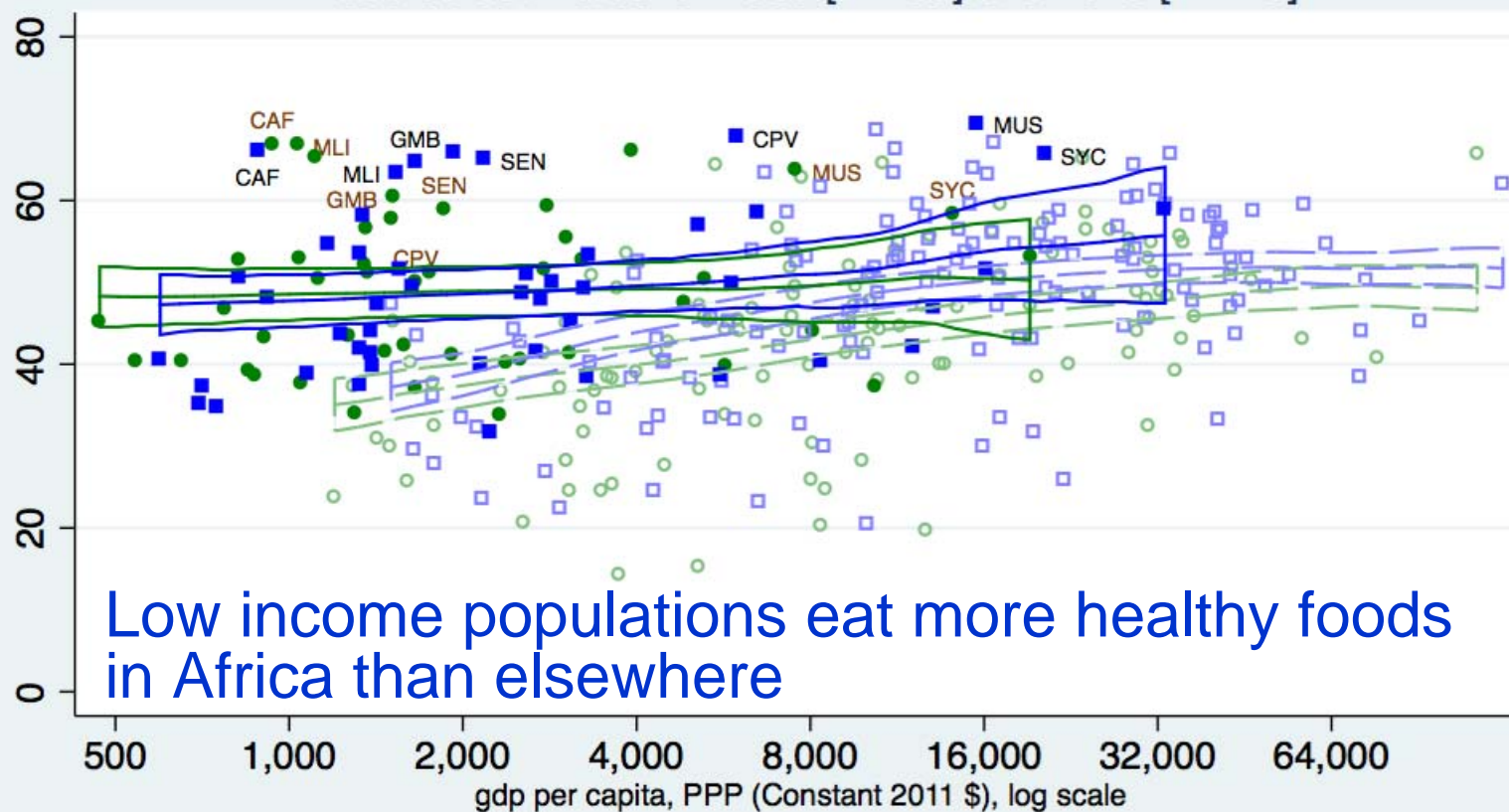


Obesity is increasingly important for adult health



Diet quality depends on eating more healthy foods

Diet Quality Score (0-100) for Consumption of 10 Healthy Foods
Modeled estimates for 1990 [n=159] and 2010 [n=179]



