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GLOBAL LEARNING AND EVIDENCE EXCHANGE

CLIMATE-SMART AGRICULTURE

DECEMBER 5–9, 2016 // SIEM REAP, CAMBODIA

Outlook On Agricultural Policy, Growth And Food Security

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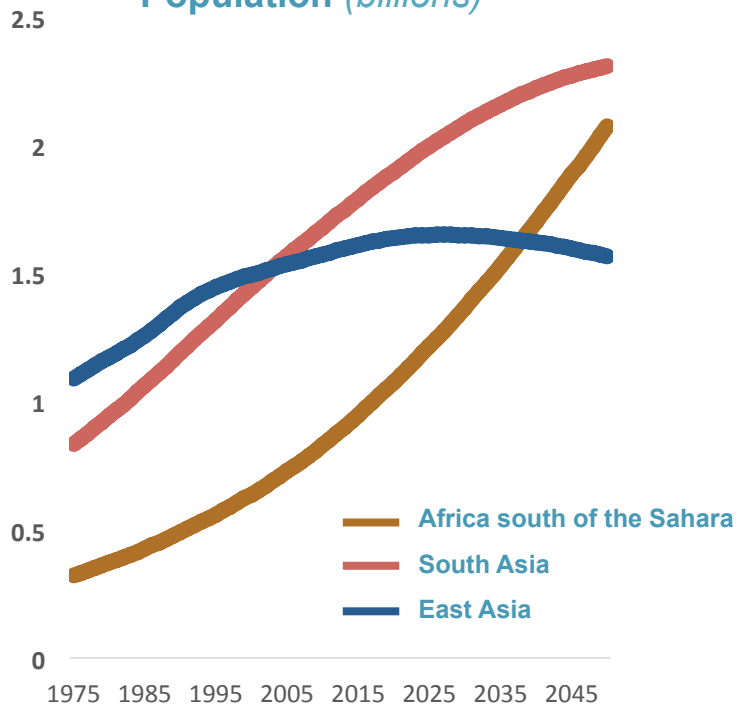
OUTLINE

- Challenges and overview of governance and policies for agricultural growth and food security
- Impacts of policies, investments, and climate-smart agriculture (CSA)
- Policies for agricultural growth and food security

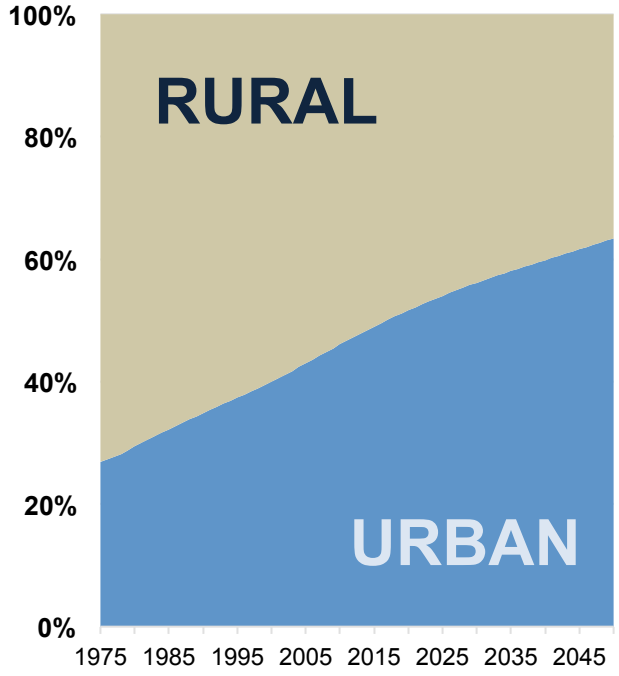
POPULATION: RAPID GROWTH IN AFRICA AND SOUTH ASIA

DEVELOPING WORLD URBANIZES

Population *(billions)*



A demographic shift in developing countries



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Source: United Nations, Department of Economic and Social Affairs, Population Division (2014). World Urbanization Prospects: The 2014 Revision, CD-ROM Edition.

