

# The global pattern of malnutrition: From undernutrition to obesity and diet-related disease

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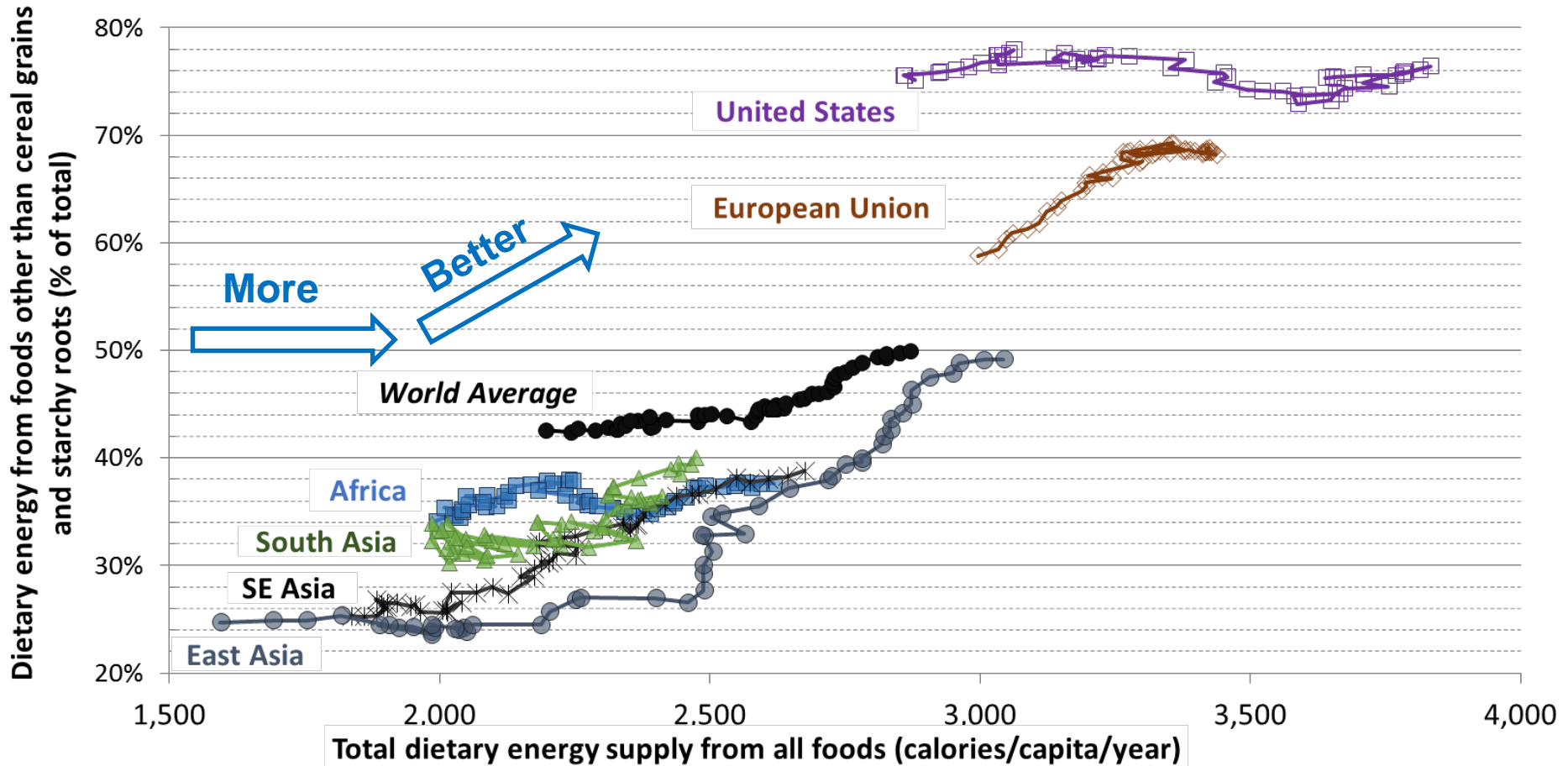
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**Building Human Capital: Nutrition is Fundamental**  
**BIFAD side event at the World Food Prize 2015 Borlaug Dialogue**  
**October 14<sup>th</sup>, 2015**



# In fifty years, from *more* food to *better* food

Percent of energy from non-staple foods and total dietary energy by region, 1961-2011  
(FAO Food Balance Sheet estimates)



Source: Author's calculations from FAO Food Balance Sheets,  
<http://faostat3.fao.org/download/FB/FBS/E> (June 2015).

## Fifteen years into the 21<sup>st</sup> c., we have:

- **Progress on stunting and wasting**  
...but still far to go
- **Sharp rise in obesity**  
...and more to come
- **Rapid shift in diet-related diseases**  
...even in developing countries

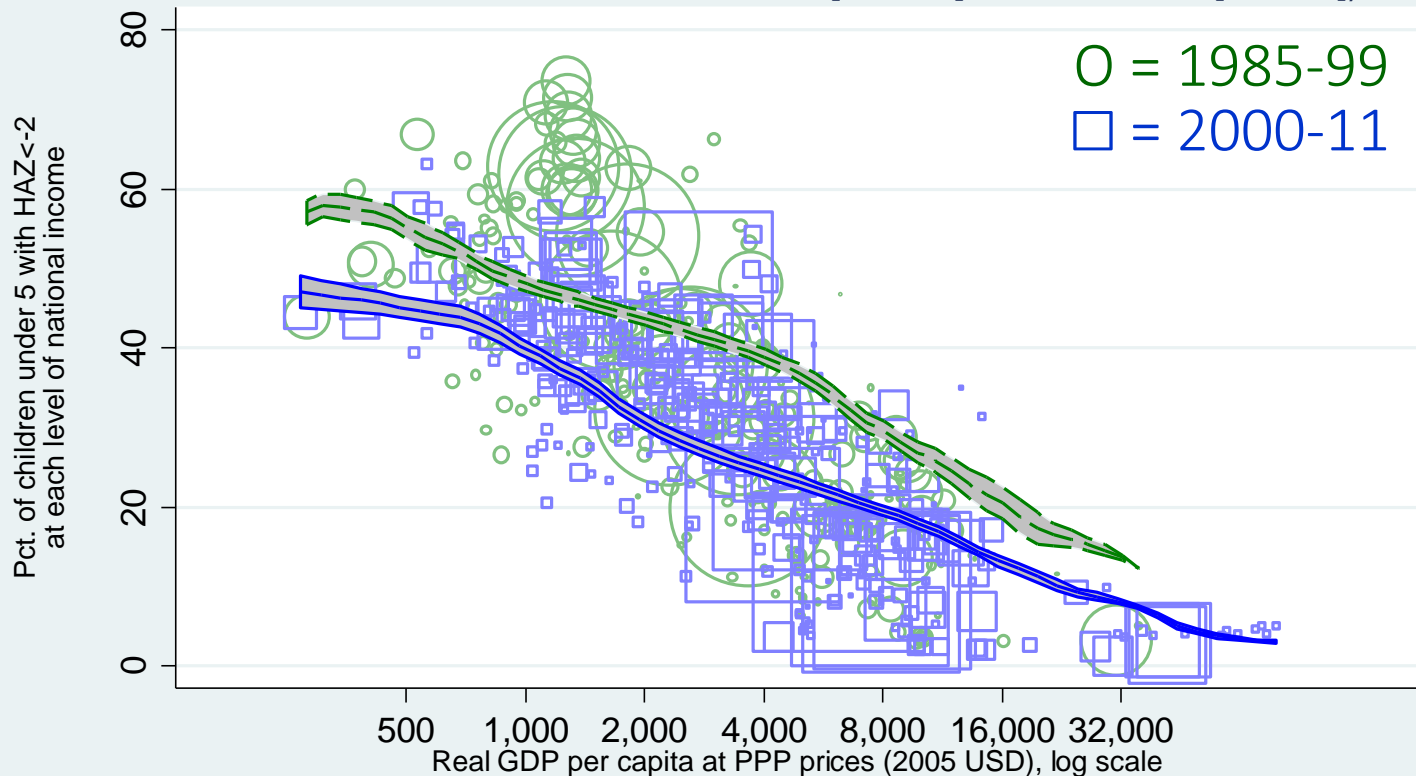
# How has the food system changed?