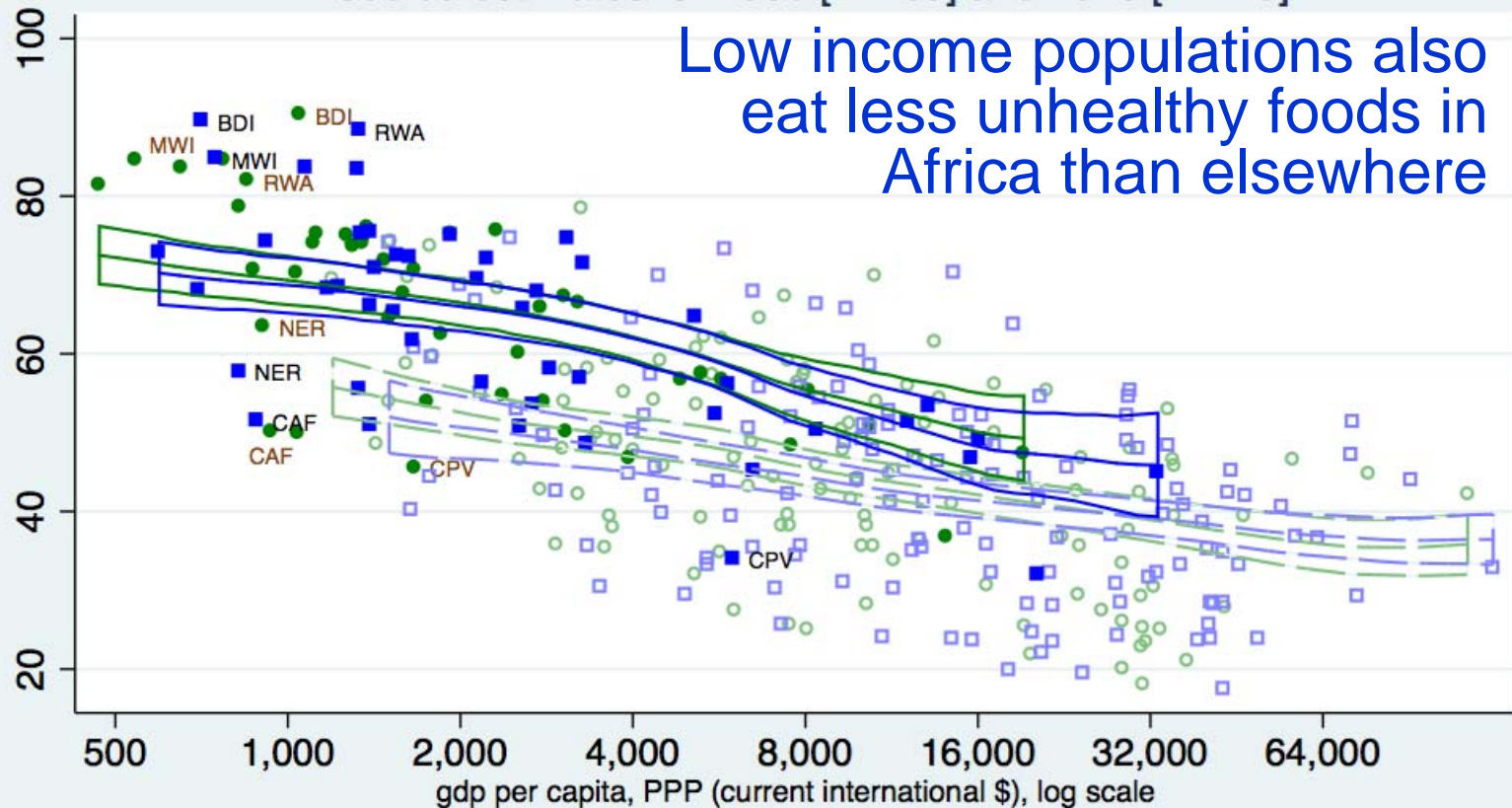
Note: 1990=green circles, 2010=blue squares, darker colors represent sub-Saharan African countries, faded colors represent the rest of the world. Diet score is higher for more intake of 10 healthy items: fruits, vegetables, beans & legumes, nuts & seeds, whole grains, milk, polyunsaturated fatty acids, fish, plant omega-3s and fiber. Lines show means and CIs from -lpolyci- with a bandwidth of 0.75.

Source: Nutrition and Chronic Diseases Expert Group (NutriCoDE); GDP is from World Bank.

Diet quality also means eating less *unhealthy* foods

Diet Quality Score (0-100) for Consumption of 7 Unhealthy Foods

Modeled estimates for 1990 [n=159] and 2010 [n=179]