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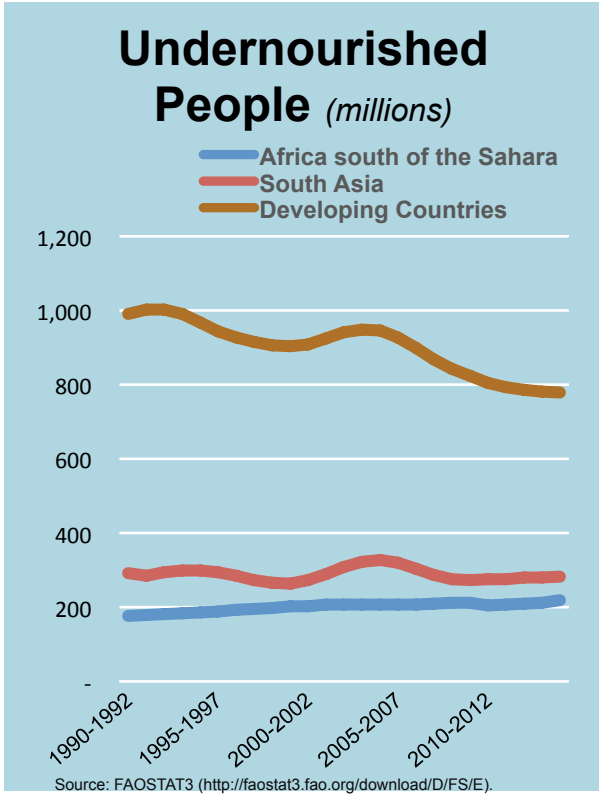
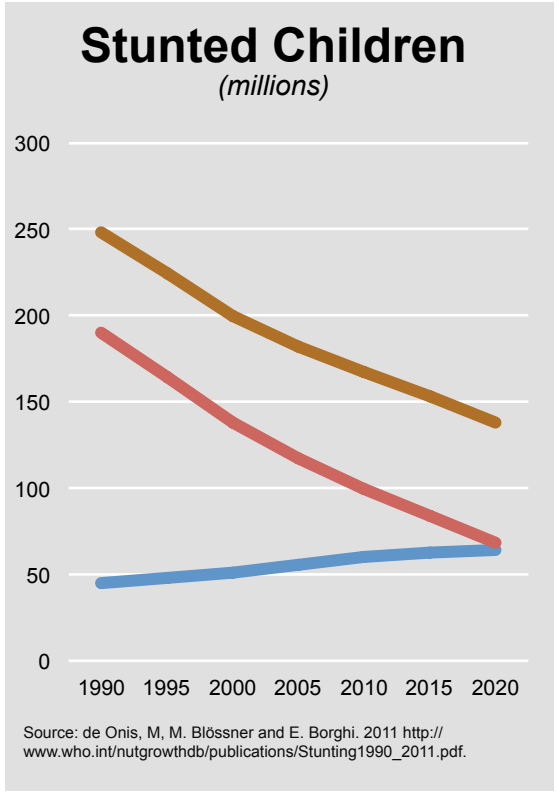
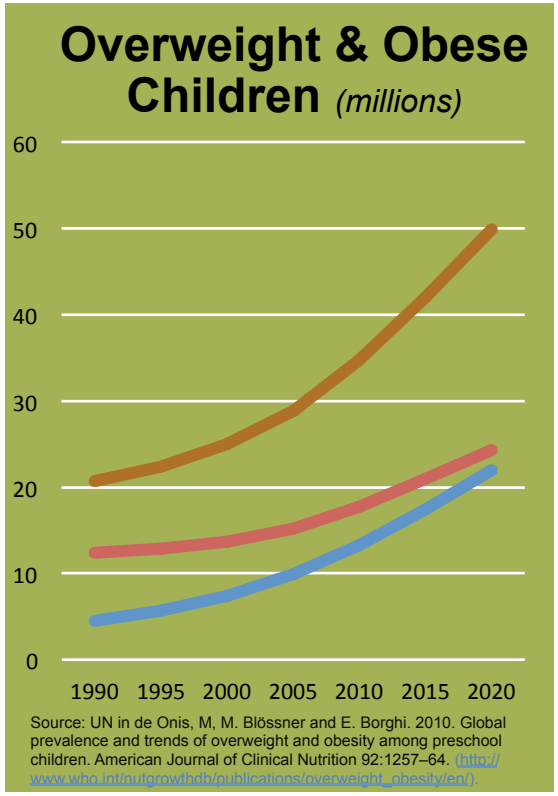
SLOW DECLINE IN MALNOURISHMENT ALARMING INCREASE IN OBESITY