- **Are countries just richer, or different in other ways?**
  - Richer = more of everything, both public and private
  - Different = new things, both technologies and institutions
- **Strategy**
  - test for shifts in the global average *at each level of national income*
  - this generalizes the Preston curve (Preston 1975, Bloom & Canning 2007), first applied to life expectancy
- **Data**
  - national income: purchasing power per capita
  - height and weight: stunting, wasting and obesity
  - disease burden: diabetes and diarrhea (*% of DALYs lost*)
- **Method**
  - all data are nationally representative; results are weighted by population
  - calculate local mean and confidence interval at each income level
  - this represents the average person in countries at that level of income, in each period of time

The main development goal:  
**child stunting**

# Clear progress against child stunting, at each level of income

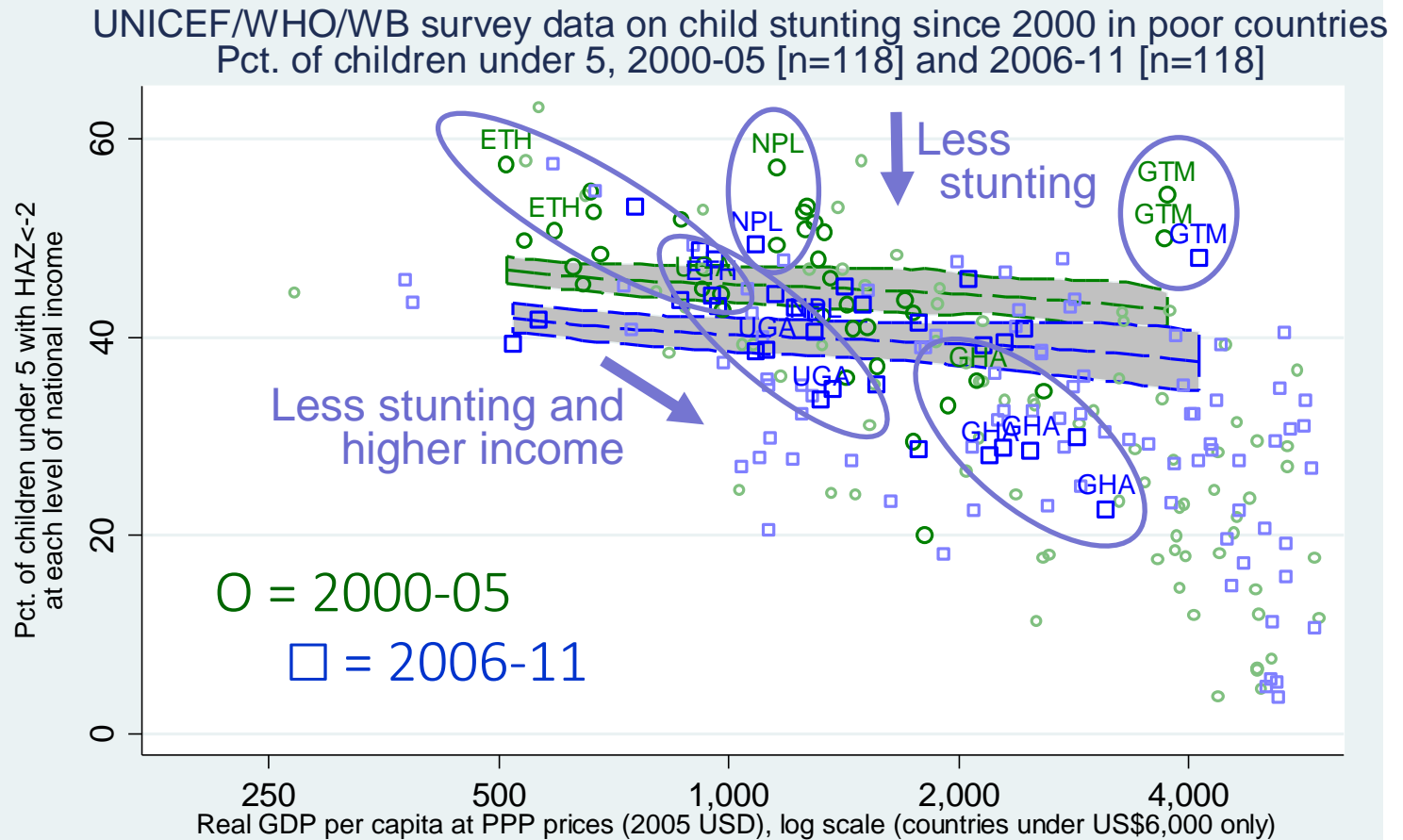
UNICEF/WHO/WB survey data on prevalence of child stunting, 1985-2011  
Pct. of children under 5, 1985-99 [n=250] and 2000-11 [n=337]



Note: Symbols are sized by population, with decades shown by green circles for 1986-99 (250 surveys in 103 countries) and blue squares for 2000-2011 (337 surveys in 117 countries). Lines show local means and confidence intervals for each period estimated by `lpolyci`, weighted by population and with a bandwidth of 0.75.

Source: World Bank, WHO and UNICEF joint data; GDP and population are from PWT 8.1.

# Focusing on the poorest in recent years, we can zoom in to see FTF countries' gains



Note: 2007-09=green circles, 2000-11=blue squares, with darker colors for FtF focus countries of which a few are labeled. Lines show each period's local means and confidence intervals estimated by -lpolyci-, weighted by population and with a bandwidth of 0.75.

