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# **Global Food Security In Light of Laudato Si': On Science, Solidarity and Subsidiarity**

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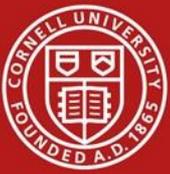
June 6, 2019



## **Food security is foundation to human dignity**

Food security exists if and only if  
*“all people at all times have physical, social, and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”*

(1996 World Food Summit definition, emphasis added)



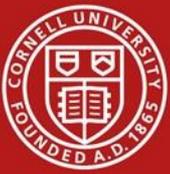
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**Food security may be the defining global challenge of the century.**

**Integral human development, social stability, and the protection of the planet all at risk if we fail.**



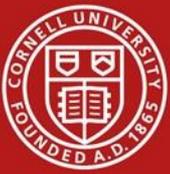
Photo credits: CIFOR, Bloomberg



## Food security depends on :

1. Promoting and directing **science** to address the needs of the poor and of the planet
2. Showing **solidarity** with the poor through generous and effective social protection and safety nets
3. Embracing **subsidiarity** to contextualize actions in heterogeneous agri-food systems and to inculcate care for others and 'our common home'



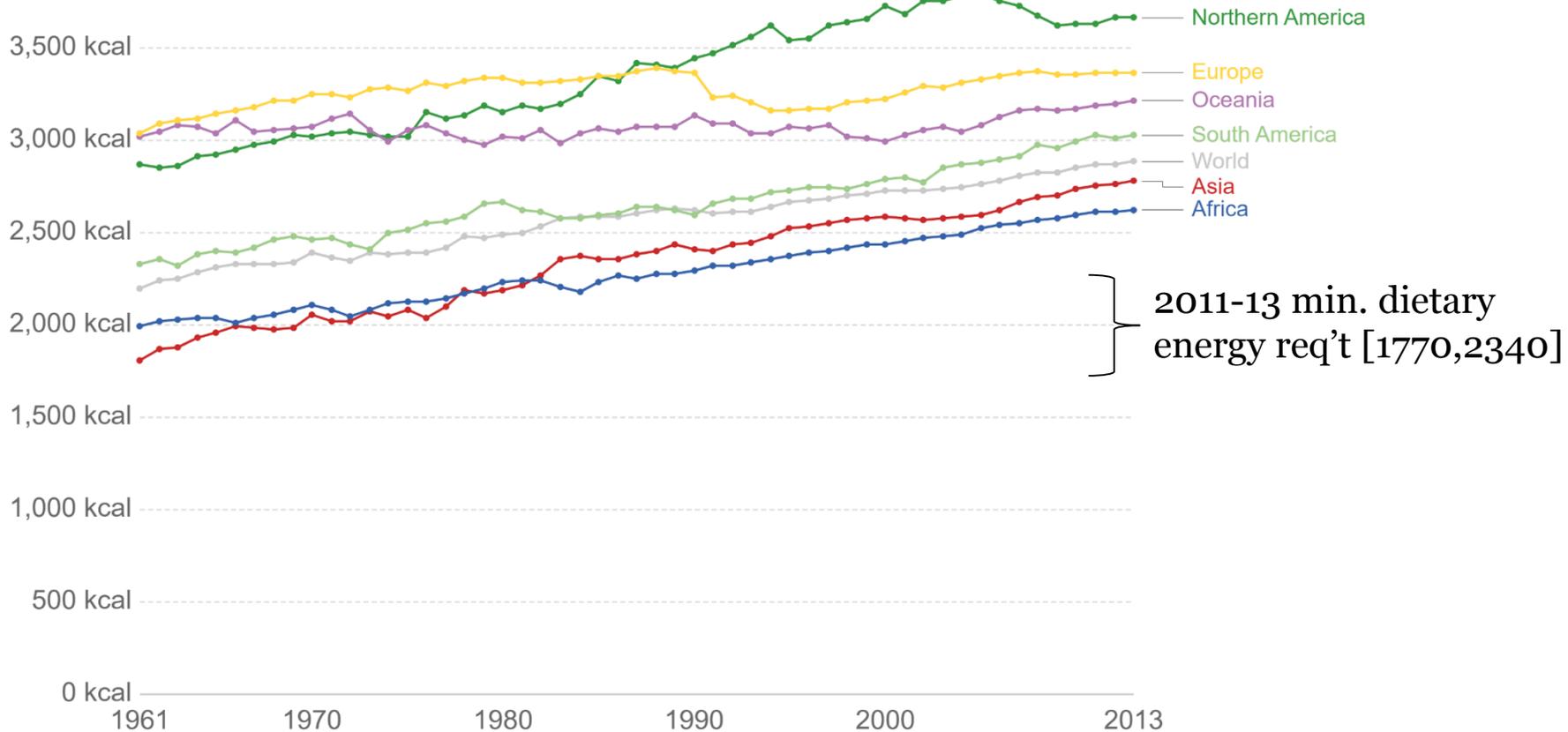


## Great progress in raising calorie availability ...

### Food supply by region in kilocalories per person per day, 1961-2013

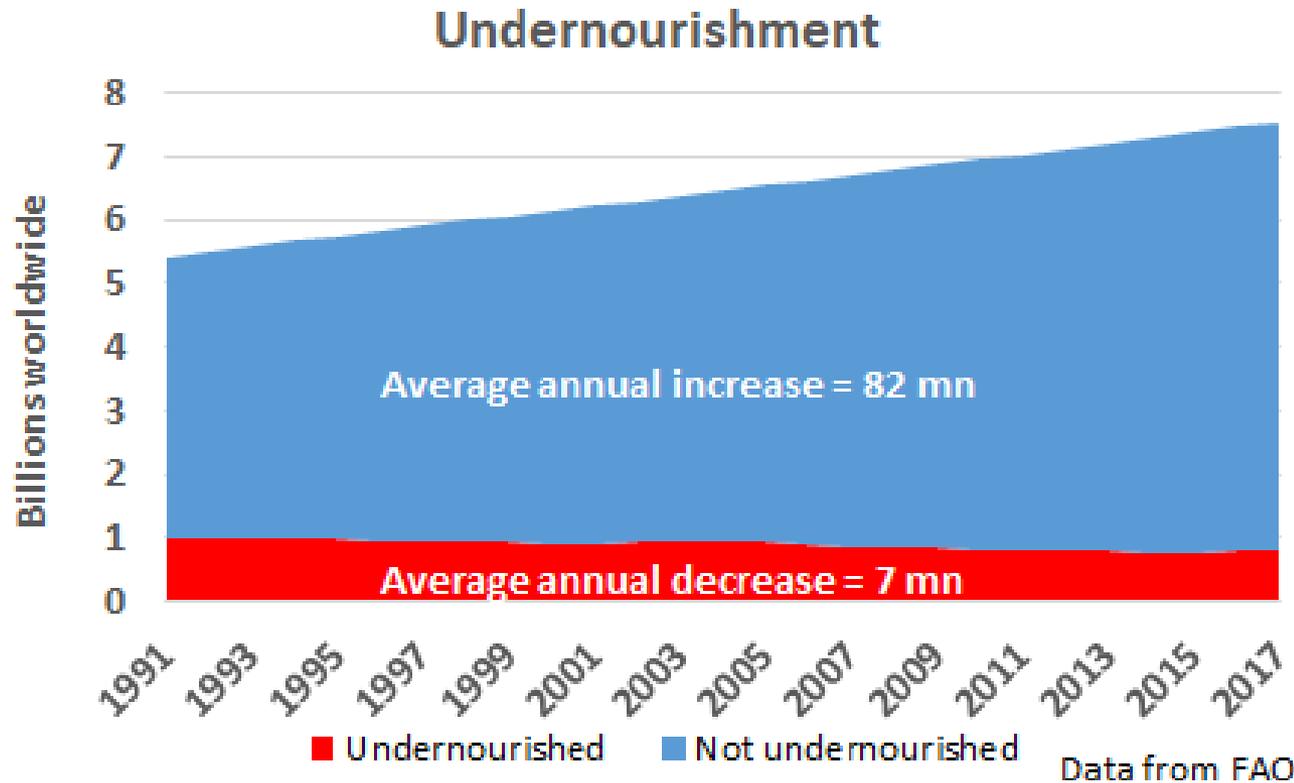


Daily per capita food supply by world region, measured on the basis of average caloric supply (kilocalories per person per day). Note that this measures the food available for consumption at the household level but does not account for any food wasted or not eaten at the consumption level.





**As global population grew, >2 bn more people adequately nourished in a quarter century. Each week for a generation, another 1.5 mn people have enjoyed adequate caloric intake!