INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

sustainable solutions for ending hunger and poverty

Agriculture in a dynamically-changing environment: IFPRI's long-term outlook for food & agriculture under new demand & added constraints

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Overview of Presentation

- Global agriculture in a highly dynamic world
- Various ‘drivers of change’ underlying global production, consumption and market trends
- Entry points for policy that could offset negative impacts of food prices
- Outlook for food production and consumption under present bio-fuel production and climate change
- Implications for food security and policy

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Agriculture in a highly dynamic world

- The sharp increases in food prices that occurred in in the recent past were followed by steady declines – although not all countries followed the global trends
- These events have helped us to understand the nature of linkages between international and local markets, and the way in which prices of basic grain commodities have responded to various shocks
- The role of oil prices was shown to play an important role in driving the costs of goods and services that depend significantly on fossil fuels as inputs to production – including agriculture
- Higher oil prices also make biofuels more attractive

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The state-of-the-world as we know it…

- Even before the “food crisis” was announced, there were already crises situations taking place
- The challenges and increased stresses that face global food production and distribution systems, are particularly acute and pressing for Sub-Saharan Africa, where persistent levels of food insecurity already existed.
- Even though most outlooks showed a decline from the peaks, there’s recognition that increased volatility will remain into the future

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Various ‘drivers of change’ underlie global trends in food prices

A number of factors at work which determine changing conditions in global food markets

- Socio-economic growth – rising incomes and demands for meat (and the necessary feed grains to supply it)
- Environmental shocks – increasing variability in climate facing agriculture
- Policy drivers
  - Steady decline in cereal stocks
  - Unilateral trade actions (bans & export taxes)
  - Direct effect of energy prices on agriculture & energy policies which have implications for agriculture

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Some drivers are ‘fast-moving’, while others are slow…..

Slower-moving drivers – which play into long-term

- Socio-economic growth and demographic change (population and pc income didn’t surge overnight in China and India – neither did their consumption)
- Longer-term shifts in climatic conditions
- Slowing yield growth (relative to demand growth)

Faster-moving drivers of change

- Short-term environmental shocks which cause seasonal losses of harvest/yield (floods, droughts)
- Rapid increase in energy demand and prices – and the growth of crop-based biofuels production

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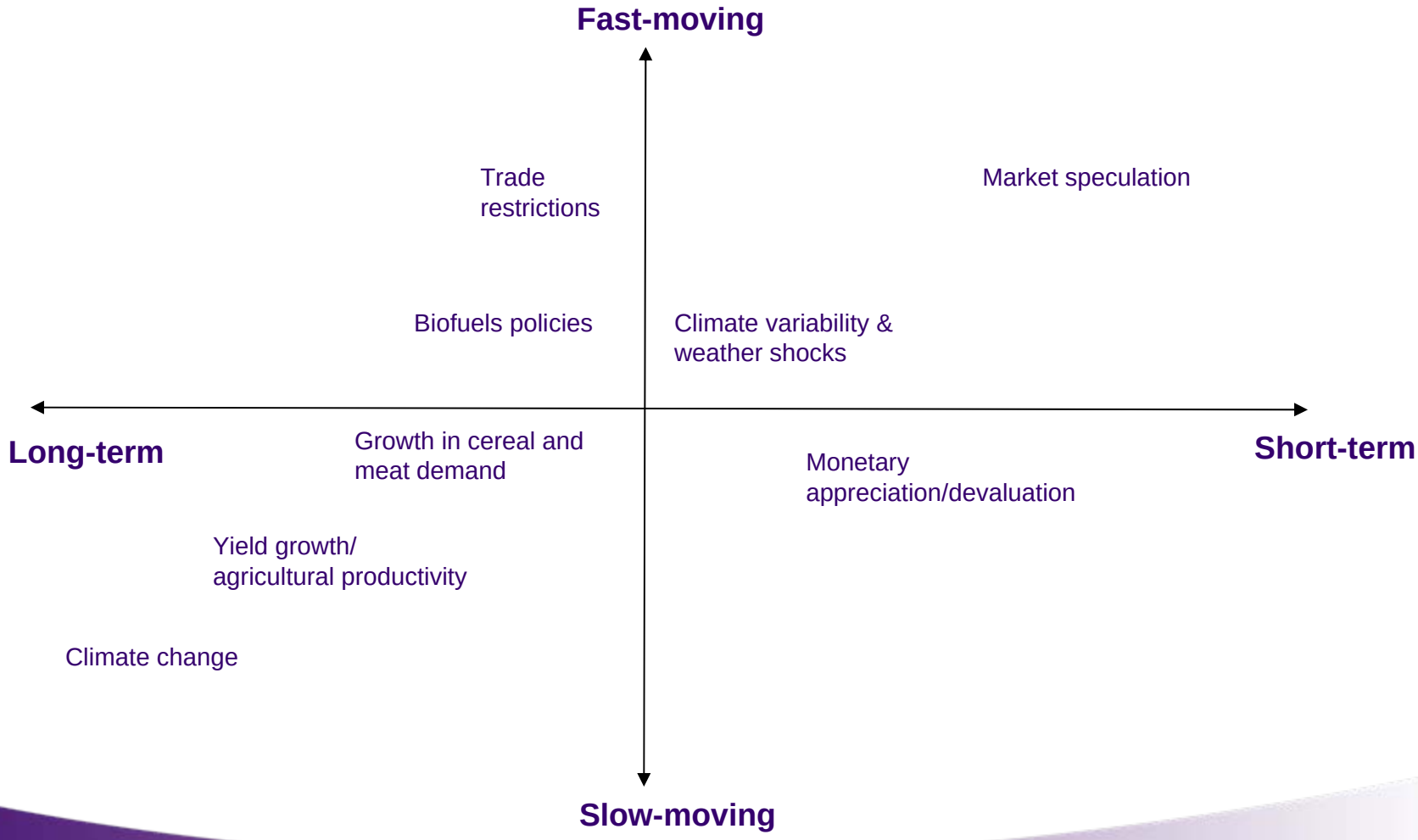
Sorting between the long/short term factors and fast/slow-moving drivers