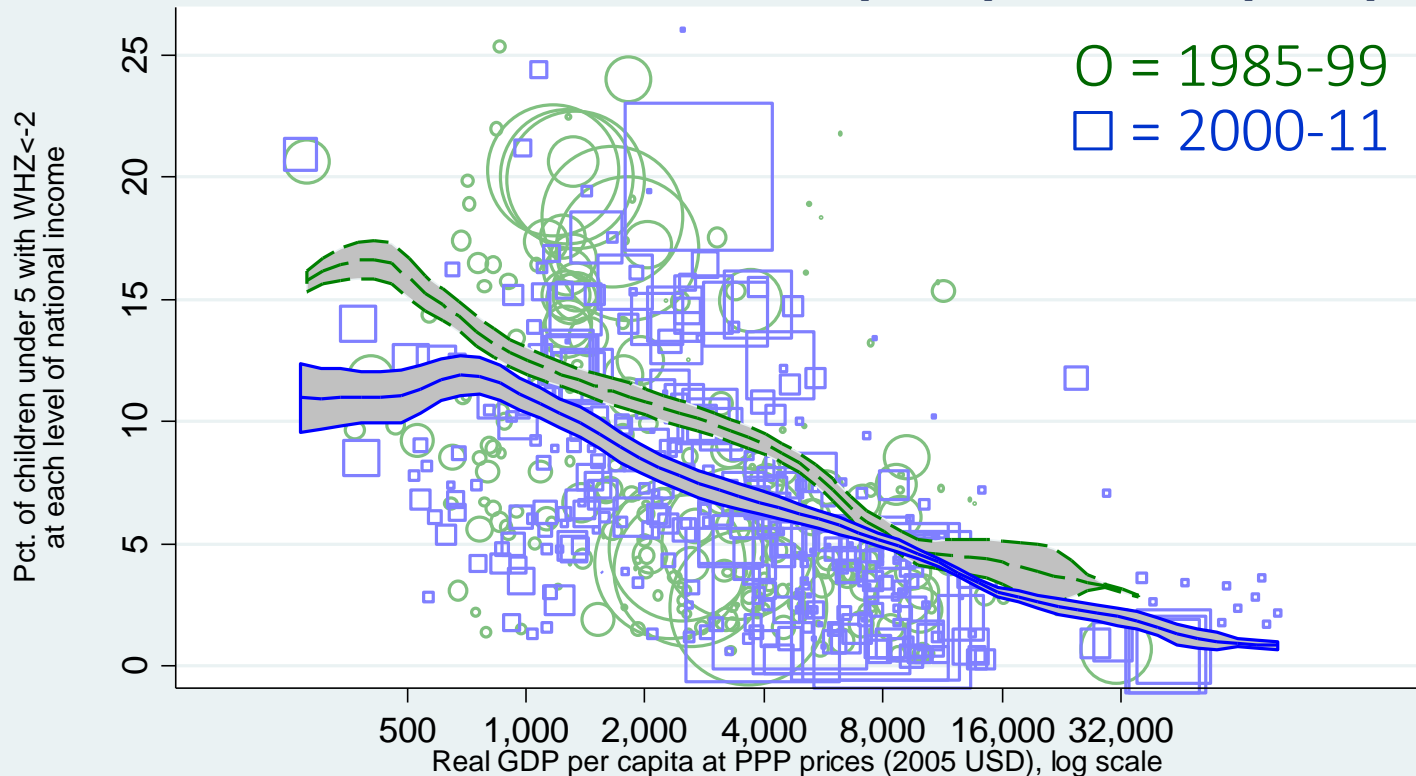
Source: World Bank, WHO and UNICEF joint data; GDP and population are from PWT 8.1.

Less prevalent, but still serious:  
**child wasting**



# Child wasting rates have also fallen

UNICEF/WHO/WB survey data on prevalence of child wasting, 1985-2011  
Pct. of children under 5, in 1985-99 [n=244] and 2000-11 [n=333]

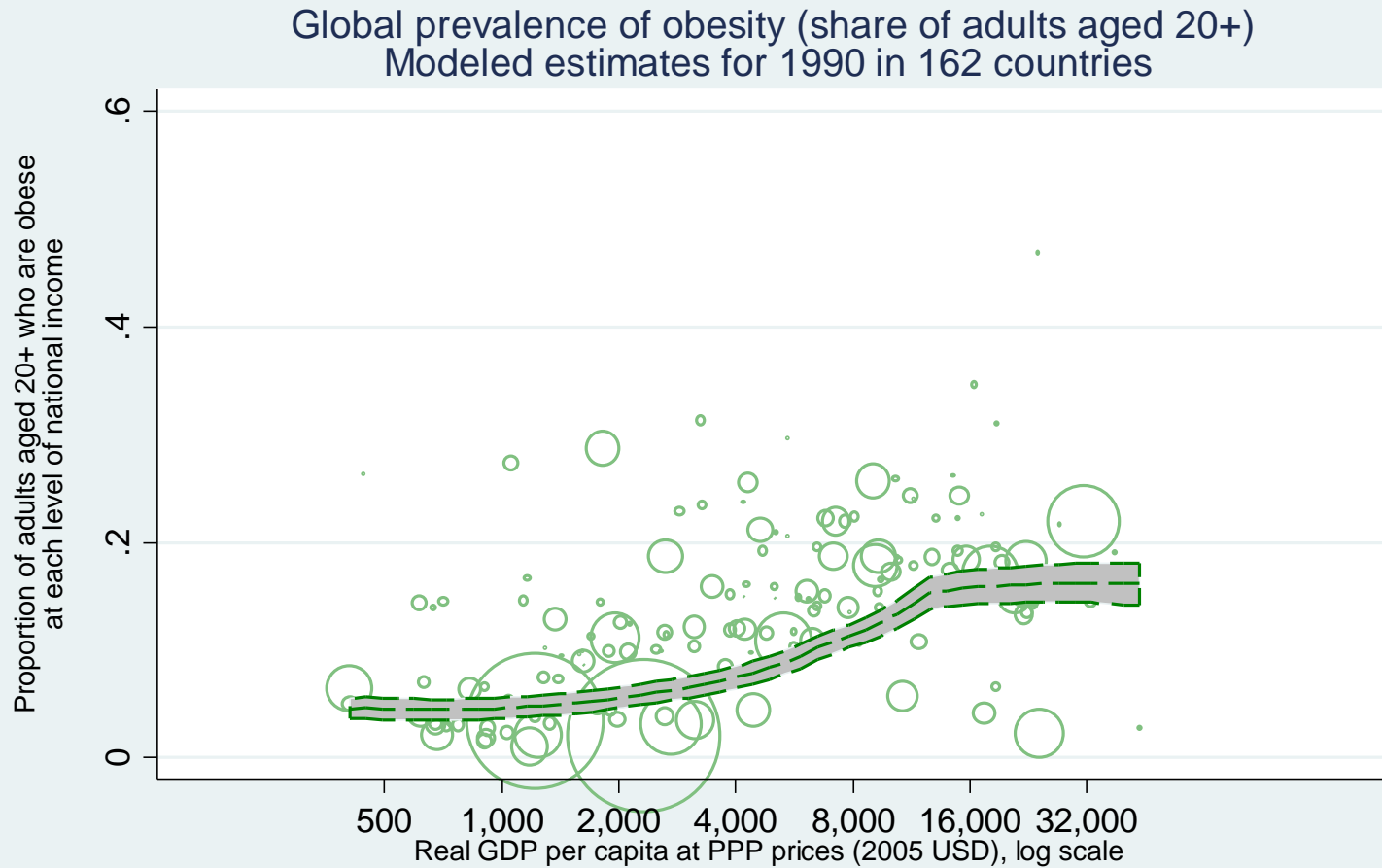


Note: Symbols are sized by population, with decades shown by green circles for 1986-99 (244 surveys in 102 countries) and blue squares for 2000-2011 (333 surveys in 116 countries). Lines show local means and confidence intervals for each period estimated by `lpolyci`, weighted by population and with a bandwidth of 0.75.