**





## Future challenges may be tougher than past

1. Less progress on ‘hidden hunger’: **micronutrient** (mineral/vitamin) deficiencies. Ex: 1.6 bn suffer iron- or vitamin B<sub>12</sub> deficiency anemia ... and growing! **>2 bn** at MN risk.
2. **Planetary boundaries** increasingly bind. **Climate change** in particular creates a previously unobserved context. Water/climate/soil nutrient constraints + changing pest/pathogen pressures = new production challenges
3. Human suffering is more **spatially concentrated** and more tied to **conflict**. In 1990 Africa home to 119 mn (24%) of the world’s ultra-poor (<\$0.95/day pc) ... grew to 133 mn (82%) by 2011. **Poverty traps** increasingly salient to the remaining poor.

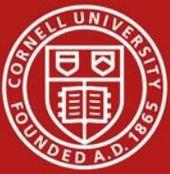


**75-80% of food consumed w/n country where grown**

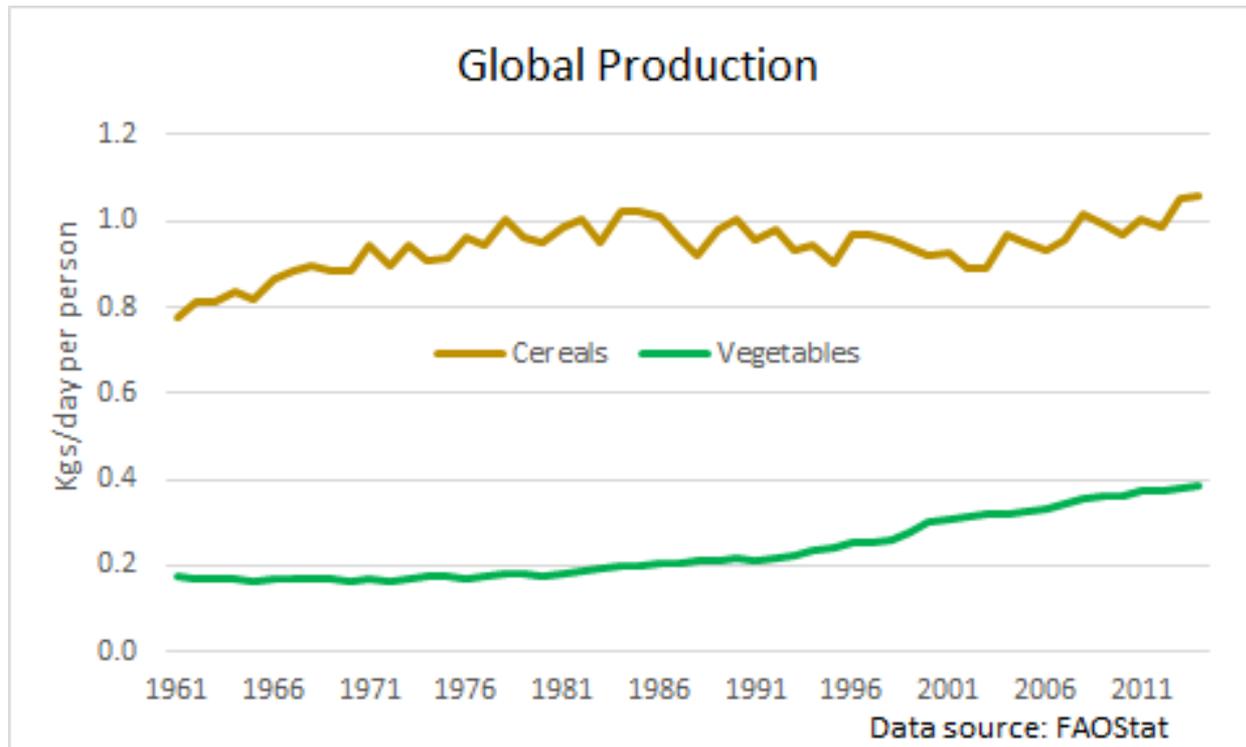
Food system performance improvements must occur in Africa/Asia, where most demand growth will be greatest.