Source: FAOSTAT3 (http://faostat3.fao.org/download/D/FS/E).



Source: de Onis, M, M. Blössner and E. Borghi. 2011 http://www.who.int/nutgrowthdb/publications/Stunting1990_2011.pdf.



Source: UN in de Onis, M, M. Blössner and E. Borghi. 2010. Global prevalence and trends of overweight and obesity among preschool children. American Journal of Clinical Nutrition 92:1257–64. (http://www.who.int/nutgrowthdb/publications/overweight_obesity/en/).

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CHALLENGES FOR AGRICULTURAL GROWTH AND FOOD SECURITY

- Climate change
- Limited and degrading land resources
- Depletion of groundwater, water pollution, declining water quality and degradation of water-related ecosystems
- Demands on agriculture beyond food production: biofuels, mitigation of greenhouse gas emissions, environmental services

GOVERNANCE AND INSTITUTIONAL QUALITY REDUCE MALNUTRITION AND HUNGER

Per capita income

Bureaucratic effectiveness

- Quality of public and civil services - policy formulation and implementation; regulation of private sector

Law and order

- Solid and impartial legal system in conjunction with popular observance of the law

Sources: Econometric results from Smith and Haddad (2015) for malnutrition; Rosegrant and Magalhaes (under preparation) for hunger. Indicators are taken from International Country Risk Guide (ICRG) indicators published by the Political Risk Services Group (PRS, 2013).

GOVERNANCE AND INSTITUTIONAL QUALITY REDUCE MALNUTRITION AND HUNGER

Political stability

- Government's ability to carry out its declared programs - when in office; to gain office and stay in office through constitutional and non-violent means

Restraint of corruption

- Restraint of the exercise of public power for private gain

Democratic accountability

- Respecting and protecting the rights and civil liberties of all citizens

Sources: Econometric results from Smith and Haddad (2015) for malnutrition; Rosegrant and Magalhaes (under preparation) for hunger. Indicators are taken from International Country Risk Guide (ICRG) indicators published by the Political Risk Services Group (PRS, 2013).

MACROECONOMIC POLICIES AND AGRICULTURAL DEVELOPMENT

Budgetary policies

- Allocation of total revenue – recurrent and capital expenditures; among sectors of the economy

Fiscal policies

- Determination of how much revenue the government collects and how – taxes and subsidies that influence incentives

Monetary, trade and exchange rate policies

- Influence foreign exchange rates, commodity prices, interest rate, wages and land rental rate

Source: Adapted from Monke, E.A. and S.R. Pearson. 1989. Part III. Social Valuation in the Policy Analysis Matrix. The Policy Analysis Matrix for Agricultural Development. Cornell University Press, Ithaca and London. http://www.cepal.org/sites/default/files/courses/files/03_3_pambook.pdf.

AGRICULTURAL SECTOR POLICIES

Agricultural research and development

- Investment in research and extension
- Priorities across commodities and traits
- Intellectual property rights
- Regulatory policy

Investment in irrigation and water management

Investment in rural infrastructure

- Roads, Rail and Electrification

Property rights for land and water

Subsidy policies on water, fertilizer and energy

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IMPACTS OF AGRICULTURAL POLICIES, INVESTMENTS, AND CLIMATE-SMART AGRICULTURE

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PHILIPPINES:
COST OF CLIMATE CHANGE IN AGRICULTURE

PhP 186 billion per year cost of climate change:

- Php 41 billion from increased malnutrition
- Php 145 billion in economywide losses