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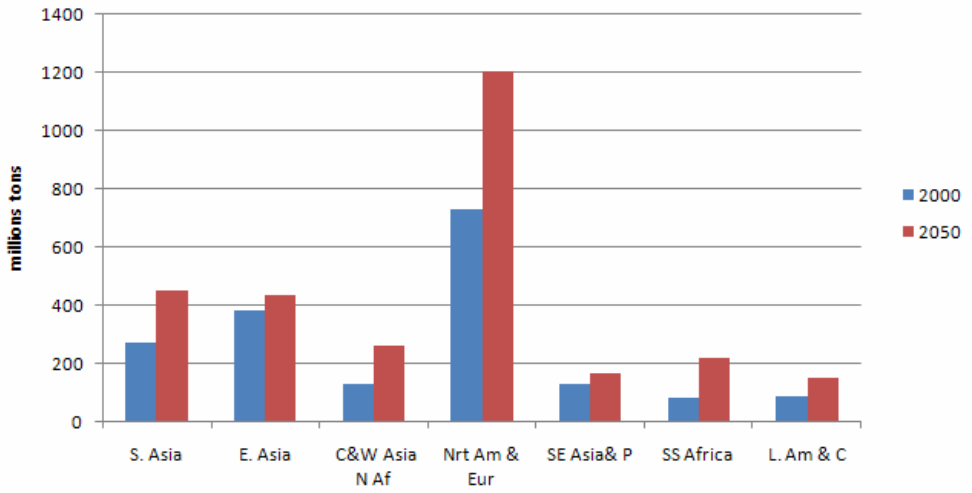
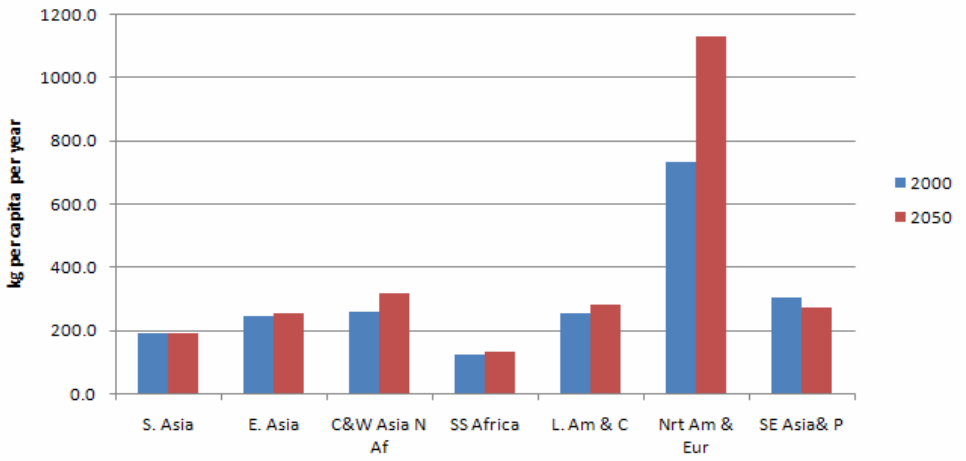
Outlook for cereal production

Continue to depend on key regions to deliver...

Total Cereal Production to 2050



Per Capita Cereal Production to 2050



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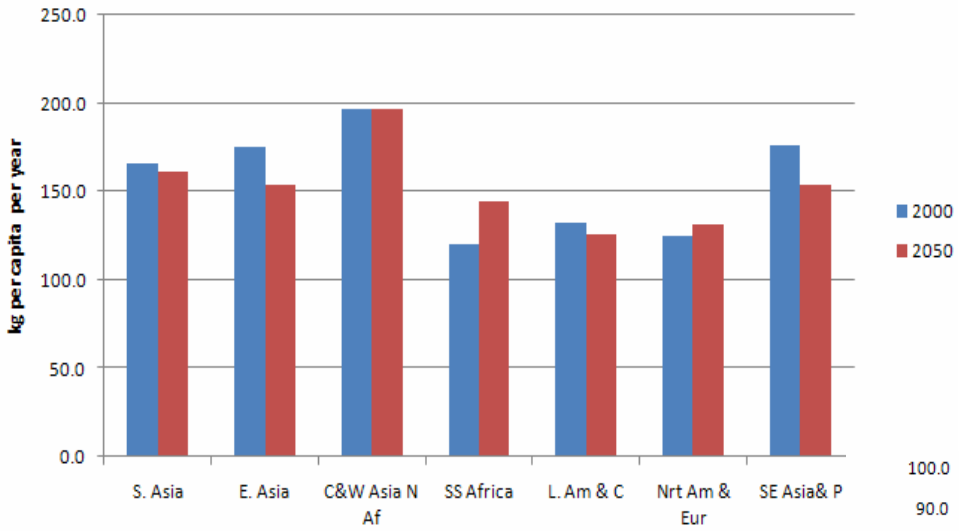
Strong Cereal Demand Growth