Source: World Bank, WHO and UNICEF joint data; GDP and population are from PWT 8.1.

The most visible kind of change:  
**adult obesity**

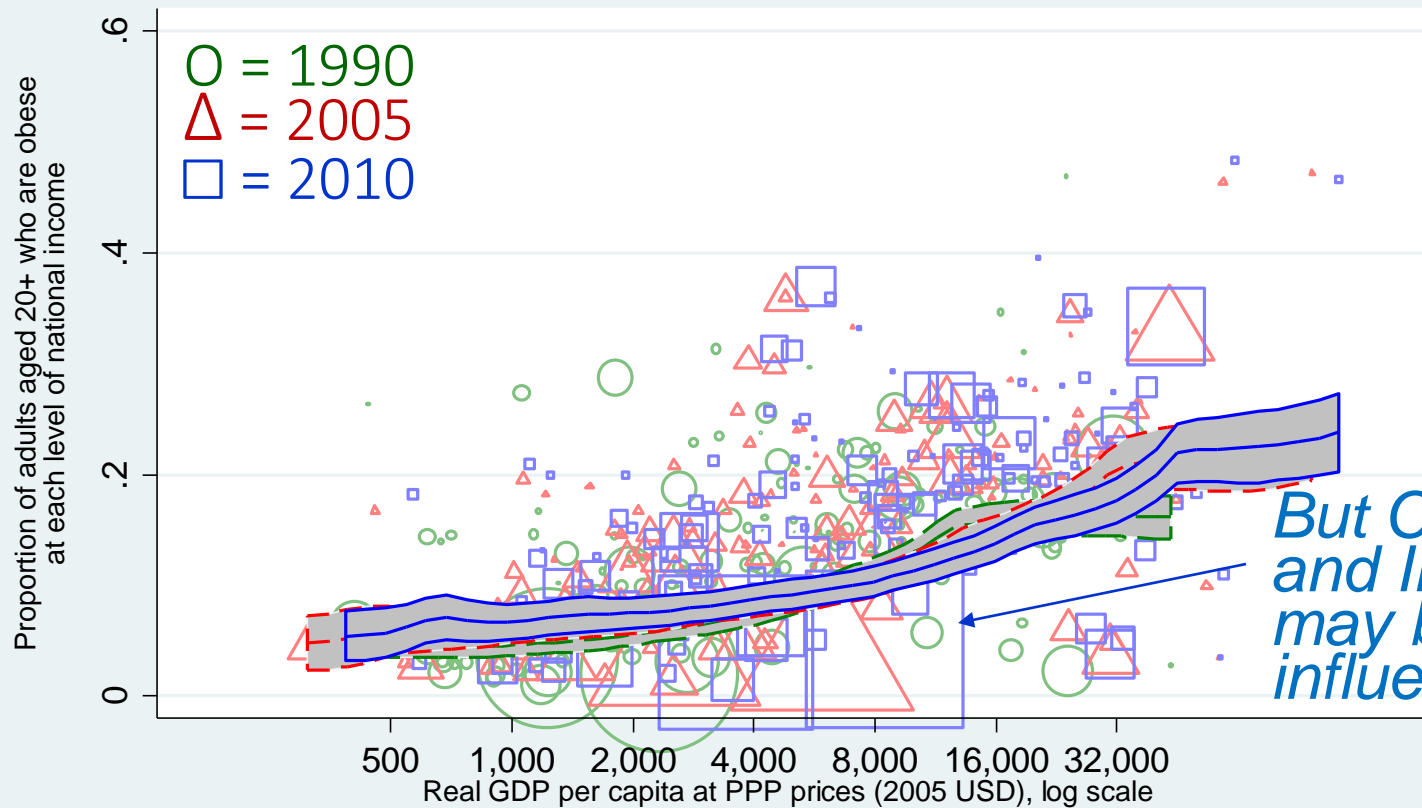
# Adult obesity had a clear income gradient in 1990



Note: Symbols are sized by population, with year shown as 1990=green circles.  
Lines show each year's local means and confidence intervals  
estimated by `-lpolyci-`, weighted by population and with a bandwidth of 0.75.  
Source: Global Burden of Disease Study; GDP and population are from PWT 8.1.

# From 1990 to 2010, did the income gradient shift?

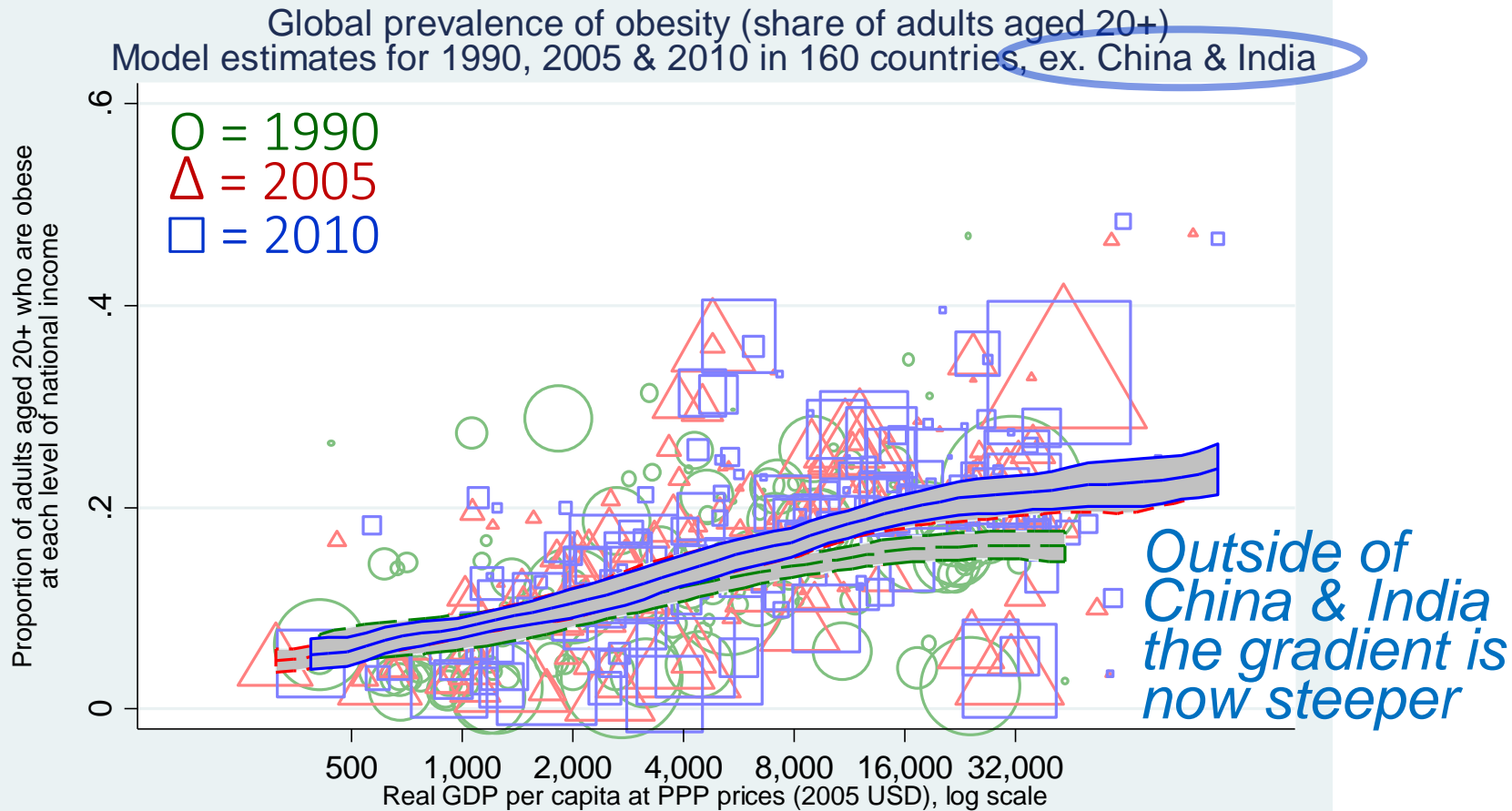
Global prevalence of obesity (share of adults aged 20+)  
Modeled estimates for 1990, 2005 & 2010 in 162 countries



