


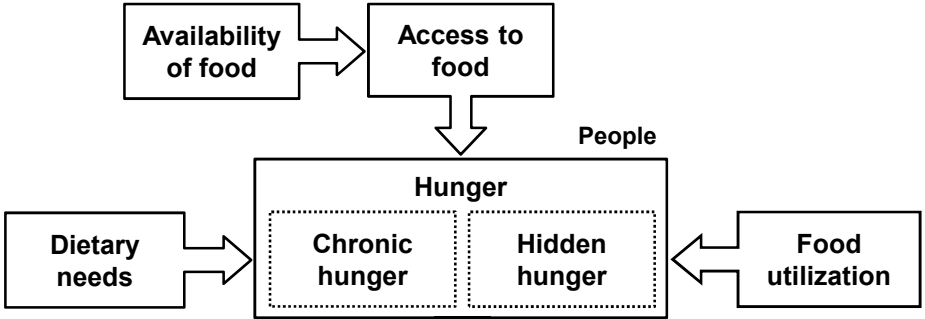
## Measuring food and nutrition security based on health outcomes

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Alexander J. Stein

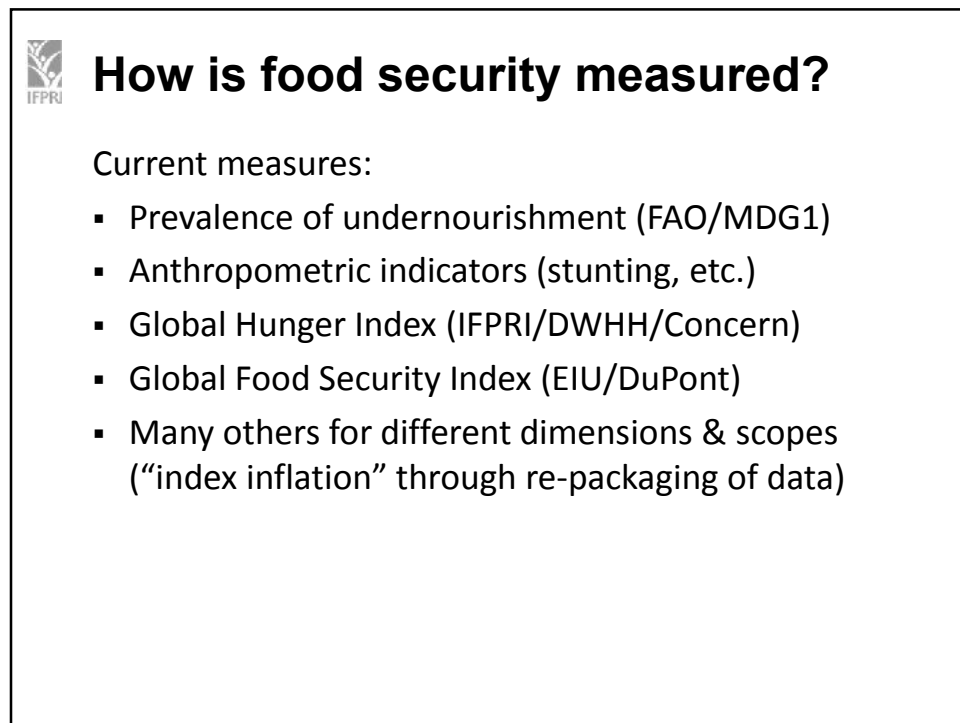
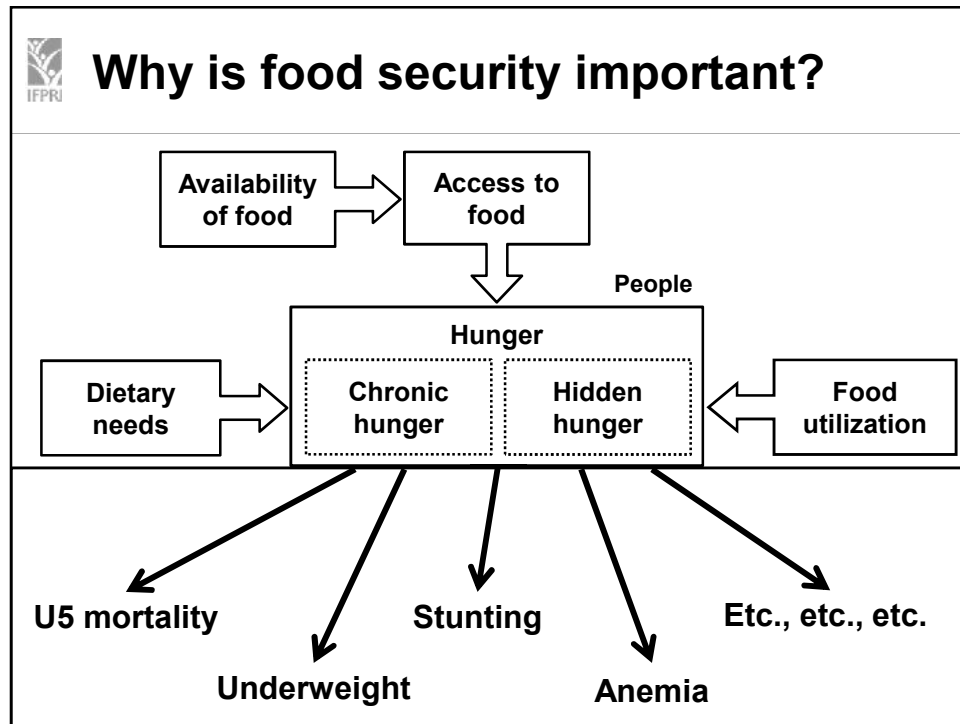