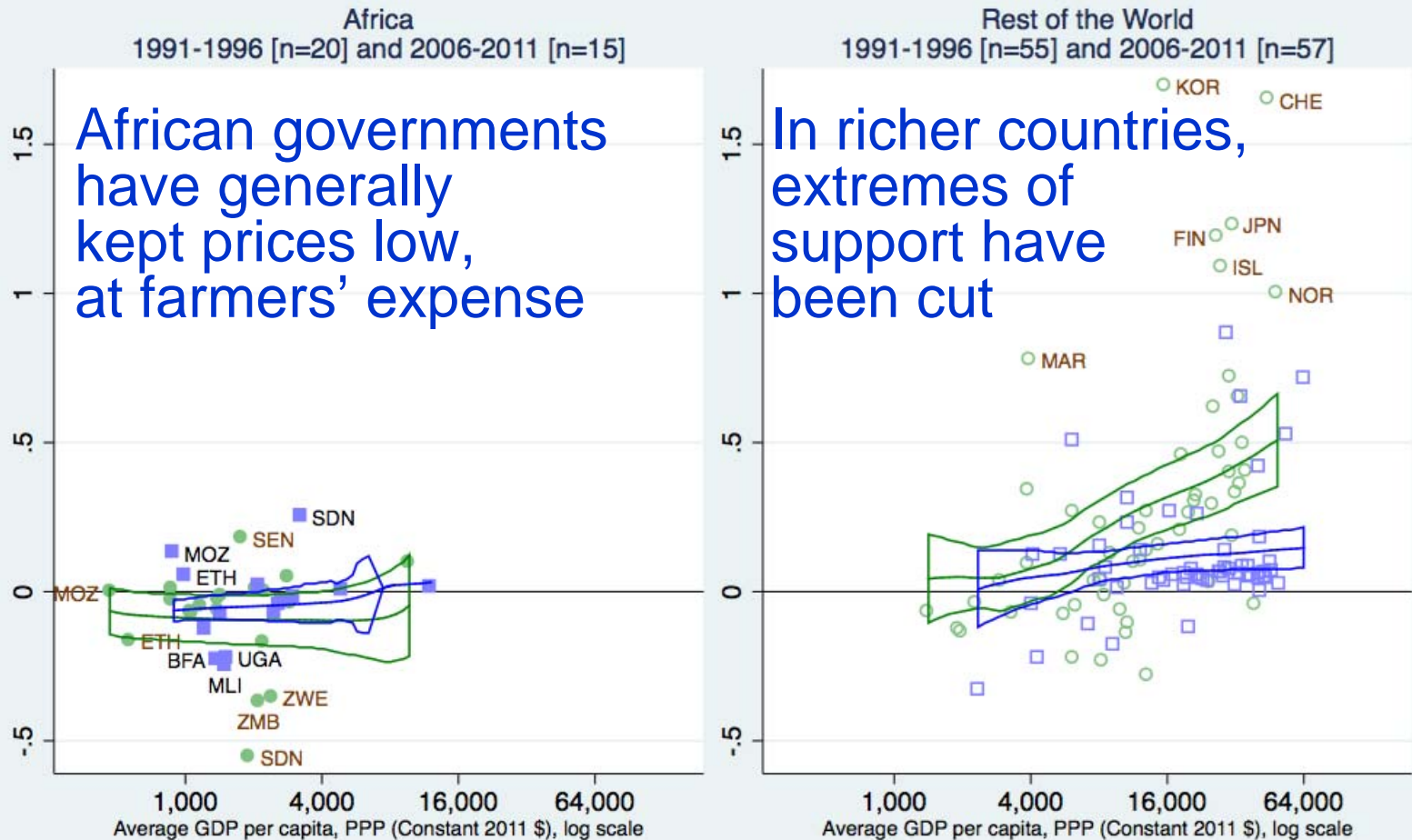
Note: 1990=green circles, 2010=blue squares, darker colors represent sub-Saharan African countries, faded colors represent the rest of the world. Diet score is higher for lower intake of 7 unhealthy items: Red meats, processed meats, sugar-sweetened beverages, saturated fat, trans fat, dietary cholesterol, and sodium. Lines show means and CIs from -lpolyci- with a bandwidth of 0.75.

Source: Nutrition and Chronic Diseases Expert Group (NutriCoDE); GDP from World Bank

Preston curves: what has changed in agriculture | nutrition | policy

Food policy has often shifted with income growth from lowering to raising food prices

Consumer Tax Equivalent (CTE) of all Agricultural Policies
Average Value-weighted effect on food prices for 1991-1996 and 2006-2011