Total, Feed and Food Demand for Cereals (millions of metric tons)

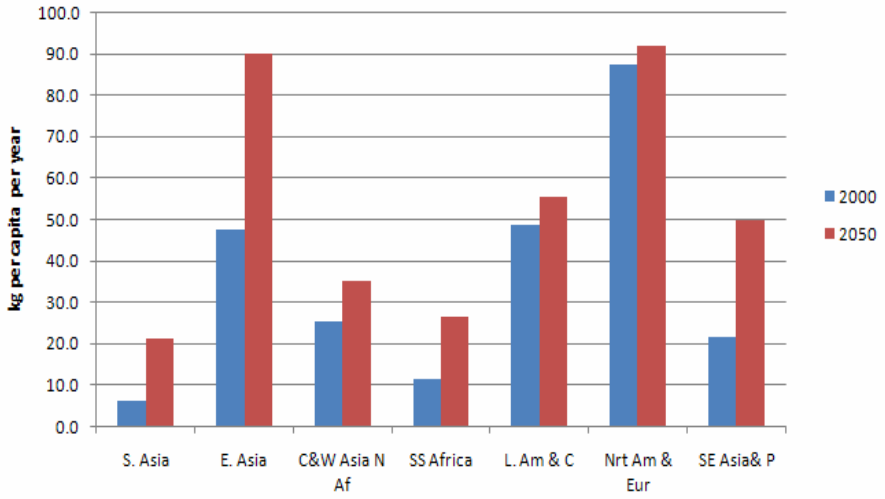
	Total			Food			Feed		
	2000	2050	% chg	2000	2050	% chg	2000	2050	% chg
S. Asia	262	447	70%	233	384	64%	4	18	331%
E. Asia	437	610	40%	273	263	-4%	113	266	135%
C&W Asia N Africa	180	327	81%	99	162	64%	55	119	117%
Nrt Am & Eur	609	793	30%	124	140	13%	373	503	35%
SE Asia& P	106	152	43%	74	92	24%	18	41	127%
SS Africa	103	313	203%	80	242	202%	8	23	196%
L. Am & C	93	187	101%	45	65	46%	34	95	181%

Regional per cap variation stands out …. especially meat

Per capita Cereal Demand to 2050

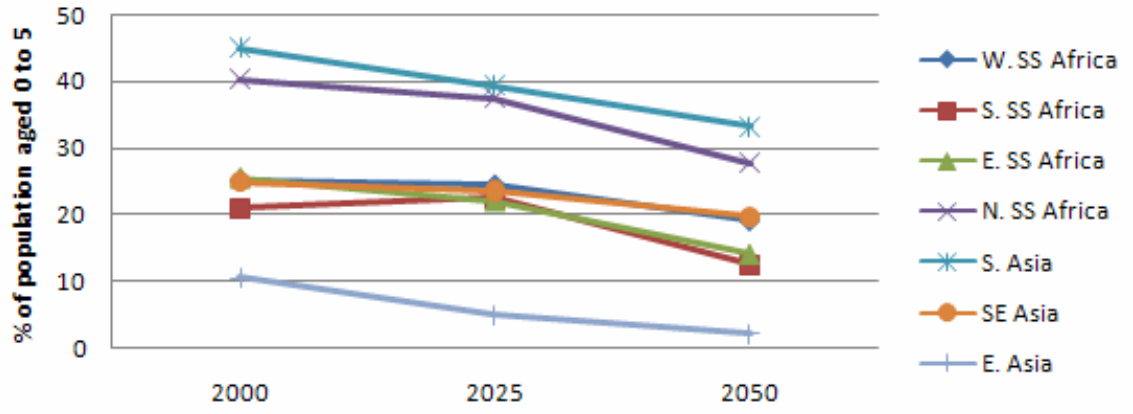


Per capita Meat Demand to 2050

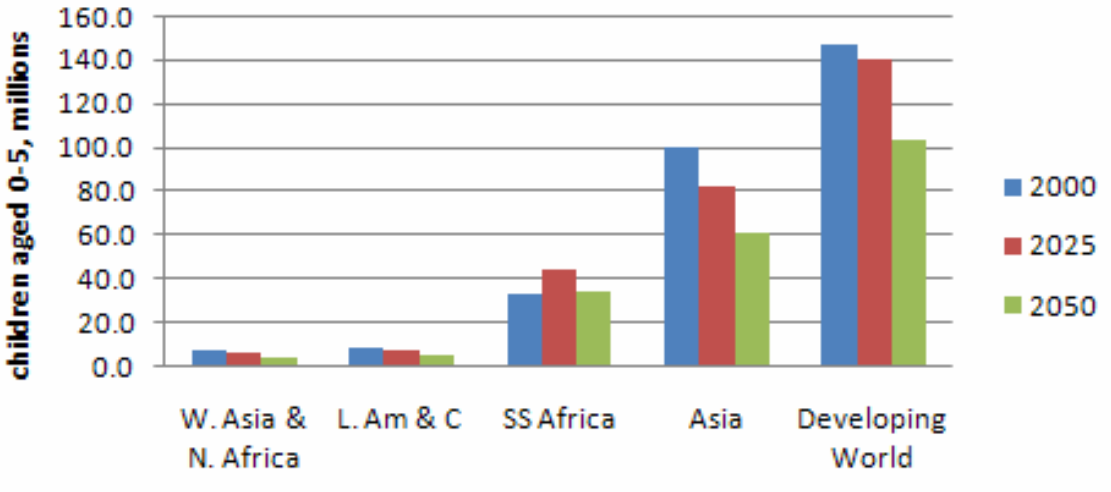


A varied pattern of child malnutrition

Prevalence of pre-School Child Malnutrition in Asia and Africa (% of population aged 0 to 5)



