Updates to the Prevalence of Undernourishment

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Why a revision is needed? (I)

✔ Every year, FAO revises the estimates of the parameters that are used to estimate the PoU, as more data become available.

✔ For the 2020 update, FAO has included:
  ✔ New population data for all countries from the World Population Prospects, 2019 edition, provided by the UN Population Division in June 2019
    ✔ Population data are used to estimate MDER and CV|r for all countries
  ✔ Update of the FAO’s Food Balance Sheets series
    ✔ FBS data are used to estimate the DES in all countries
  ✔ New food consumption data from household surveys for 13 countries, including China
    ✔ Food consumption data from surveys are used to update the parameter of inequality of food energy consumption. The countries.
Why a revision for China was needed? (I)

✓ Inconsistency on the trend of poverty in China versus the PoU
Why a revision is needed? (III)

✓ Inconsistency between the levels of PoU, on one hand, and of both poverty and severe food insecurity based on the FIES on the other.
Why a revision is needed? (IV)

✓ Decomposing the PoU, we note that the slow decrease shown until now was driven only by the increase in the average Dietary Energy Consumption (DEC)

<table>
<thead>
<tr>
<th>Year</th>
<th>DEC</th>
<th>CV</th>
<th>MDER</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2917</td>
<td>0.32</td>
<td>1901</td>
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<tr>
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<td>0.32</td>
<td>1900</td>
</tr>
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<td>0.32</td>
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<td>2014-16</td>
<td>3071</td>
<td>0.32</td>
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<td>2015-17</td>
<td>3089</td>
<td>0.32</td>
<td>1890</td>
</tr>
<tr>
<td>2016-18</td>
<td>3093</td>
<td>0.32</td>
<td>1889</td>
</tr>
</tbody>
</table>

Source: FAO. Suite of Food Security Indicators

✓ The CV for China has been kept constant since 1999 with data from 1996.

✓ As a result we are overestimating the PoU for China and, due to the size of the country, the PoU of the world.

✓ WE NEED TO CORRECT THIS INACCURACY IN THE HUNGER ASSESSMENT OF THE WORLD.

✓ This was indicated in SOFI 2019 (note 9), SOFI 2018 (Box 3, figure 4).
Why a revision for China is needed?

PoU vs Fisev (SOFI 2018)
Methods (I)

PoU assumes a probabilistic model for the distribution of habitual, dietary energy consumption in the population, and contrasting it with the distribution of dietary energy requirements.

\[ PoU = \int_{-\infty}^{MDER} f(x|DEC; CV) \, dx \]

Where:

- **DEC**: is an estimate of the per capita level of the average habitual, daily dietary energy consumption in the population.
- **MDER**: is an estimate of the dietary energy requirements.
- **CV**: is an estimate of the coefficient of variation of the distribution of per capita levels of habitual dietary energy consumption.
Methods (II)

✓ The CV is the combination of two components:

\[ CV = \sqrt{(CV|y)^2 + (CV|r)^2} \]

✓ CV|r is the component of the variation that is associated with differences in energy requirements in the population of a country
   ✓ It reflects the normal *diversity* in the population

✓ CV|y is the part of the variation that can be associated with differences in the households’ socio-economic characteristics
   ✓ It reflects *inequality* in the ability of people to match consumption and requirements

✓ While there is sufficient information on the population structure (from the WPP) to estimate CV|r, having access to data of food consumption at HH or individual level to estimate the CV|y is much harder
Methods (III)

✓ Over the last years, FAO has established several dialogues with Chinese authorities to secure access to food consumption microdata from the annual survey conducted by the Bureau of Statistics.

✓ This year FAO decided to use the China Health and Nutrition Survey (CHNS) collected by the National Institute for Nutrition and Health (NINH)

• Includes a nutrition module that allows computing the individual, habitual daily dietary energy intake as the average of three, 24-hour recall, recordings of food intake data.

• Allows classifying the households into groups of income level. Thus allows to study the actual distribution of levels of DEC within groups of same income level, and across income levels groups.