w/urbanization, income growth, post-harvest value chains (incl. social protection programs) grow ever more important.





## Challenge: Vitamin/mineral rich food supply not growing fast enough for diet transition (Bennett's Law)



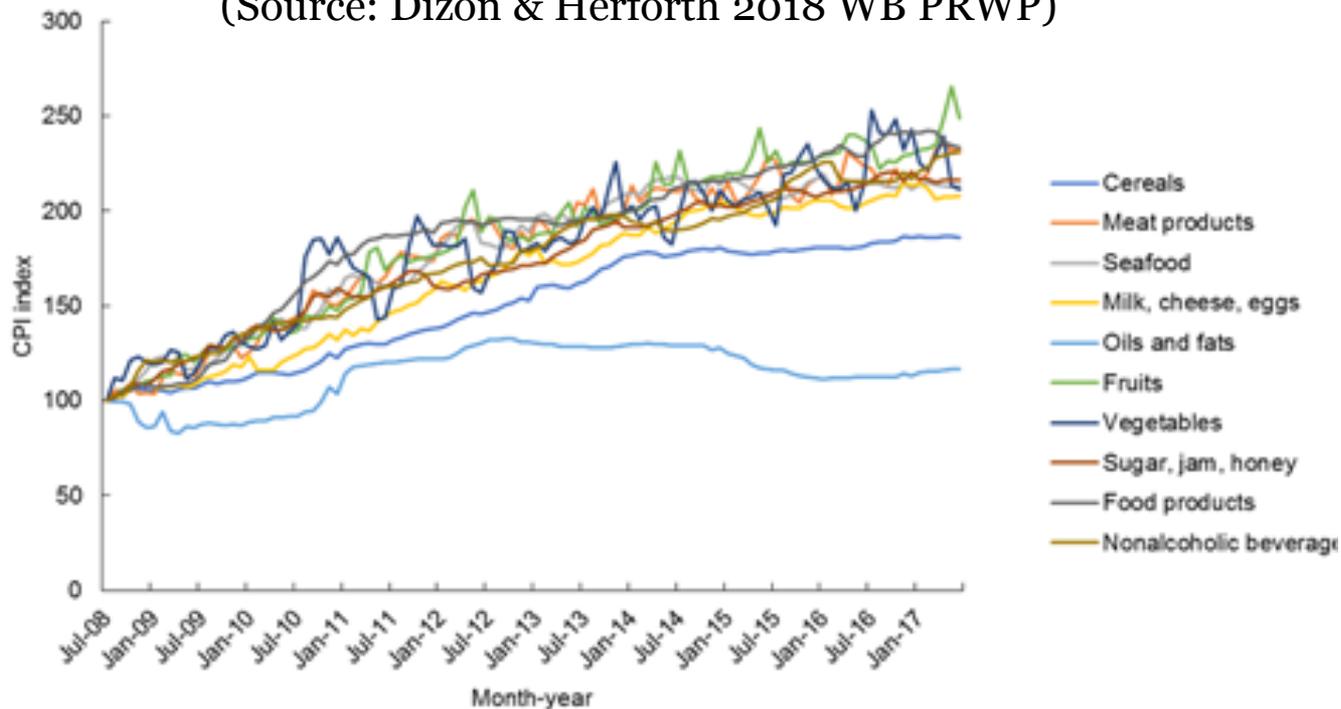
Especially since loss/waste rates  $\geq 50\%$  higher for vegetables due to perishability and vitamin degradation, and relative price increases due to differences in demand elasticities.