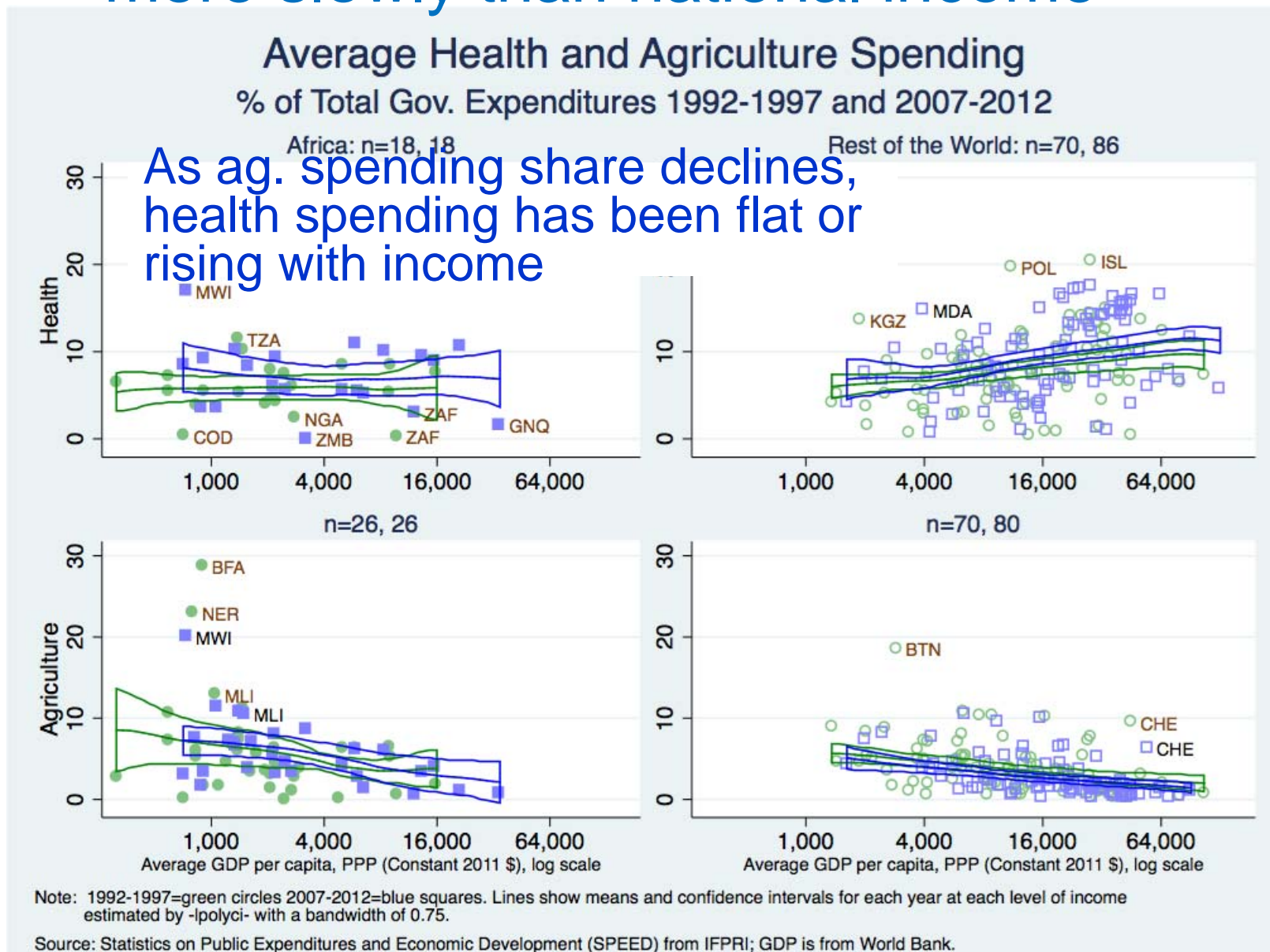


Note: Tariff-equivalent effect in percent of all farm and food policies. Each year shown as 1991-1996=green circles 2006-2011=blue squares. Lines show means and confidence intervals for each year at each level of income estimated by -lpolyci- with a bandwidth of 0.75.

Source: World Bank, Distortions to Agricultural Incentives project; GDP from World Bank

Preston curves: what has changed in agriculture | nutrition | policy

Fiscal spending on agriculture has generally risen more slowly than national income



Comparing Africa to other regions reveals a lot:

- **Preston curves reveal how the present is like the past, or not...**
 - most change is movement along a stable development path
 - only a few variables differ and shift over time
- **Some remarkable differences include:**
 - Rapid rural population in Africa will continue past 2050 despite rapid urbanization, due to population momentum
 - Africa continues to have a larger share of its workers in agriculture, with lower productivity relative to nonfarm workers
 - Africa has had higher rates of child stunting at each income level, but stunting rates have shifted down rapidly in Africa like elsewhere
- **Africa's unique demography will remain its greatest challenge**
 - Without faster agricultural productivity growth where the rural poor live, their increasing numbers will force even more of them into poverty ...even with rapid urbanization and health improvements



Acknowledgements

Robel Alemu Getachew, Nathaniel Rosenblum,
Anaya Hall, Elena Martinez, Peilin Shi, Gitanjali Singh,
Patrick Webb and Dariush Mozaffarian

Feed the Future Policy Impact Study Consortium
Funded by USAID

Global Nutrition and Policy Consortium
Funded by BMGF: www.globaldietarydatabase.org

Feed the Future Innovation Lab for Nutrition
Funded by USAID: www.nutritioninnovationlab.org



USAID
FROM THE AMERICAN PEOPLE



FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative



thank you!