Note: Symbols are sized by population, with year shown as 1990=green circles, 2005=red triangles, and 2010=blue squares. Lines show each year's local means and confidence intervals estimated by -lpolyci-, weighted by population and with a bandwidth of 0.75.

Source: Global Burden of Disease Study; GDP and population are from PWT 8.1.

# Adult obesity has shifted up in richer countries

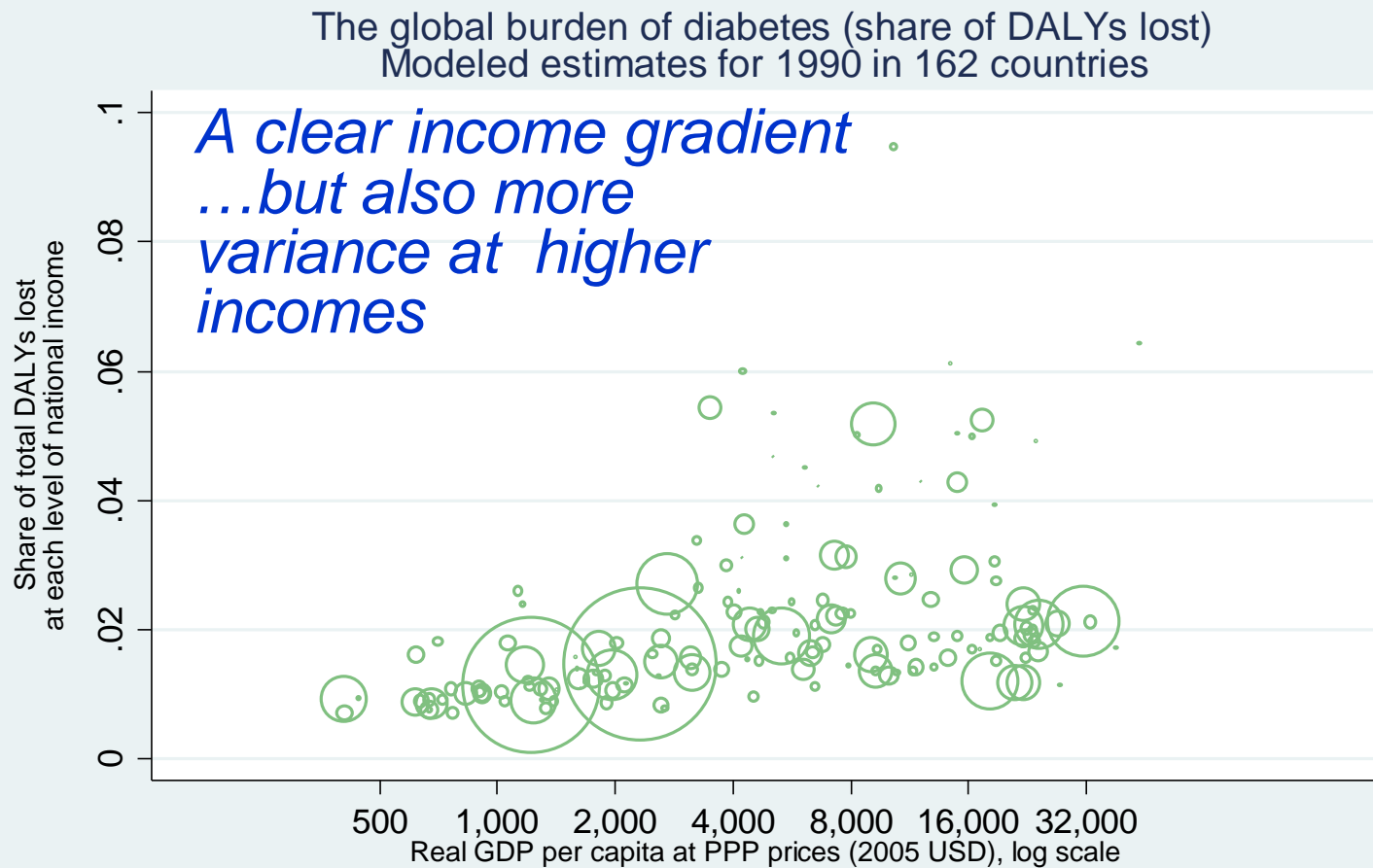


Note: Symbols are sized by population, with year shown as 1990=green circles, 2005=red triangles, and 2010=blue squares. Lines show each year's local means and confidence intervals estimated by `-lpolyci-`, weighted by population and with a bandwidth of 0.75.

Source: Global Burden of Disease Study; GDP and population are from PWT 8.1.