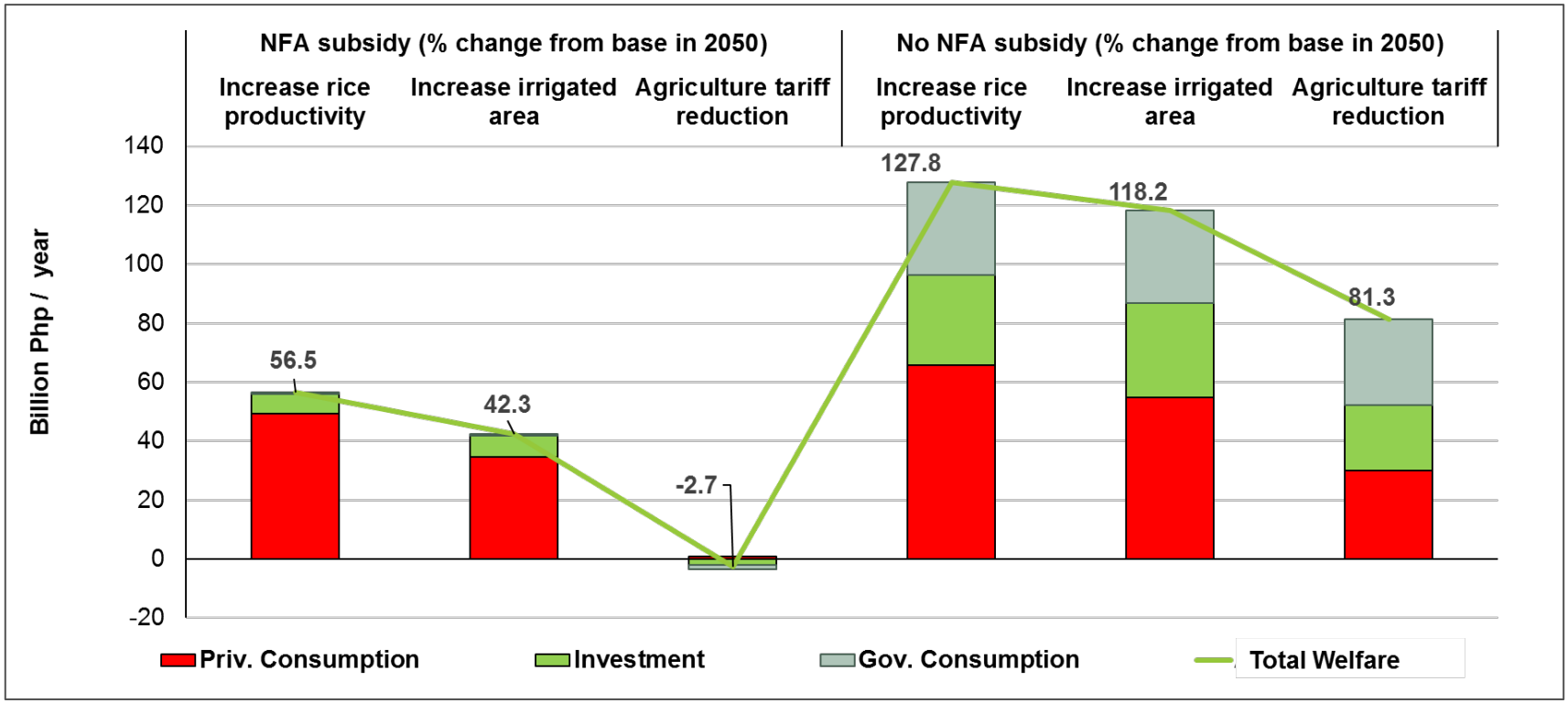
Climate change reduces crop productivity growth, increases food prices, and reduces food security

Large negative effects on the rest of the economy:

- increased international commodity prices cause terms of trade and real exchange rate losses
- labor is trapped in agriculture; reduces growth in industrial and service sectors and consumer welfare