Total Levels of pre-School Child Malnutrition in Developing World (millions of children aged 0 to 5)



IMPACT model projections

Important stressors on global agriculture

http://www.earthartist.com/community/commercial/images/1_image.jpg

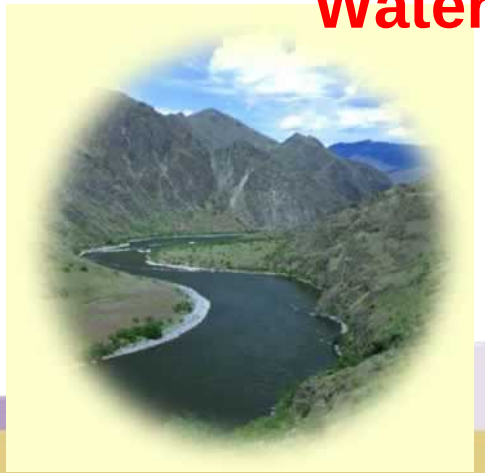
Climate change

Ag Productivity Growth

Land

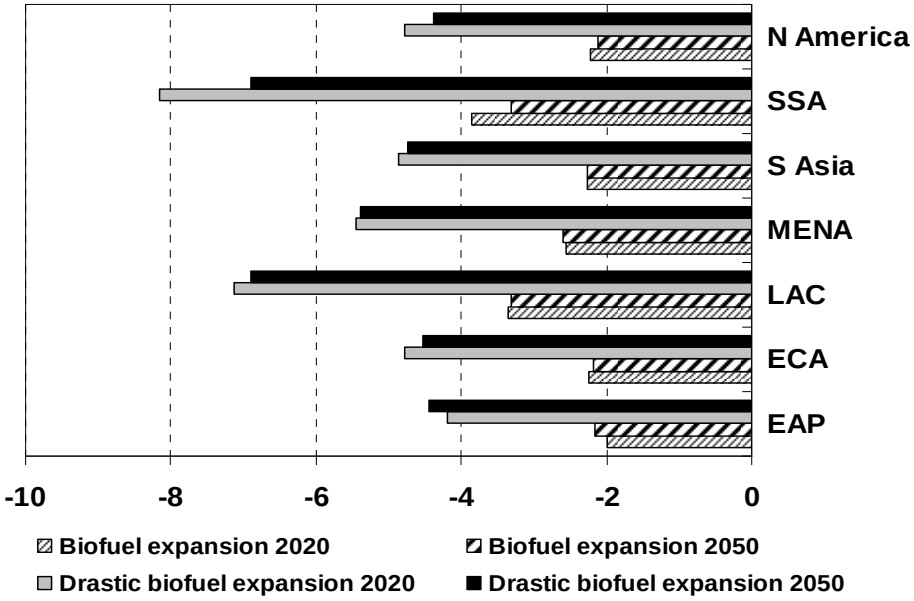
http://www.smartgrowth.bc.ca/Portals/0/Images/agric.landscape.jpg

Water

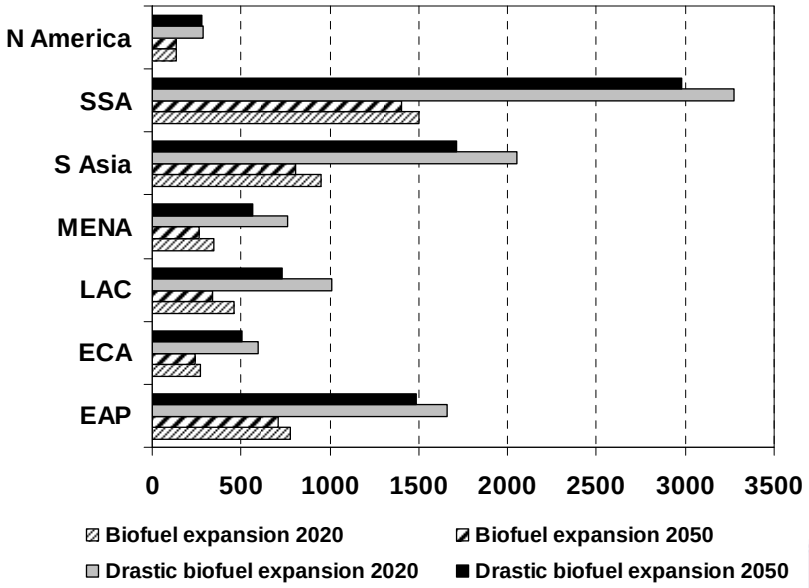


Increases in malnutrition due to biofuels

Calorie Availability Changes in 2020 and 2050, compared to baseline (% difference from baseline case)



Changes in numbers of malnourished children in 2020 and 2050, compared to baseline (thousands of preschool children)