The worst diet-related disease:  
diabetes

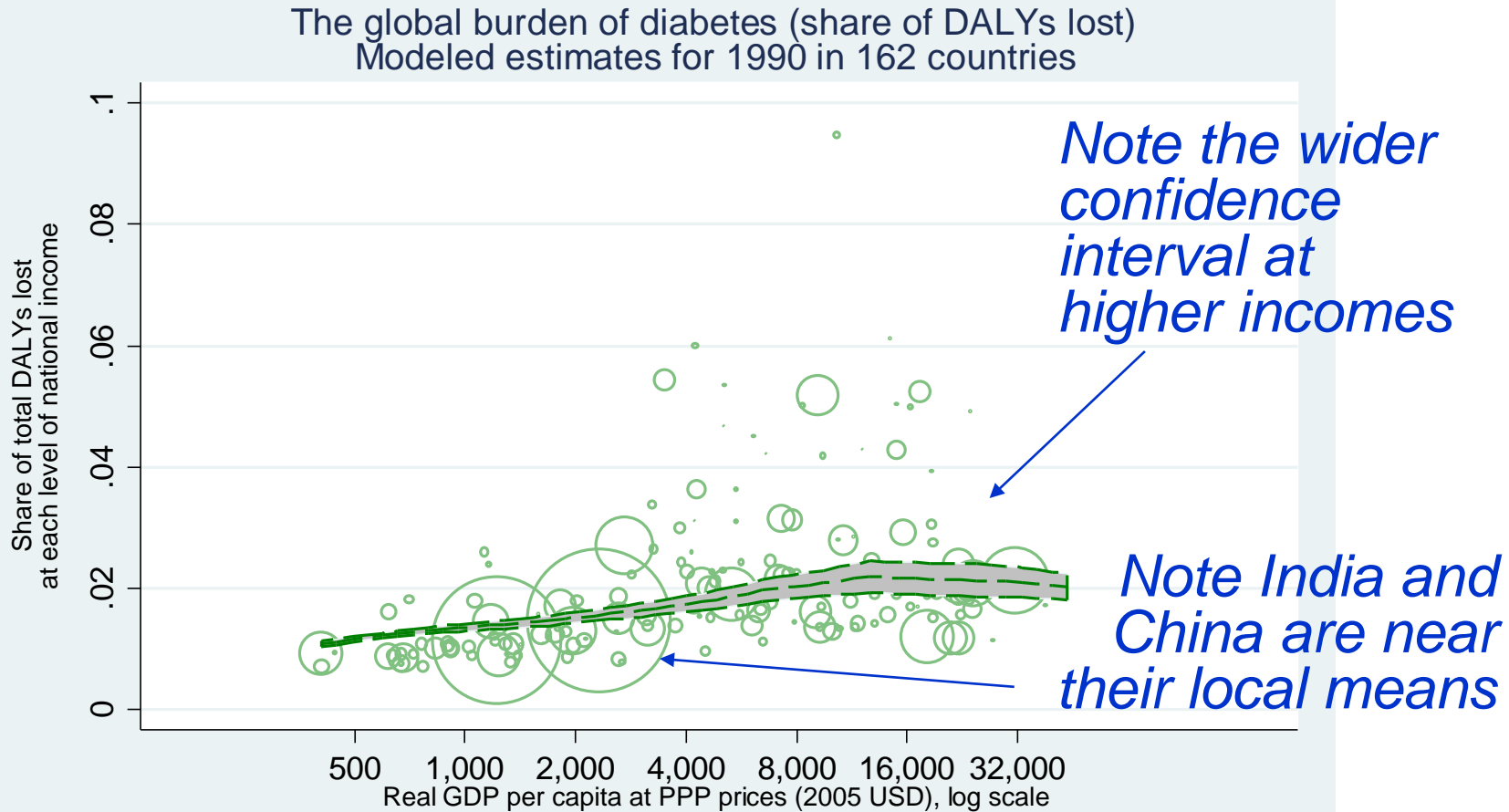
## Diabetes burdens in 1990



Note: Symbols are sized by population, with year shown as 1990=green circles.

Source: Global Burden of Disease Study, Results by Cause; GDP and population are from PWT 8.1.

# Diabetes burdens in 1990, with local means

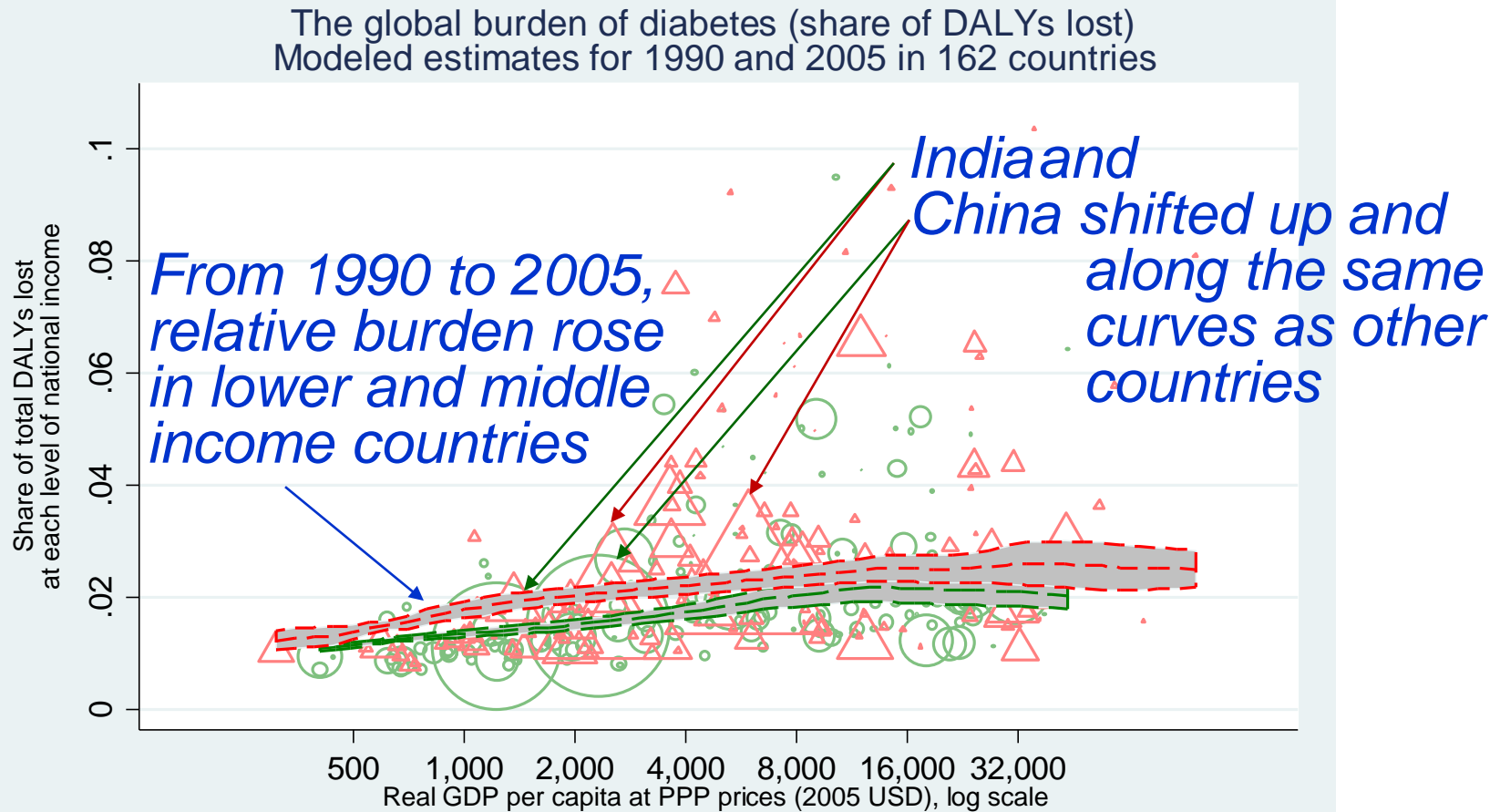


Note: Symbols are sized by population, with year shown as 1990—green circles.  
Lines show each year's local means and confidence intervals  
estimated by -lpolyci-, weighted by population and with a bandwidth of 0.75.

