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POLICY RESEARCH INSTITUTE**

sustainable solutions for ending hunger and poverty

Sectoral Approaches to Multi-Metric Valuation: Agriculture

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What metrics does the sector use for valuation?

- Physical crop/livestock production and crop/livestock production per unit of area or unit of resource
- Input use (land, labor, capital) and input use per unit area/resource
- GDP or value added in agricultural production
- Total factor productivity growth (outputs minus inputs)
- Net agricultural trade (quantity and value)
- Agricultural prices, expenditures on agriculture, per capita demand
- Government investments, payments, subsidies, taxes

How are these metrics defined and used? Disadvantages

- Metrics are computed in physical terms or value terms
- Computed using national income accounts and nationally representative sample surveys
- Effectively measures direct physical and market values of outputs and inputs
- But misses externalities (non-market values): GHG emissions, soil and water degradation, biodiversity
- Misses impacts of agriculture on other sectors (deforestation, land use change)



Possible Improvements

- **Green accounting:**
 - Assign economic values to agricultural externalities and assess value of ecosystem services
- **Establish causation from agriculture to changes in ecosystem services and pollutant emissions**
- **Estimation of values from proxies**
 - Subsidies, taxes, treatment and restoration costs
- **Indirect valuation**
 - “Willingness to pay” approaches
- **If economic estimation infeasible, track physical changes**
 - Land degradation, water quality, soil nutrients, deforestation, biodiversity

Multi-Metric Valuation: **Food Security**

David Lobell* and Mark Rosegrant**

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 preferences for an active and healthy life

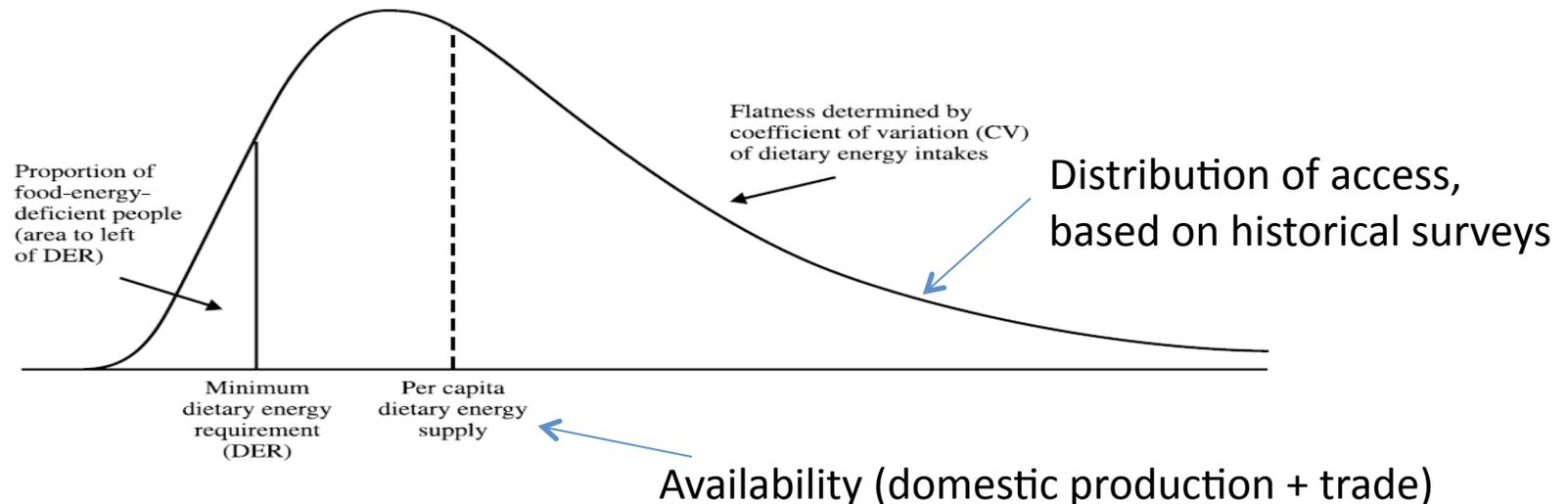
***Stanford University**

****International Food Policy Research Institute**

Common Metrics to Assess Current Situation:

1. Number of Hungry based on calorie supply (FAO) or consumption-- nationally representative HH consumption/expenditure surveys
2. Diet diversity indicators: number of food groups consumed
3. Undernutrition: % Children undernourished
 - a) anthropometry (height-for-age; weight-for-age; weight-for-height)
 - b) nutritional status biomarkers (anemia, Vitamin A deficiency)— combined effect of food availability, home care, health

Figure 5.2 FAO log-normal distribution framework



4. Poverty counts (e.g., < \$1.25/day) (World Bank)—using HH income or expenditure surveys

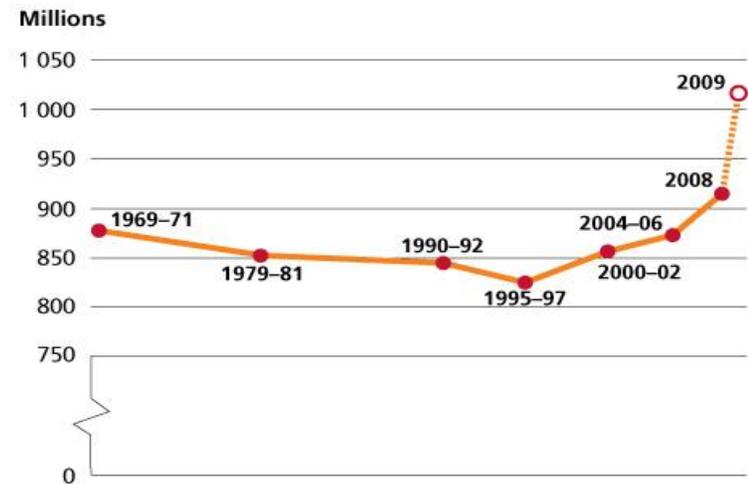
Metrics in Assessment Models:

- **Food insecurity:**
 - **Lack of availability/access to calorie, micronutrients (number or %)**
 - **Nearly all studies have focused on changes in average calorie availability, assuming factors related to access and utilization stay the same**
- **IFPRI IMPACT model: child malnutrition (number and %)**
 - **Also estimates investment needed to restore child nutrition levels following climate shocks (e.g. \$7 Billion annually in agriculture)**
 - **One way to monetize (but obviously requires lots of assumptions)**
- **Some recent work also focuses on change in % below poverty line (Hertel et al. 2010)**

Relative Advantages of these Metrics:

- **FAO metric is easy to track using production , supply/used data**
- **% Childhood underweight is probably more accurate, but goes beyond food security**
- **Poverty counts better capture access, purchasing power**

Learning from the past: number of undernourished in the world, 1969–71 to 2009



Source: FAO.

Common Disadvantages:

- **Calorie-based, ignores micronutrients, diet diversity—should include diet quality**
- **Limited insight on utilization, effects of diseases on hunger**