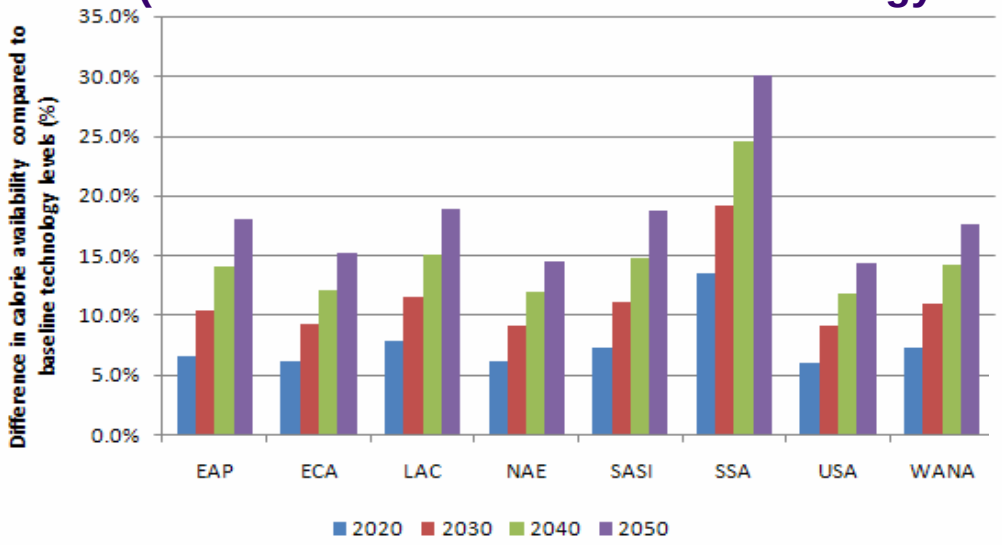


US corn ethanol achieves EISA target by 2022 -- plus aggressive growth in other countries as well

IMPACT model projections)

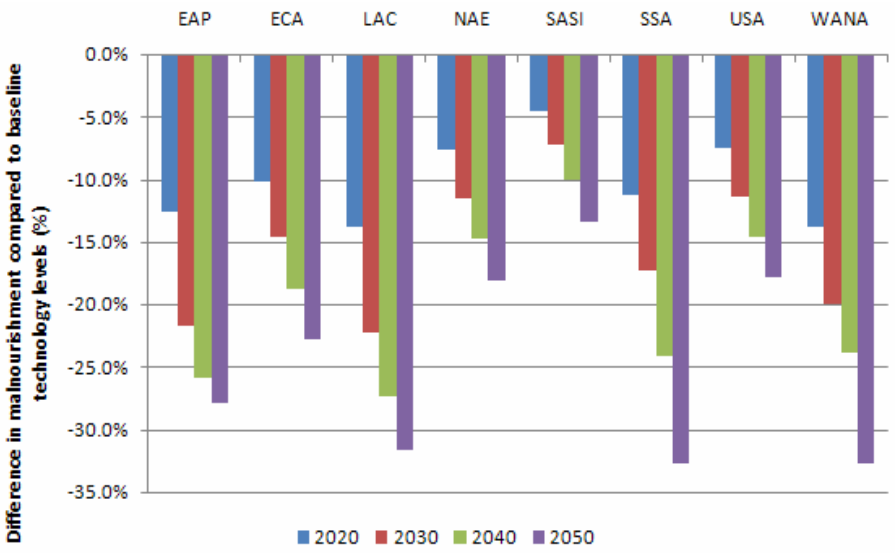
Effects of biofuels expansion offset with enhanced yield growth in cereals

Calorie availability increases compared to bio-fuel expansion under baseline technology levels (% difference from baseline technology case)



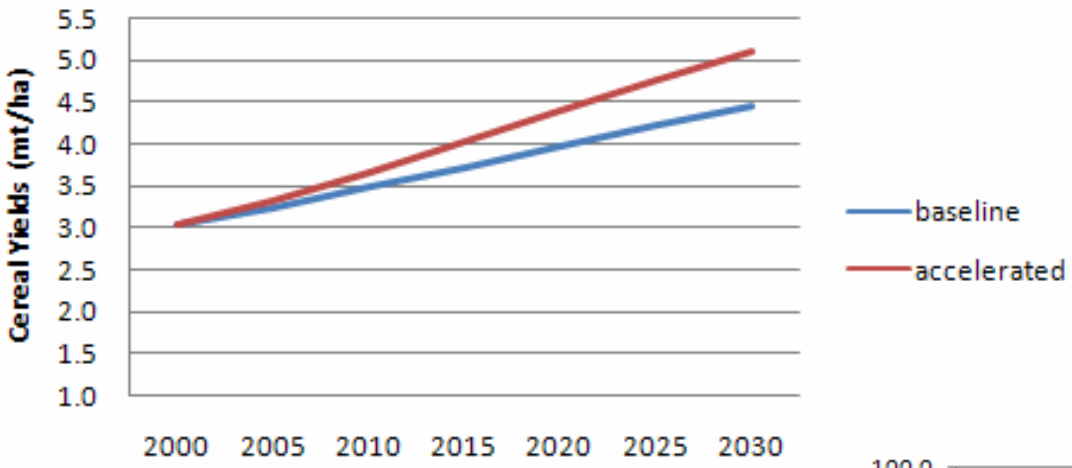
Up to 40% increase in rate of cereal yield growth in some regions

Decreases in numbers of malnourished children compared to biofuel expansion under baseline technology levels (thousands of children)



Additional yield growth in cereals to offset malnutrition impacts of US biofuels target