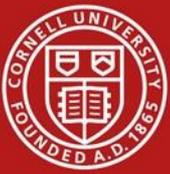


**Result: relative prices of more nutritious foods increase faster than less nutritious foods, hurting dietary diversity**

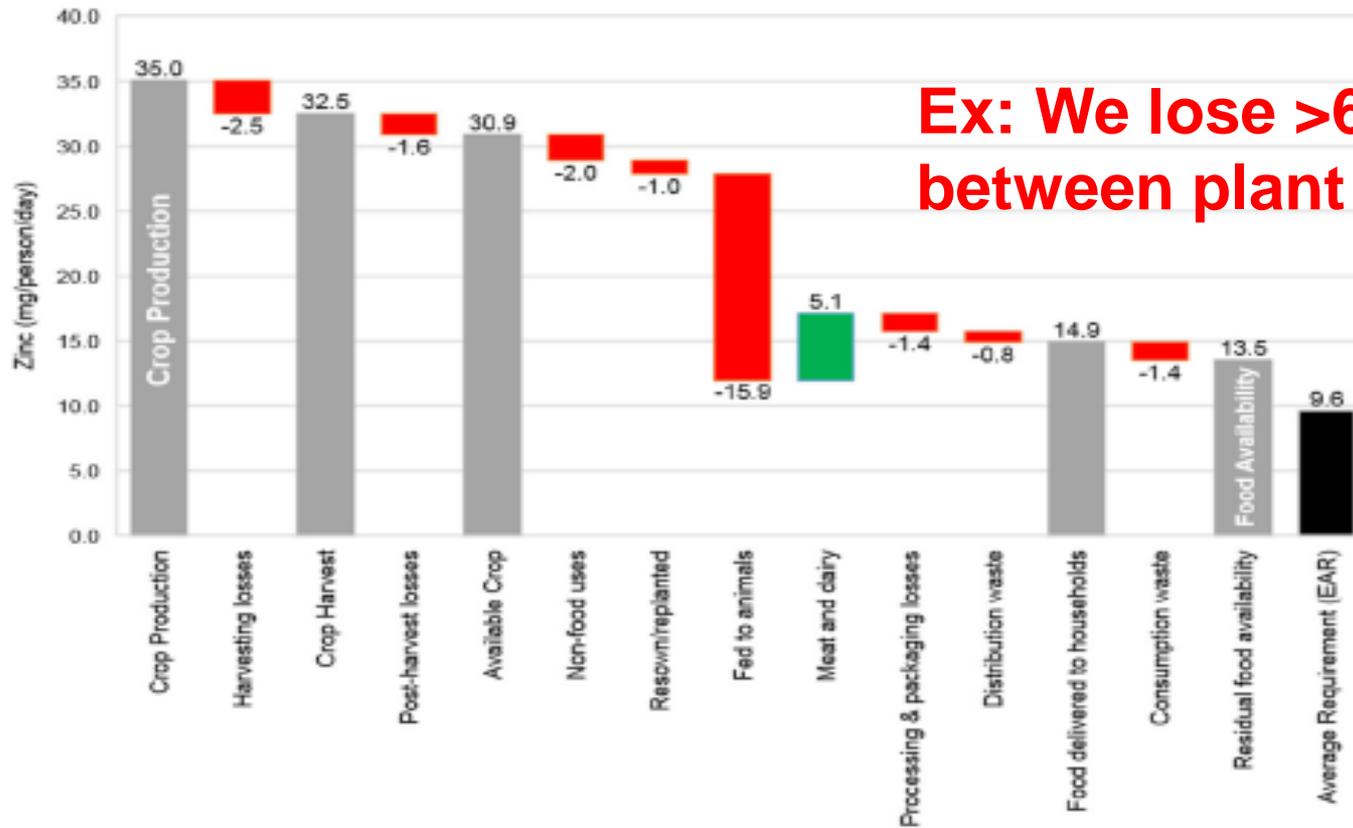
Example: In Pakistan, fruit/veg/ASF prices have increased 2-2.5x those of oils/fats and 25-75% > cereals