Source: Global Burden of Disease Study, Results by Cause; GDP and population are from PWT 8.1.



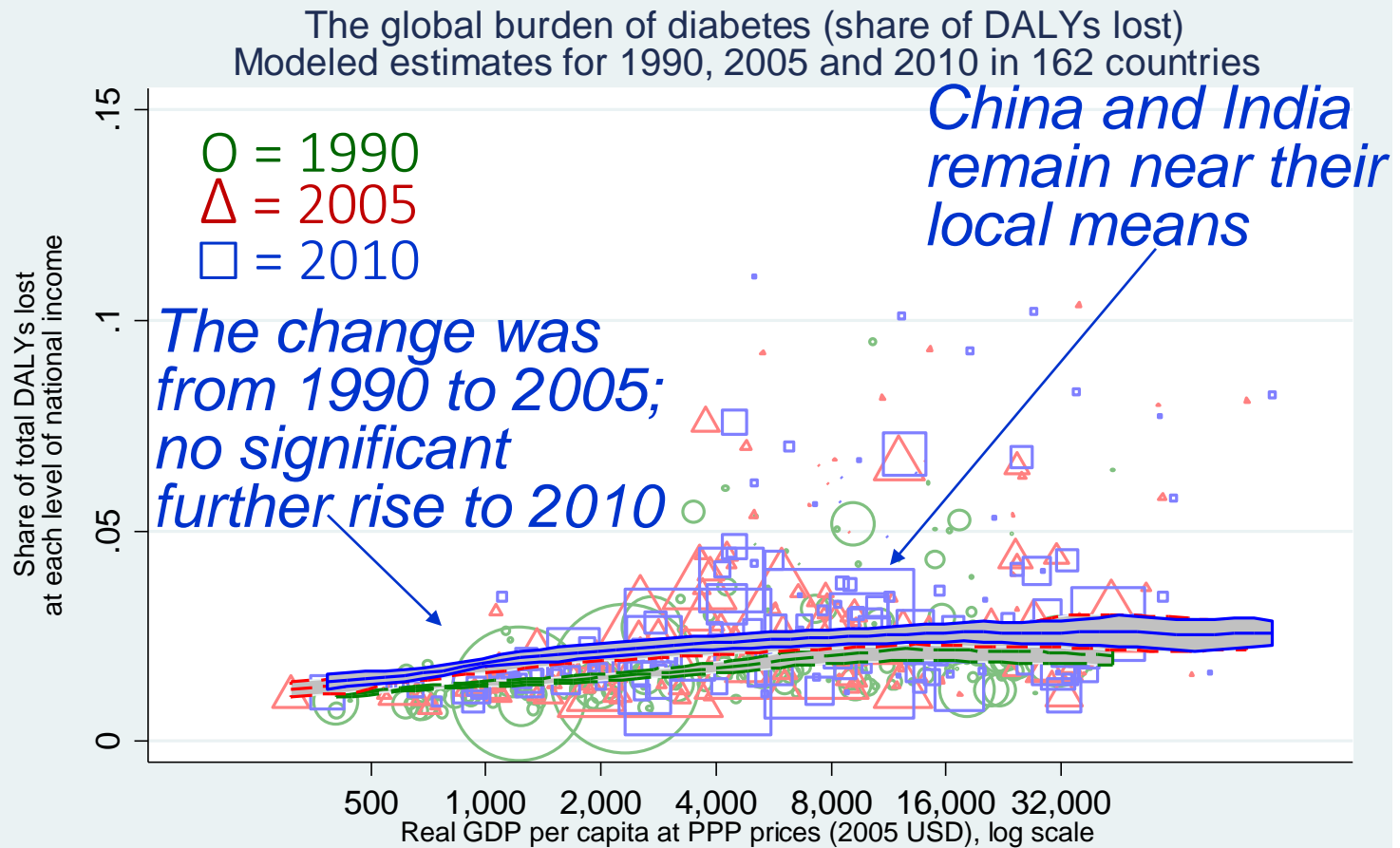
# Changes in diabetes from 1990 to 2005



Note: Symbols are sized by population, with year shown as 1990=green circles and 2005=red triangles. Lines show each year's local means and confidence intervals estimated by `lpolyci`, weighted by population and with a bandwidth of 0.75.

Source: Global Burden of Disease Study, Results by Cause; GDP and population are from PWT 8.1.

# Diabetes burdens have risen in poor countries



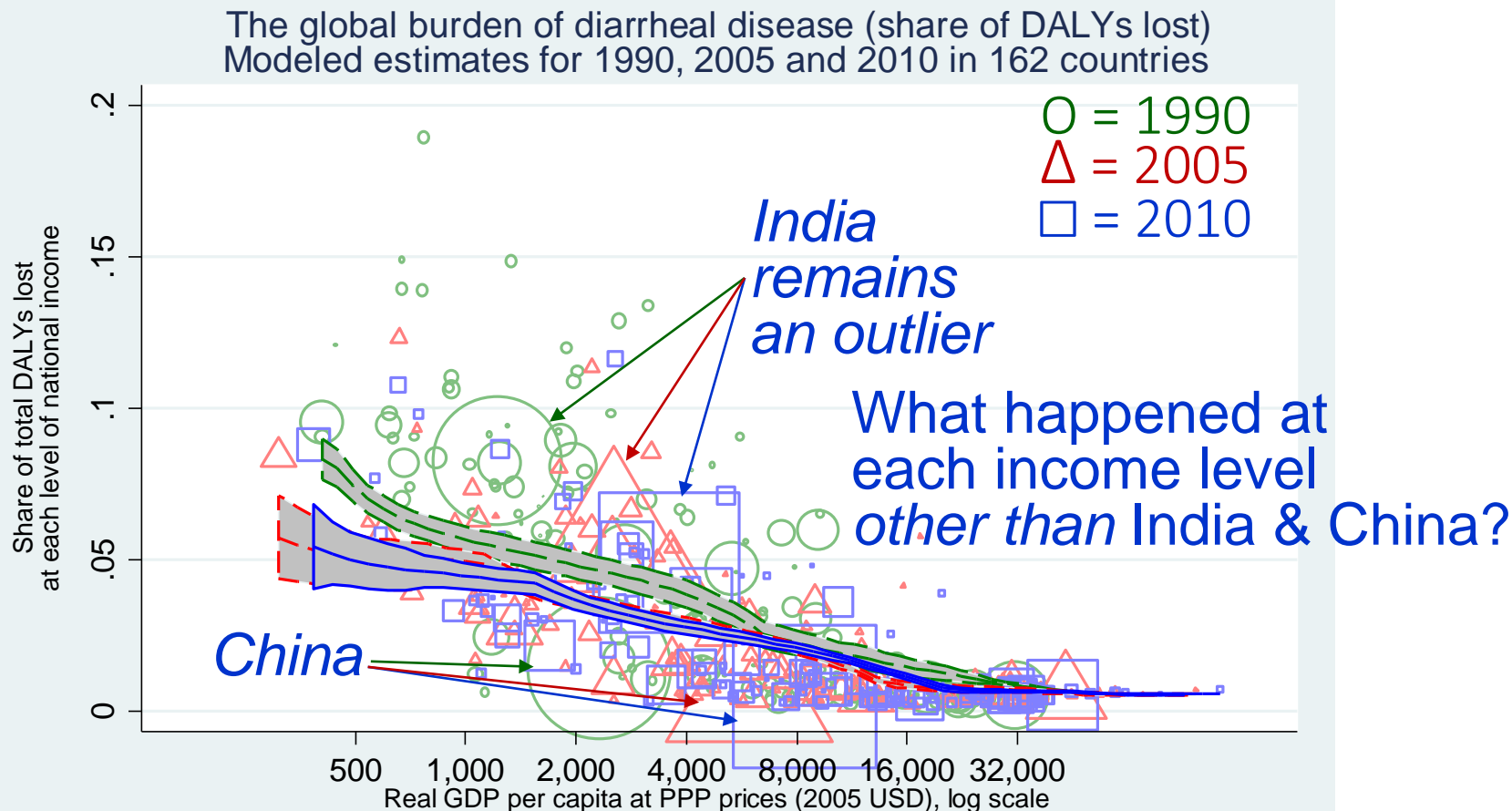
Note: Symbols are sized by population, with year shown as 1990=green circles, 2005=red triangles, and 2010=blue squares. Lines show each year's local means and confidence intervals estimated by `-lpolyci-`, weighted by population and with a bandwidth of 0.75.