Global Cereal Yield Growth



Additional (annual average) yield growth in cereals:

1% in developing world

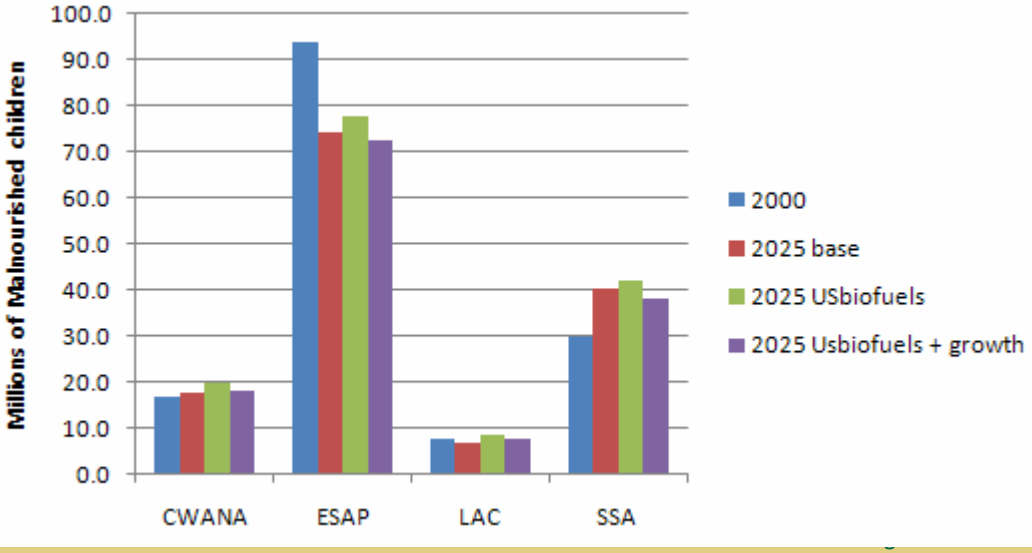
0.5% in developed world

In other words….

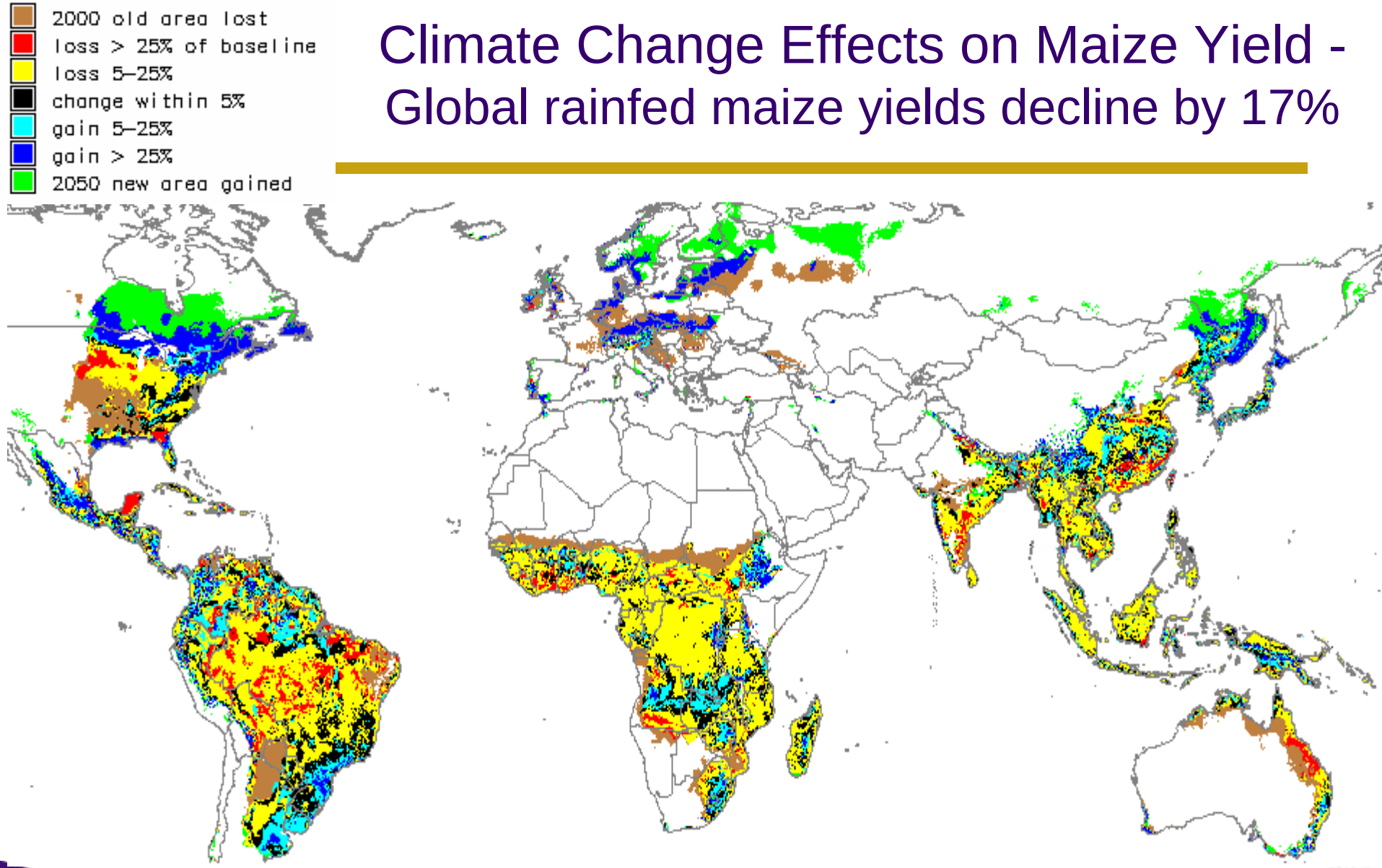
Going from: 1.3% → 1.8%

Avg annual yield growth, globally

Malnourished children (0-5)