(Source: Dizon & Herforth 2018 WB PRWP)





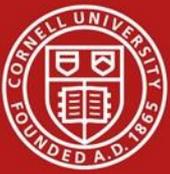
## Challenge: loss/waste of key nutrients along the value chain from crop production to human consumption



Ex: We lose >60% of zinc between plant and belly

Source: Ritchie et al. 2018 *FSFS*

For some nutrients (calcium, folate) residual food availability <10% >DRs.  
**Keep in mind, however, loss/waste endogenous to prices.**

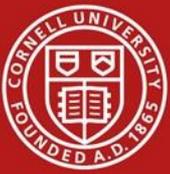


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# Micronutrient deficiencies

We need complementary innovations upstream (fertilizers, biofortification), midstream (fortification in processing) and downstream (consumer behavior change)

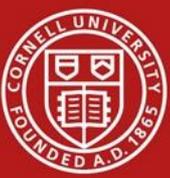




**Science:** Need to reorient global agri-food R&D towards (i) veg/fruit supply, (ii) novel protein/MN sources, (iii) (bio) fortification to improve nutrient content, lower F&V prices, and induce greater dietary diversity in poor communities.

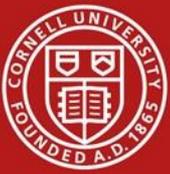
**Solidarity:** Need to design safety nets around health and nutrition (not agribusiness income support) objectives.

**Subsidiarity:** Community-supported ag, local farmers markets, school feeding programs based on local crops, etc.



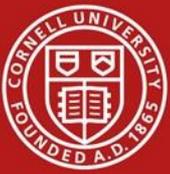
## Planetary boundaries limit input expansion:

- Arable land essentially fixed w/o major (ecol. risky) conversion of forest, wetlands, or drylands, esp in Asia
- Soil nutrient depletion (esp. N, P and key minerals)
- Increasing urban/protected area competition for land
- Ag already accounts for ~70% of human water usage, > 80% in Africa and Asia, climate changes makes worse
- Agrifood systems stress natural env'ts ... must reduce loss/waste, esp. by enhancing repurposing of loss/waste via products and nutrient recycling (circular economy)



**So must rely mainly on technological advances to boost agricultural productivity. But...**

- **Site specificity** due to agroecological heterogeneity
- Innovation most needed in **Africa/Asia**, where demand growth will occur but **ag R&D** capacity also most limited
- Technological advance requires **investment**, and governments and philanthropies are essential but insufficient ... will rely heavily on the **private sector**.
- **Private IP** regimes increasingly pose obstacles
- Ongoing **opposition to GMOs/gene editing**