Source: Global Burden of Disease Study, Results by Cause; GDP and population are from PWT 8.1.

Now contrast with the signature  
illness of undernourishment:

**diarrheal disease**

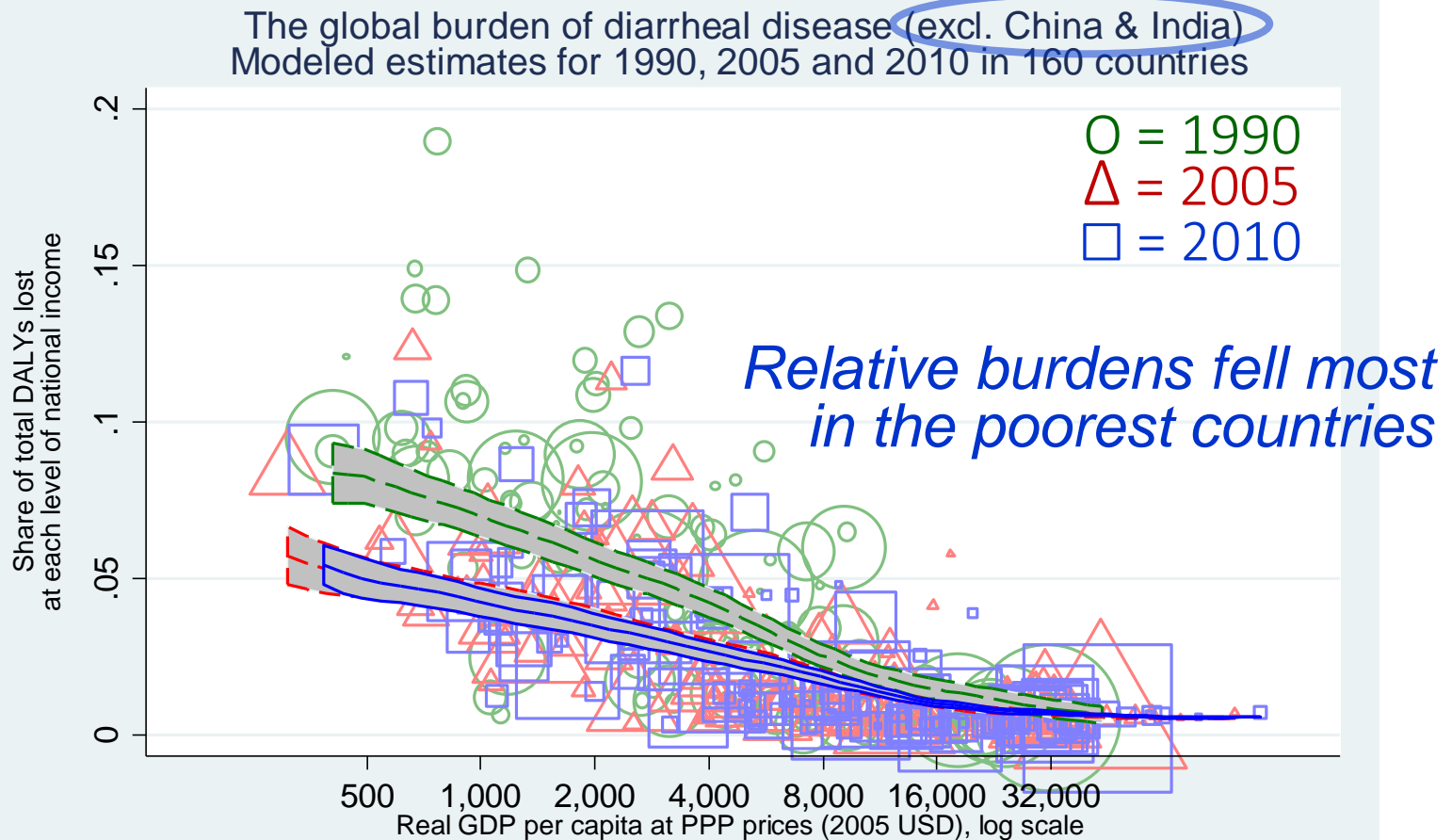
# Diarrhea burdens have fallen but are still large



Note: Symbols are sized by population, with year shown as 1990=green circles, 2005=red triangles, and 2010=blue squares. Lines show each year's local means and confidence intervals estimated by -lpolyci-, weighted by population and with a bandwidth of 0.75.

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Source: Global Burden of Disease Study, Results by Cause; GDP and population are from PWT 8.1.

## In conclusion:

Fifteen years into the 21<sup>st</sup> c., we have...

- **Progress on stunting and wasting**  
...large gains from higher income,  
and also big improvement in poor countries
- **Sharp rise in obesity**  
...so far, almost entirely due to higher income  
and also worsening in the richest countries
- **Rapid shift in diet-related diseases**  
...worsening of diabetes at low and middle incomes  
while diarrhea is improving in poor countries

## Looking forward: In the coming decades, we can...

- **Complete eradication of stunting and wasting**  
...and reap large gains  
in later health & cognition
- **Bend the curve of obesity**  
...and reverse its rise  
at higher incomes
- **Treat and prevent diet-related diseases**  
...such as diabetes and diarrhea

# Acknowledgements

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thank you!