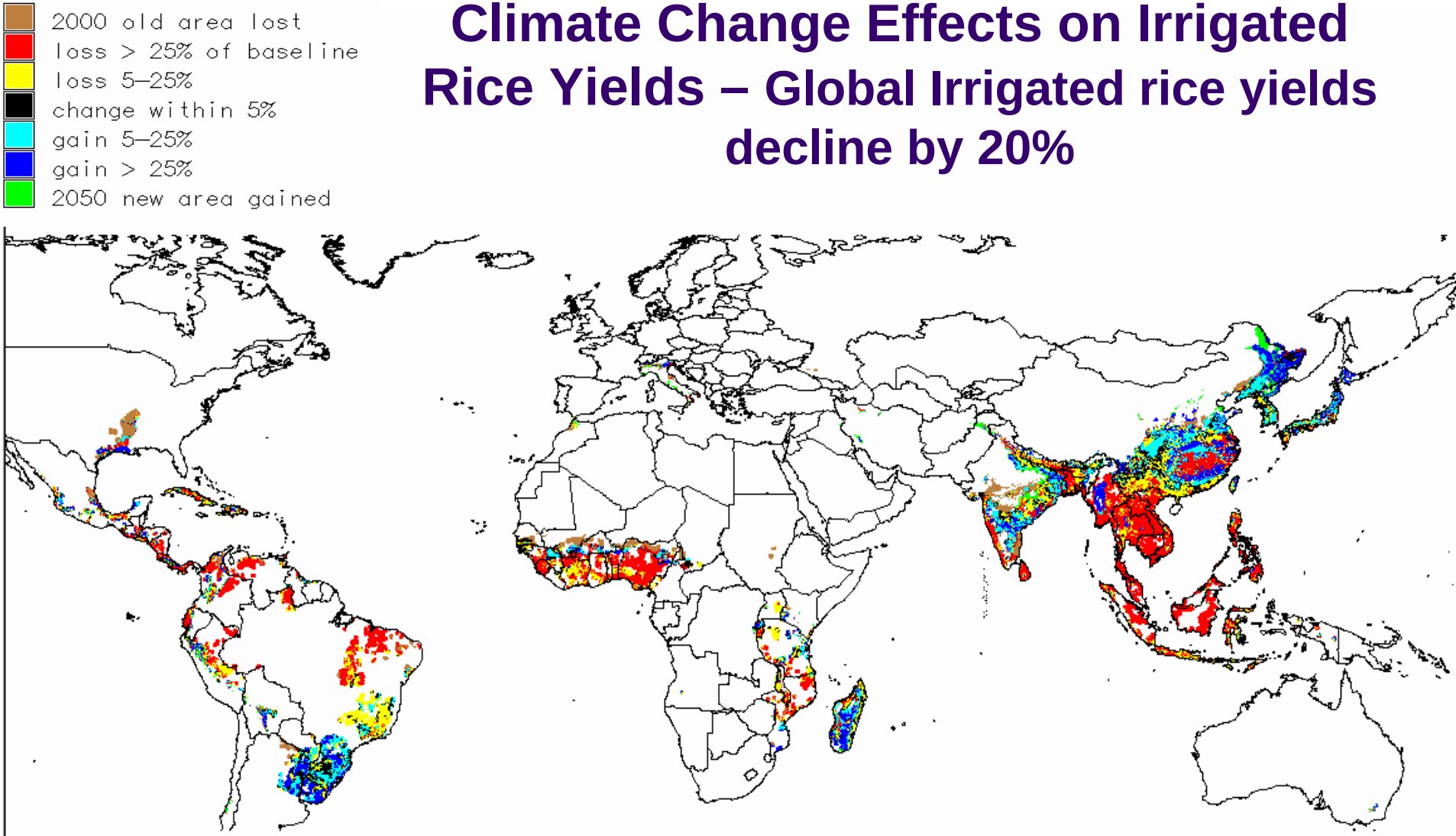
Climate Change Effects on Maize Yield - Global rainfed maize yields decline by 17%



Hadley GCM, SRES Scenario A2a, Maize Variety IB0041

Source: C. Ellison, J. Koo, R. Robertson, "Simulating the Yield Consequences of Climate Change: Combining Crop Models with Location-specific Climate and Physical Constraints" , EPTD, IFPRI, in draft

Climate Change Effects on Irrigated Rice Yields – Global Irrigated rice yields decline by 20%