## What is food security?



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graph TD; A[Availability of food] --> B[Access to food]; B --> C[People]; C --> D[Hunger]; D --> E[Chronic hunger]; D --> F[Hidden hunger]; G[Dietary needs] --> E; H[Food utilization] --> F;
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Rome Declaration on World Food Security:  
“Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.”





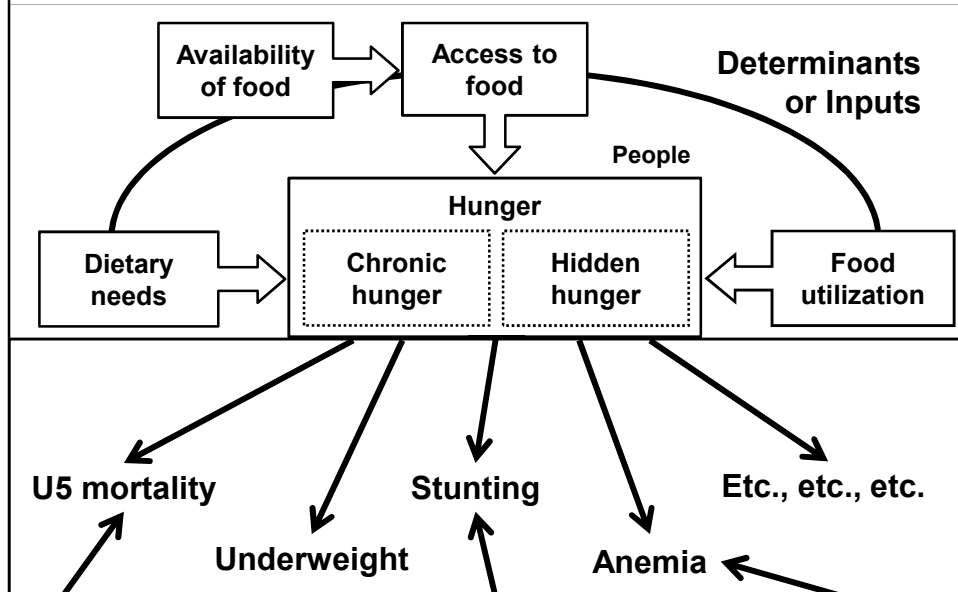
## How is food security measured?