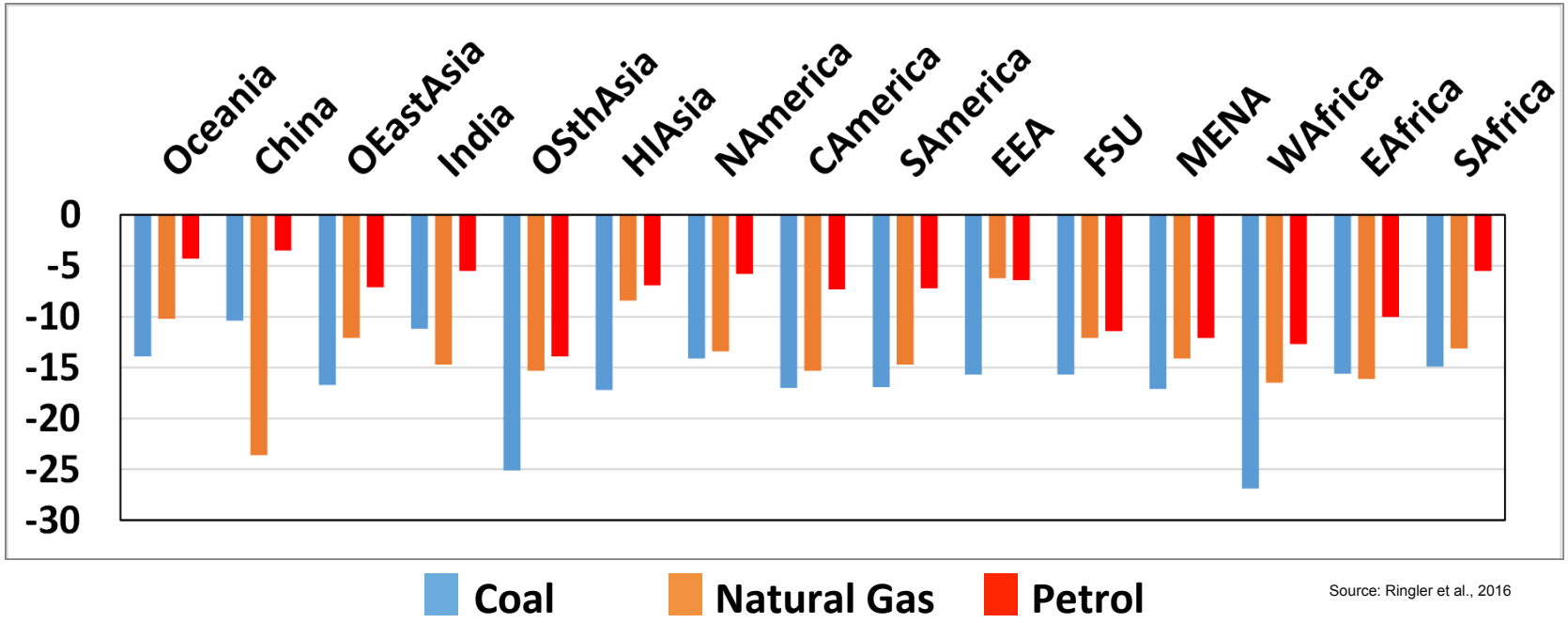
Source Adapted from: Monke, E.A. and S.R. Pearson. 1989. Part III. Social Valuation in the Policy Analysis Matrix. The Policy Analysis Matrix for Agricultural Development. Cornell University Press, Ithaca and London. http://www.cepal.org/sites/default/files/courses/files/03_3_pambook.pdf.

PHILIPPINES: WELFARE IMPACT FROM DIFFERENT ADAPTATION STRATEGIES, 2050



CHANGE IN FOSSIL FUEL USE IN ELECTRICITY SECTOR WITH ENERGY TAXES COMPARED TO BASELINE

(%-CHANGE, 2050)



Source: Ringler et al., 2016

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Note: Oceania: Australia, New Zealand and Other Oceania; OEastAsia – Other East Asia; OSthAsia – Other South Asia; HIAsia – High-income Asia; NAmerica – North America; CAmerica – Central America and Caribbean; SAmerica – South America; EEA – European Economic Area; FSU – Former Soviet Union; MENA – Middle East and North America; WAfrica – West Africa; EAfrica – East and Central Africa; SAfrica – Southern Africa.