Methods - concerns

Representativeness

- Unfortunately, the CHNS only covers part of the country. 12 provinces and/or major cities (Beijing, Chongqing and Shanghai).
- Extending the results of the analysis of variability of food consumption to the total population might imply the risk of bias.
- Population in provinces not included have lower levels of disposable income. Thus there is the risk of underestimating the inequality of food consumption.
Methods - solution to concerns (I)

To address the problem FAO got access to an additional source of data:

- The China Household Finance Survey (CHFS) managed by the Survey and Research Center for China Household Finance of the Research Institute of Economics and Management at the Southwestern University of Finance and Economics in Chengdu, Sichuan, China.
  - Data are representative at the provincial level for all provinces all China mainland.

It allows to compute average food expenditure across groups of households classified by decile of total consumption expenditure (a proxy for real income).
Methods - solution to concerns (III)

The strategy to solve representativeness concern is:

1. To link habitual food consumption (CHNS) to average monthly food expenditure (CHFS) for the provinces in common.

2. Then exploit data on food expenditure available for all provinces and income deciles from the CHFS, to predict the average food consumption (DEC) by income decile in the provinces not covered by the CHNS in 2011, and in all provinces in 2013, 2015 and 2017.


Assumptions are:

1. The same income-price relationship holds in all provinces, both the non CHNS provinces and the CHNS provinces

2. Variation in DEC due to differences in socioeconomic characteristics within the same consumption decile can be neglected.
Implementation of the strategy (I)

✓ We estimate a reduced form function that links the average dietary consumption (DEC) to food expenditure (FOOD_EXP), exploring alternative specifications for the functional form.

✓ The best fitting relationship is the cubic function. The relationship is statistically significant.

\[ DEC = 1043.1 + 3.18 \cdot FOOD_{\text{EXP}} - 0.0043 \cdot FOOD_{\text{EXP}}^2 + 0.000006 \cdot FOOD_{\text{EXP}}^3 \]

\[ t-\text{stat} \quad (13.5) \quad (4.8) \quad (-2.8) \quad (1.85) \]

(Ho: b = 0)
Implementation of the strategy (II)

✓ Habitual dietary energy consumption levels plotted against average monthly food expenditure levels by income decile.

\[ y = 2 \times 10^{-6}x^3 - 0.0043x^2 + 3.1758x + 1043.1 \]

\[ R^2 = 0.4919 \]
Implementation of the strategy (III)
Implementation of the strategy (IV)

- The model is applied to all income groups in all provinces, generating values of average DEC to be used in estimating the coefficient of variation of DEC due to income in China.

- To recognize the uncertainty associated with our prediction model, we add to each predicted DEC a random draw from a normal error distribution with mean zero and standard error equal to the standard deviation of the prediction errors obtained when estimating the model.

- In order to measure a SE around the \( CV|y \), we repeat the random draw 20,000 times and each time compute the coefficient of variation (Montecarlo Simulation). The final CV per year is the average of this simulation.
Results

✓ Results show a much lower CV/Y for China than the one estimated in 1996.
  • CV|Y of 16.24% for 2011 compared to the 30.5% for 1996

✓ Results also show that the approach taken (combining different sources) does correct the representativeness concern of using only the CHNS.
  • CV|Y using only the CHNS (covering only the richer provinces) would have been 8.5%, failing to capture the lower tail of the food consumption distribution in China.

✓ This translates to a much lower PoU for China in comparison to what it would have been without the update on the CV.
Results at global level (I)

√ Almost parallel downward shift on the NoU series. Nevertheless, the revision **confirms the trend** in the number of people affected by hunger globally, which has been on the rise since 2014.
Results at global level (II)

The revised PoU estimates, display a remarkable convergence, both for the entire world and for the world excluding China, with the series of the prevalence of severe food insecurity based on the FIES in 2014–2019.
Conclusions:

✓ Due to lack of access to HH survey data on food consumption for China, previous SOFIs may have failed to reflect the socio-economic progress in China over the last couple of decades.

✓ This has created an urgent need to revise the estimates of the inequality in dietary energy consumption across different income groups in China.

✓ FAO has proposed an innovative way to merge information obtained from two different surveys to estimate recent values of the Coefficient of Variation of habitual DEC due to income (CV|y) for mainland China, and revise th PoU which is now more in line with other indicators of food insecurity, poverty and chronic undernutrition.