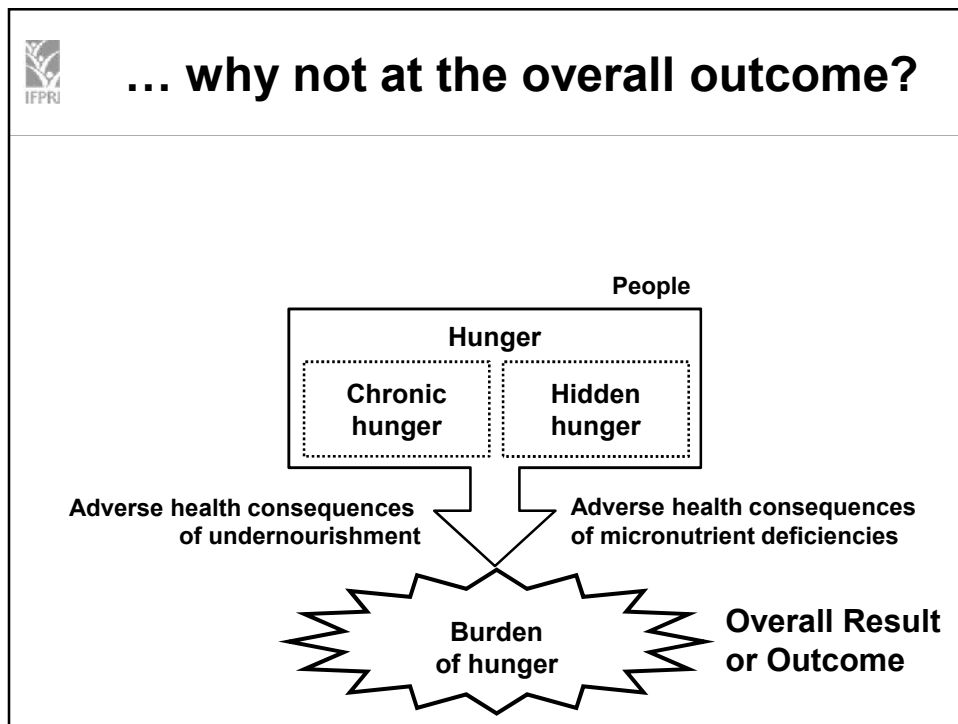
Current measures:


- FAO’s indicator captures mainly changes in food availability at the household level
- Anthropometrics capture only single outcomes (not comparable, ignore “depth” of problem)
- GHI adds data on underweight and mortality to FAO figures to create an abstract index score
- GFSI covers various aspects of food affordability, availability, quality and safety at national level



## Many things are looked at...





 ... why not at the overall outcome?

- WHO data on health outcomes at country level: “disability-adjusted life years” (DALYs) lost
- DALYs are weighted person-years lost due to shortened life and disability:
  - $DALYs_{lost} = YLL + YLD_{weighted}$
- Attribution to undernutrition:
  - Data on protein-energy malnutrition, vitamin A, iron & iodine deficiency, maternal conditions, measles, diarrhoeal diseases, and lower respiratory infections
- 65 million DALYs lost due to undernutrition in 2011 (4% of the global burden of disease), of which two thirds due to “hidden hunger”



