What do we really know?
Metrics for food insecurity and malnutrition

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Outline

1. Questions and issues
2. Three key methods
   - FAO indicator of chronic undernourishment
   - Household consumption surveys
   - Anthropometric measurements
3. Contradictions and complementarities between indicators
4. Recommendations for improvement
5. Next steps
Dimensions of food insecurity

- Food Security ≠ Nutrition Security
- FIVIMS – multiple indicators needed

- Food intake
  - Nutritional status
    - Undernourishment (lack of food energy)
    - Nutrient deficiency
    - Overnourishment
  - Physiological condition
    - Health, sanitation, care
  - Undernutrition
  - Overnutrition
Questions and issues

• Key questions to be answered:
  – Who are the hungry? How many? Where? When? Why?

• Inconsistency of different methods
• Suite of indicators indispensible
• Focus on **chronic** food insecurity and malnutrition;
• Short-term famines and hunger emergencies require different approaches;
The FAO method

The FAO method for estimating metrics of food insecurity and malnutrition involves the use of various sources for data. For example, the FAO method applied to Bangladesh (2005/2007) yields a coefficient of variation (CV) of 0.32. The method uses a log-normal distribution to model the percentage of undernourished individuals.

The mean daily energy requirement (MDER) and mean daily energy intake (MEAN) metrics are calculated to assess food balance sheets. In Bangladesh, the MDER is estimated to be 1760 kcal/person/day, and the MEAN is 2290 kcal/person/day. These calculations are based on log-normal distribution of food intake data.
The FAO method
Use of the indicator

• Annual publication in SOFI
• Since 2008: ex-post projections
• Monitoring MDG One
• Useful for national and global governance
• Not suited (and not intended) to guide sub-national policy action
• Currently being reviewed in FAO
The FAO method

Main strengths

• Focus on essential food energy requirement
• Regular publication and worldwide coverage
• Consistent with national statistics
• Relatively low cost
• Food balance sheet approach also applicable to other nutrients (macro, micro)
The FAO method

**Critical issues (1)**

- Dietary energy supply (DES)
  - Dietary diversity not captured
  - Seasonal fluctuations not covered
  - Biased estimates through errors in food balance sheets (losses, waste, non-food use etc)
  - Dependant on quality of data inputs from countries (e.g. the case of India)
The FAO method

Critical issues (2)

• Inequality of consumption within countries (CV)
  – Sources of CV not transparent
  – Upper and lower bounds for CV unclear (0.2-0.35)
  – Constancy of CV over time unrealistic and may misrepresent trends in hunger

• Minimum dietary requirements (MDER)
  – Based on WHO/FAO/UNU Expert Consultation (2001)
  – Some issues need more research

• Ex-post projections
  – Enables more timely estimates
  – Method insufficiently documented
The FAO method

Estimates of undernourishment 2005/2007 with varying DES, CV and MDER

[Graph showing the estimated number of undernourished worldwide (in millions) against the variation of original value with different metrics (DES, CV, MDER)].

Metrics of food insecurity and malnutrition
Food Consumption Surveys

• Data base:
  – Representative household surveys (increasingly frequent and rising accuracy);
  – Food expenditures (recall or diary);

• Method:
  – Conversion of food expenditures into calories (and other nutrients);
  – Comparison with household-specific needs;
  – Aggregate to generate national and international numbers;
Advantages

• More direct assessment of detailed food deficits
  – fewer assumptions needed;
• Direct measurement of distribution of hunger
  – no distributional assumptions;
• Household-specific assessment of actual dietary requirements possible;
  – no aggregate assumptions;
• Disaggregation by groups possible;
• Actionable indicator:
  – allows analysis of determinants of hunger

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Disadvantages

• Seasonal assessment usually difficult;

• Data accuracy issues:
  – Food consumed away from home;
  – Intrahousehold losses, waste, non-food use, and distribution;
  – Sampling and recall errors;
  – Inter-personal variation in cut-offs;

• Timeliness, Coverage and Comparability;
  – Significant delay between field work and survey results;
  – Many countries still have no or highly irregular surveys;
  – Survey instruments differ between countries (esp. on detail of food consumption, recall versus diary, etc.);

➤ Substantial conceptual advantages, but remaining empirical problems. Questions of interpretation?

metrics of food insecurity and malnutrition
Anthropometric Assessments

• Nutritional ‘outcome‘ (rather than ‘input‘)
• Data base:
  – Representative household surveys (DHS);
  – Anthropometric assessment (of children);
• Method:
  – Comparison of individual anthropometric status with international reference standard (for children);
  – Z-score (SD. Distance from median of standard);
  – Key: Statistical assessment (misclassification), reference standard;
Advantages

- Measures what is arguably most important;
- Disaggregation by groups possible;
- Actionable indicator:
  - Very well-suited for monitoring;
  - Can study determinants;
- Good coverage, timeliness, and comparability of survey instruments (DHS, MICS, WFS);
Disadvantages

• More than food security;
• Focus on children;
• Timeliness and size of surveys;
• Missing covariates in surveys (DHS, MICS);
• Underweight and the Nutrition Transition:
  – Shift to foods with higher caloric, fat, sugar content boost weight and reduce 'underweight'
  – Stunting better indicator?
International Comparability?