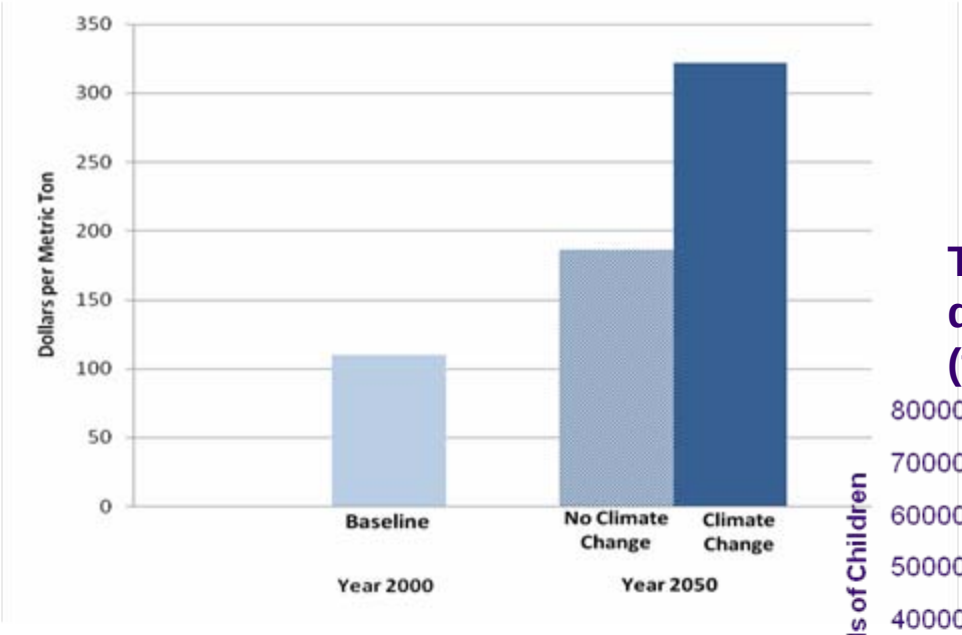


Hadley GCM, SRES Scenario A2a

Source: G. Nelson, J. Koo, R. Robertson, "Simulating the Yield Consequences of Climate Change: Combining Crop Models with Location-specific Climate and Physical Constraints" , EPTD, IFPRI, in draft

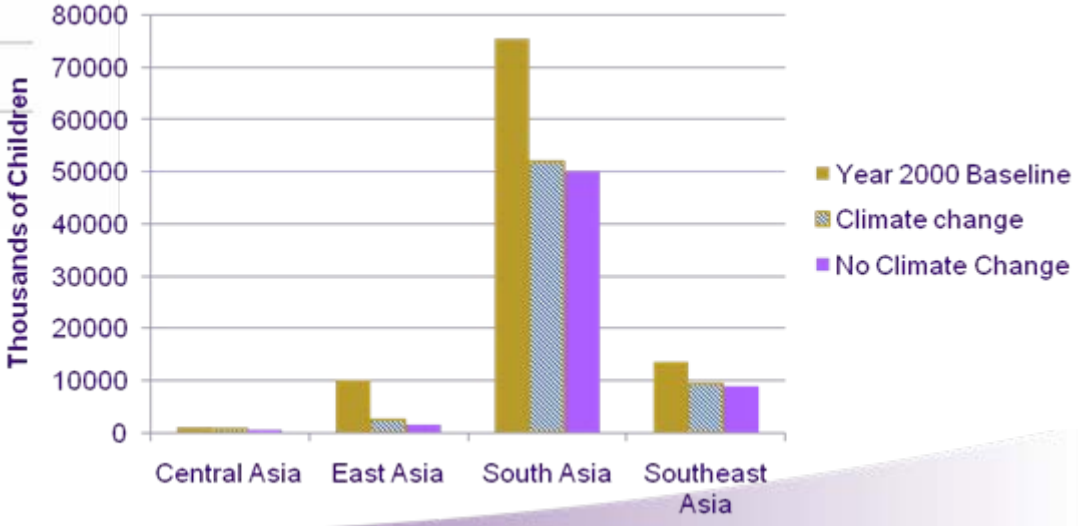
Added effect of climate change

Global commodity-level wheat prices in year 2000 and 2050 under scenarios with and without climate change



Simulated with A2a SRES climate scenario (Hadley GCM)

Total number of malnourished children in developing Asia (thousands of children, under 5 yrs of age)



IMPACT model projections (Feb 2009)

Implications for Food Security and Policy

Micro-level impacts and household welfare

- Price changes in food and energy markets influence households directly through market prices or indirectly via cost of production
- Net sellers and net buyers are affected differently
- Even though net sellers gain from price increases, the gains may not be enough to offset the negative impacts that net buyers undergo
- Some producers may benefit from higher prices – but quick spikes in prices are less beneficial than gradual increases over time (need to mobilize resources quickly)

Entry points for policy to help offset negative impacts of food price shocks

- Demand side: Policies that promote the production of bio-fuels from non-food/feed sources should be encouraged and implemented

- Supply side: Encourage policies that accelerate the improvement of crop technologies

- Other Policies: Food insecurity is an inherently micro-level household phenomenon – many of the constraints to adaptive response are also at the household level. The financial crisis may be making credit and market access even more difficult for some

Implications for Food Security and Policy

Policy implications

- Certain policy responses should be avoided in dealing with high prices. These include export bans, import subsidies, restoration of production subsidies, subsidies for the vocal middle class, policing and threatening traders and attempting to curb food price inflation with macroeconomic policies

- On the other hand, policies that promote trade, agricultural growth and protection of the vulnerable should be encouraged

Concluding Remarks

As a result, we therefore suggest a range of policy interventions that could be instrumental in offsetting the negative impacts of food prices, and helping to promote those benefits in situations where they might exist – in order to encourage increased investments in the agricultural sector, and reverse the steadily declining trend of research and development spending and decades of counter-productive agricultural trade and national-level sector policy.