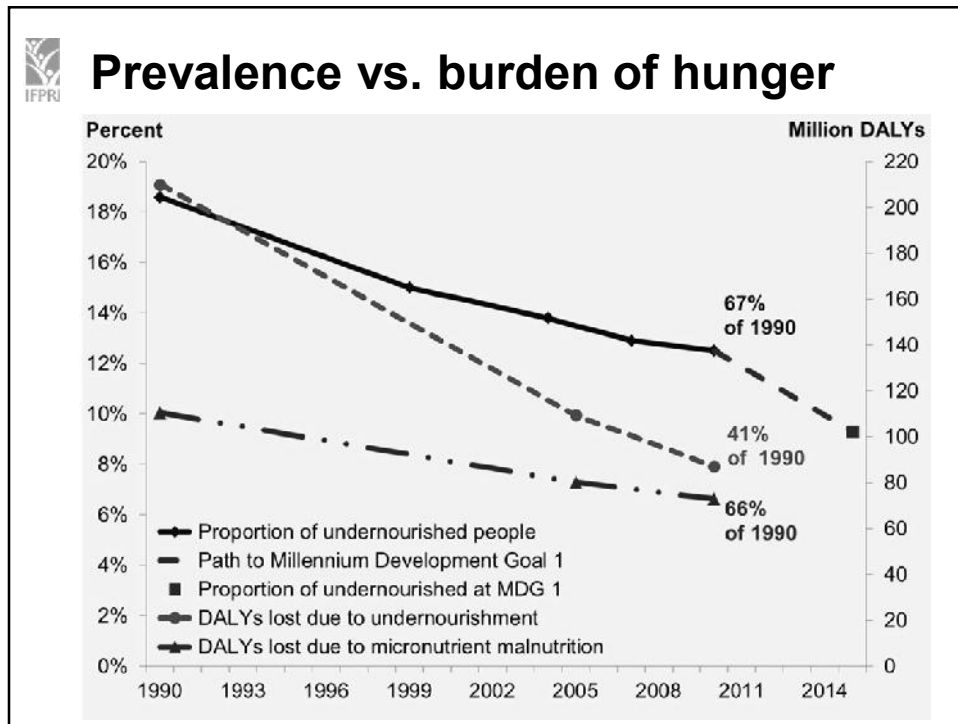
## Rankings for selected countries

	DALYs	Stunting	FAO	GHI	GFSI
Angola	<b>2</b>	<b>54</b>	29	10	19
Niger	<b>3</b>	5	<b>60</b>	17	15
Malawi	11	10	37	32	8
Burkina Faso	12	35	31	32	18
Nigeria	<b>17</b>	24	<b>76</b>	37	26
Tanzania	<b>23</b>	21	9	25	<b>7</b>
Uganda	24	33	12	37	35
Benin	25	<b>17</b>	<b>80</b>	42	24
Sudan	45	35	7	17	10
Tajikistan	50	30	19	37	22
India	<b>54</b>	7	47	<b>13</b>	40
Guatemala	56	7	23	46	46
Botswana	63	48	27	43	59
Paraguay	64	83	32	73	57
Ecuador	98	n/a	44	62	48
Sri Lanka	108	86	36	43	44



## Newer data & approach, new result

- Same approach using more detailed health data from Inst. for Health Metrics & Evaluation (IHME)
  - Disadvantage: only available as global aggregate
  - Different: no discounting, new set of weights
  - Advantage: available for 1990, 2005 and 2010
- 160 million DALYs lost due to undernutrition in 2010 (6% of the global burden of disease), of which more than half due to hidden hunger
- 320 million DALYs lost due to undernutrition in 1990
- Burden of hunger in 2010 half the burden of 1990!
- Very different if compared to FAO/MDG1 measure



## Why this discrepancy?

Food availability but one factor for food security:

- Dietary needs (mechanisation, motorisation, ICTs)
- Food waste (storage, pest control, preservation, retail)
- Food utilization (nutrition education, infant feeding, water, parasites, health status, dietary change)
- Depth of undernourishment below given threshold

DALYs measure outcome of all these factors:

- More comprehensive, catch-all picture of “hunger”
- Incl. impaired cognitive and physical development
- Link to human capital development & econ. growth