• Genetic differences seem to preclude worldwide standard for adolescents/adults;
• Small genetic differences among children?
  – Inconclusive evidence (possibly 1-3% differences, e.g. South Asia vs. Africa?);
    • Data for new reference standard support small differences;
  – Very high sensitivity of undernutrition rates to small differences in standard;
  – South Asian ‘enigma‘ partly due to this? (Not due to selection effect of lower mortality)
## Comparison of Methods

<table>
<thead>
<tr>
<th>Criterion</th>
<th>FAO approach</th>
<th>Consumption survey</th>
<th>Anthropometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to draw a regular picture for total global, regional and national populations</td>
<td>++</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Ability to draw a regular picture for special population groups at global level</td>
<td>-</td>
<td>-</td>
<td>++</td>
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<tr>
<td>Usefulness to assess inequality of food consumption within countries</td>
<td>--</td>
<td>++</td>
<td>--</td>
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<tr>
<td>Usefulness to assess consumption consistent with national supply and demand</td>
<td>++</td>
<td>-</td>
<td>--</td>
</tr>
<tr>
<td>Accuracy in terms of measuring the adequacy of food intake</td>
<td>+</td>
<td>++</td>
<td>--</td>
</tr>
<tr>
<td>Accuracy in terms of measuring and identifying determinants of nutritional status at a point in time</td>
<td>-</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Accuracy in comparing nutritional status across space and over time</td>
<td>--</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
<td>Ability to assess dietary diversity and micronutrient status</td>
<td>--</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>Ability to portray regional and socioeconomic heterogeneity within countries</td>
<td>--</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Ability to portray seasonal variation</td>
<td>--</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Ability to inform global governance</td>
<td>++</td>
<td>-</td>
<td>++</td>
</tr>
<tr>
<td>Usefulness to guide national policy decisions (e.g., targeting)</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Usefulness to simulate nutritional impacts of policies and shocks at country level</td>
<td>--</td>
<td>++</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: + and – signs indicate whether or not the approach is suitable. Double signs indicate very suitable or very unsuitable.
Figure 4: Undernourishment and childhood underweight rates in 2000

Source: Klasen (2008)

Similar mismatch FAO method and food consumption method.
Figure 5: Childhood underweight and under five mortality rates 2000

Recommendations for improvement (1)

Improving the FAO Indicator

- Review the accuracy of FBS data (underway)
- Update CVs regularly using household surveys (underway)
- Use FBS approach for other nutrients
- Consider lower frequency of publication
- Longer-term projections of undernourishment
- Resume estimates of depth of hunger (?)
Recommendations for improvement (2)
Moving beyond the FAO Indicator

- Expand living standard measurement surveys
- Link LSMS with anthropometric surveys
- Simulations (global and national)
  - e.g. use of consumption surveys and price/output data to estimate current levels of hunger
  - Policy impact simulations.
Recommendations for improvement (3)

Moving beyond the FAO Indicator

• Improve and expand surveys of concrete nutrition indicators
  – Dietary diversity
  – Micronutrient deficiency
  – (Overweight and obesity)

• More research:
  – Consumption surveys versus anthropometrics
  – Cut-offs (anthropometrics and intake)
Next steps

• Establish inventory of various indicators
• Enhancement of the empirical data base
  – Continue review of FBS data base
  – Reconcile food consumption data from FBS and household surveys
  – Enlarge country coverage and frequency of household living standard and anthropometric surveys
  – Harmonize formats, questionnaires, and sampling frames for both (esp. DHS/MICS and LSMS).
Institutional implications

Key agencies must cooperate more closely to:

– overcome incompatibilities between the methods
– work towards consistent suite of Indicators
– maintain close links to research community
– seek joint diagnoses of different indicators
– consider publishing a joint Report on Food and Nutrition Security
– advocate and promote country-owned measurements and policy responses
Options for institutional set-up

• Networking - reinvigoration of FIVIMS (?)
  – Food Security Info Network (FSIN) (FAO, WFP, IFPRI)
  – Involve others (esp. WHO, UNICEF, World Bank, EU)
  – Online Portal of all available indicators
  – Regular consultations on the three key indicators
  – Broaden focus on under- and overnutrition
  – Strengthen country-level work

• Use platforms for advocacy and support:
  – CFS
  – SCN

• Funding: combine RP and joint donor funding
Conclusions

• Three competing methods, each with substantial strengths and weaknesses;
• Improvements in all approaches feasible (but require more research, data, resources);
• More focus on nutrition security indicators desirable
• Additional low cost indicators to be considered (e. g. dietary diversity);
• Need to also assess indicators of transitory hunger in food emergencies
• Greater linkages between methods promising way forward.
Assessing chronic versus transitory food insecurity

- Profiles from household surveys needed for both types
- Transitory food insecurity – three situations:
  1) Food emergency, no prior profiles: ⇒ ad-hoc survey of vital nutrition needs
  2) Food emergency, prior profiles available: ⇒ impact simulations with household models
  3) Recurrent crises (volatility of prices/incomes): ⇒ regular household surveys plus impact simulations

metrics of food insecurity and malnutrition
Selection via Mortality and the 'South Asian' Enigma

- SSA lower undernutrition among living children.

Children died in SSA

Children died in SA
Selection argument not consistent with actual anthropometric distributions.