GLOBAL ADOPTION OF SELECTED CSA PRACTICES

- Simulations using IFPRI's IMPACT system, DSSAT crop model
- Maize, wheat, rice (~41% of global harvested area)
- Practices: no-till, integrated soil fertility management (ISFM), alternate wet and dry (AWD), urea deep placement (UDP)
- Two GCMs: GFDL and HadGEM, RCP 8.5

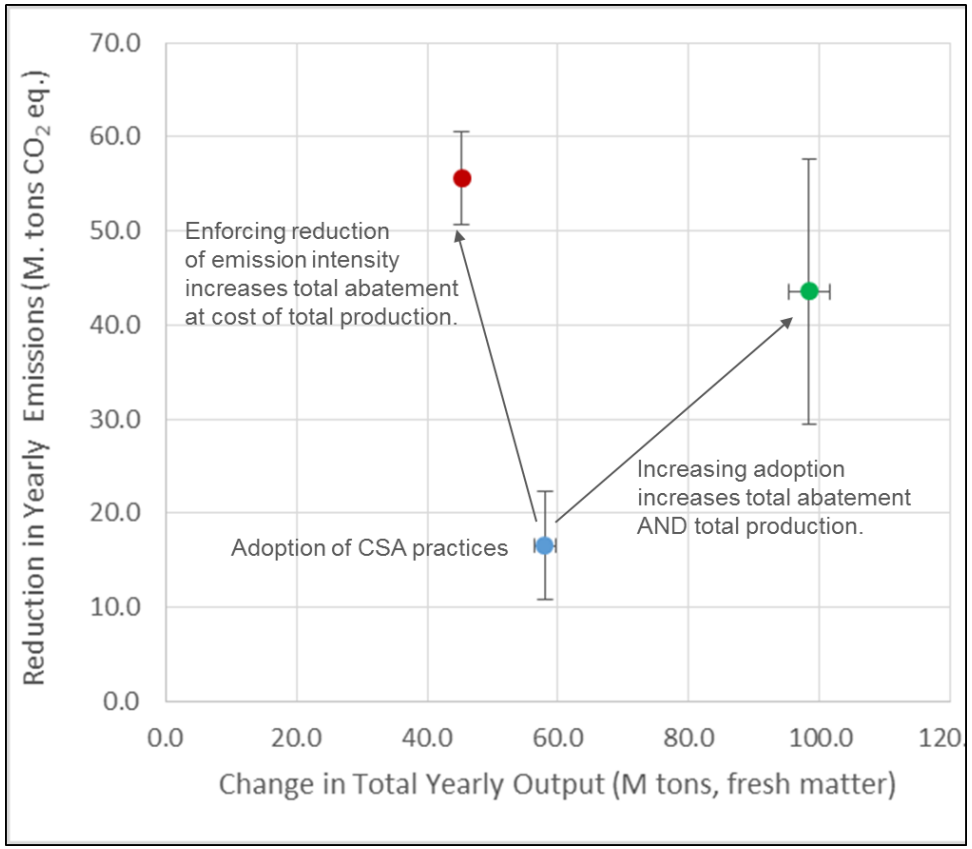
Description	Maize	Wheat	Rice
Production (% change)	+2.3 - +2.4	+2.3 - +2.2	+2.2 - +2.2
Price (% change)	-4.9 - -5.4	-6.2 - -7.3	-7.6 - -7.9
Area (% change)	-0.1 - -0.5	-1.0 - -1.2	-1.2 - -1.3
Pop risk of hunger (% change)		-3.4 - -3.1	
Malnourished children (% change)		-0.8 - -0.9	
Yearly mean emission reduction (million tons CO_2 eq.)		20.4 - 13.9	

Baseline adoption rates by 2050:
No-till = 70% AWD=40% ISFM = 40% UDP=40%

TRADEOFFS FROM SELECTED CSA PRACTICES

- Practices: no-till, integrated soil fertility management, alternate wet and dry; urea deep placement
- Maize, wheat, rice
- Tradeoffs and policy options