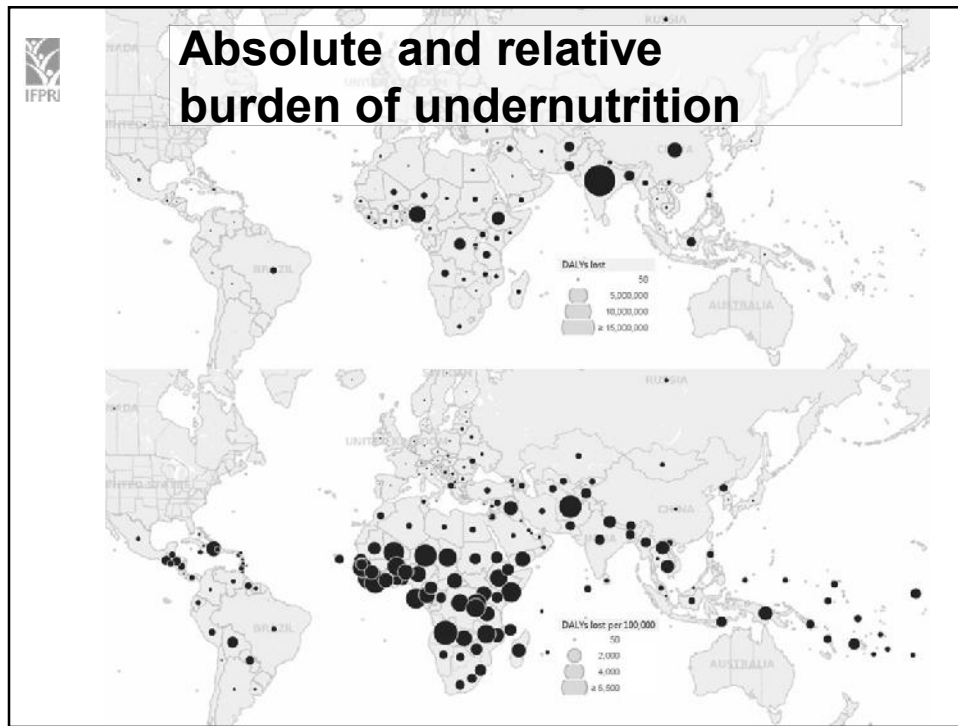
## Implications for economic growth

- WHO's Commission on Macroeconomics & Health: DALYs valued at three times per capita income as improved health spurs economic growth
- Global cost of hunger amounts to Int\$ 0.8 trillion (1% of world income) if based on WHO's DALYs
- Global cost of hunger even Int\$ 1.9 trillion (2.4% of world income) if approximated using IHME
- FAO's State of Food and Agriculture 2013: global cost of undernutrition is US\$ 1.4-2.1 trillion
  - Based on World Bank country estimate for loss in productivity due to undernutrition of 2-3% of GDP



## Conclusions

- Experts and stakeholders in the field of agriculture and nutrition need to be aware of outcomes-based indicators, such as DALYs, which better capture the *results* of food insecurity
- Data is available but needs to be updated more frequently – and made accessible; more attention should be paid to nutrition details
- Further discussion and agreement on details of methodology needed, but it seems food security (MDG1) improved more than commonly thought...
- ... although the remaining burden and cost of hunger is still unacceptably high!



	<b>DALYs</b>	<b>Stunting</b>	<b>FAO</b>	<b>GHI</b>	<b>GFSI</b>
Outcomes of undernutrition	Several (expandable)	One (stunting)	No	Mortality, underweight	No
Determinants of undernutrition	No	No	One (food availability)	One (food availability)	Several
Highest level of measurement	Individual	Individual	Household	Household	Country
Measures depth of problem	DA-weight, diff. outcomes	No (threshold)	No (threshold)	Partially (index)	Partially (index)
Tangible units of measurement	Yes (years)	Yes (capita)	Yes (capita)	No (index score)	No (index score)
Summable and comparable units	Many uses of DALYs	No	No	No	No
Data availability	192/187 countries	118 countries	185 countries	120 countries	105 countries
Updating of data	Planned annually	Annually	Annually	Annually	Annually
Timeliness of raw data	Last before 2004/10	2007-2011	2010-2012	2005-2010	2000-2012





**Thank you very much  
for your attention!**

Forthcoming IFPRI Discussion Paper:  
“Rethinking the Measurement of Undernutrition  
in a Broader Health Context”  
→ [www.ifpri.org/publications](http://www.ifpri.org/publications)

Alexander J. Stein