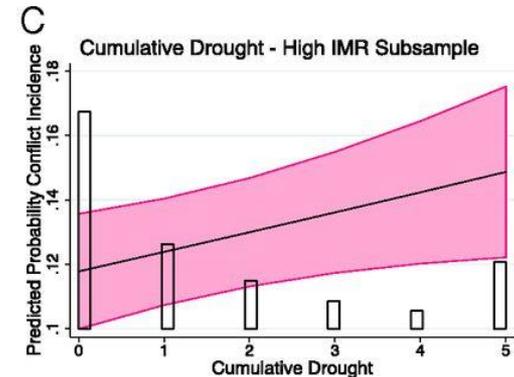
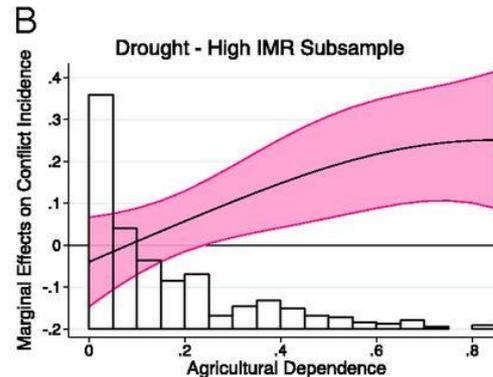
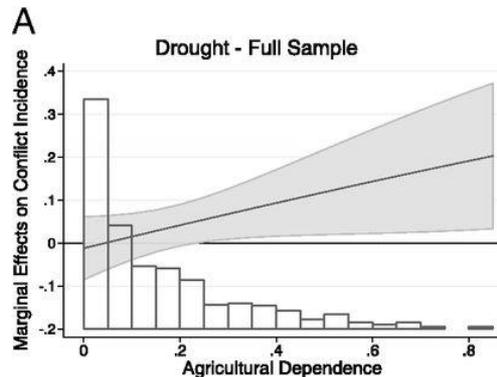
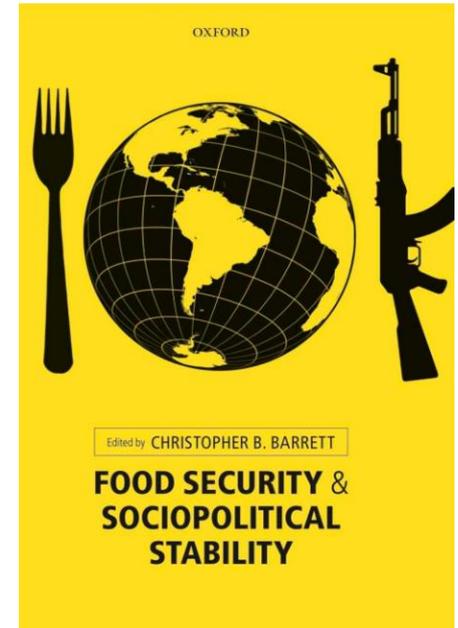
## We need innovations

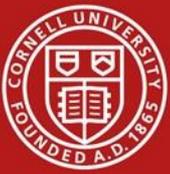
- Greater efficiency in use of increasingly scarce natural inputs to **boost total factor productivity**
- Reduce damage to natural ecosystems
- Promote re-use and re-cycling within agri-food system ... untapped potential of **circular local economies**
- More efficient post-harvest distribution and processing to **reduce loss/waste and prices**
- **Secure land/water tenure** for farmers/herders
- **Intellectual property regimes** to accelerate discovery

**... in and for Africa and Asia, especially**

## Increased co-location of food insecurity with conflict

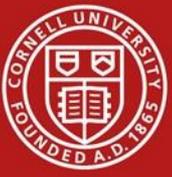
- Over past 2 decades, **conflict-affected** countries' share of stunted children grew from **46% to 79%**. (FAO et al. 2017)
- According to UNHCR, a record **~69mn forcibly displaced** people globally now.
- And strong relationship between drought and conflict (von Uexkul et al. 2016 *PNAS*)





## **A sustainable food secure future for all requires innovations:**

- 1. Growing the supply of affordable, healthy minerals and vitamins from vegetables, fruits, and animal source foods.**
- 2. Enhancing social protection and safety nets for the poor.**
- 3. Accelerating adaptation to climate change, water scarcity, and improving soil nutrient cycling in food production.**
- 4. Reducing food loss/waste throughout the food value chain, especially through advances in circular economies.**
- 5. Reducing conflict.**



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**Thank you for your time, interest and comments!**