  - Baseline adoption of selected CSA
  - Full adoption of CSA
  - Lower adoption: decreased emission intensity required



SUMMARY EFFECTS OF SCENARIOS ON GDP, AGRICULTURAL PRODUCTION, WATER USE, HUNGER, FOREST AREA, 2030

Scenario	Avg. Annual Cost	2030					
		SLO1	SLO2		SLO3		
		GDP	Ag Supply	Hunger	Water Use	GHG	Forest
MED CGIAR	1.4	0.7	1.4	-6.5	0.0	-5.5	0.03
HI CGIAR	2.0	1.3	2.8	-12.4	-0.1	-7.5	0.04
HI_NARS	3.0	1.6	3.7	-15.8	-0.1	-8.9	0.04
HI_EFFICIENCY	2.0	2.6	6.4	-24.4	-0.2	-12.7	0.06
REGION	2.5	1.1	2.4	-10.9	-0.1	-6.5	0.03
HI IRRIG	3.5	0.1	0.1	-1.3	2.6	-1.8	0.01
HI IRRIG & WUE	8.1	0.4	0.9	-4.5	-7.2	-1.9	0.01
ISWM	4.6	0.2	0.5	-2.1	-1.5	-0.5	0.00
RMM	10.8	1.0	1.6	-5.8	0.1	6.4	-0.02
COMP	25.5	4.1	9.8	-30.6	-9.0	-11.5	0.07

Less Advantageous — Neutral — More Advantageous

Note: COMP is a combination of HI EFFICIENCY; HIGH IRRIG+WUE; ISWM; and RMM. *Costs are in billion USD, while other values are percentage differences in each indicator relative to the reference scenario.*

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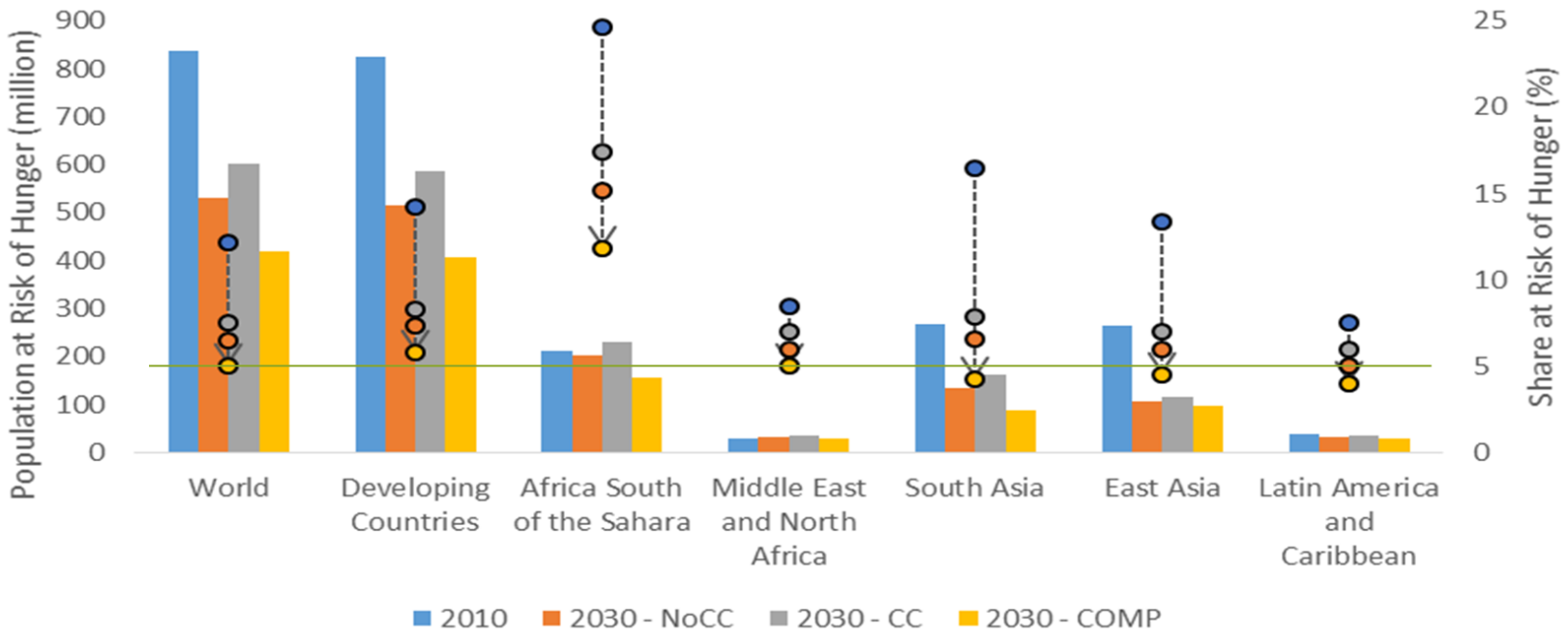
HUNGER IN 2030 BY CLIMATE AND INVESTMENT SCENARIO

Bars show numbers on the left axis. Dots show shares on the right axis.



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Note: 2030-NoCC assumes a constant 2005 climate; 2030-CC reflects climate change using RCP 8.5 and the Hadley Climate Model, and 2030-COMP assumes climate change plus increased investment in developing country agriculture.
Source: IFPRI, IMPACT model version 3.3, October 2016

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POLICIES FOR AGRICULTURAL GROWTH AND FOOD SECURITY

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POLICY-INDUCED NEGATIVE CONSEQUENCES AND RECOMMENDATIONS FOR REFORM

Input policies

Ineffective Policies

- Input subsidies – keeping input prices low directly affects crop management practices
- Overuse of water, energy, and fertilizer
- Crowding out of public investments
- Subsidized fertilizer prices favor the use of N fertilizers over other nutrients, damaging soil fertility

POLICY-INDUCED NEGATIVE CONSEQUENCES AND RECOMMENDATIONS FOR REFORM

Input policies

Solutions

- Reduction and removal of input price subsidies
- Investment in agricultural research and development targeting yield, input efficiency, and climate-induced stresses
- Non-price policies:
  Location-specific research on soil fertility constraints and agronomic practices, improve extension, develop physical and institutional infrastructure
- Design of low-subsidy risk-reducing instruments:
  Weather index insurance, risk-contingent credit

POLICY-INDUCED NEGATIVE CONSEQUENCES AND RECOMMENDATIONS FOR REFORM

Macroeconomic, trade, and sectoral policy

Ineffective Policies

- Macroeconomic setting leading to unsustainable management practices – important cause of degradation of intensive food systems in Asia
- Trade and exchange rate policies can penalize agriculture or promote it unsustainably
- Crop-specific interventions—output price protection and input subsidies—often favor individual crops like rice

POLICY-INDUCED NEGATIVE CONSEQUENCES AND RECOMMENDATIONS FOR REFORM

Macroeconomic, trade, and sectoral policy

Solutions

- Remove macro, trade and price distortions
- Develop cropping and livestock systems approaches, including resource-conserving technologies to reduce the economic and climate cost per unit of output produced
- Reform regulatory systems for agricultural innovation and seed systems

POLICY-INDUCED NEGATIVE CONSEQUENCES AND RECOMMENDATIONS FOR REFORM

Water and irrigation policy

Ineffective Policies

- Drainage investment left out to minimize costs
- Water allocation– virtually no cost, encouraging overuse, waterlogging and salinization

Solutions

- Phase out water subsidies
- Secure water rights for users
- Establish markets in tradable water rights
- Devolve management to user or joint ownership with autonomous local institutions

SEQUENCING OF INVESTMENTS AND TECHNOLOGIES

- Ineffective agricultural growth and sustainability policies are persistent
- Need bad-policy-resistant investments and technologies
- Investment in public goods: education, roads, and agricultural research and development
- Technologies embedded in seed varieties
- Decentralized information technologies: cell phone weather and crop information apps, small sensors, radio

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