Calculation of measures for the nutritional value of food aid

- ✓ I :   Total number of food commodities (173), where commodities are: $i = (1, 2, 3, … , I)$.
  [i.e. i=1 *API*, i=2 *Apples*, i=3 *Barley*, … , i=I *Potato Flakes/Granules*].

- ✓ J :   Total number of nutritional parameters (14): energy, 2 macronutrients and 11 micronutrients, where parameters are: $j = (1,2,3,… ,J)$.
  [i.e. j=1 *energy*, j=2 *fat*, j=3 *protein*, …, j=14 *zinc*].

- ✓ n_{ij} :   Content of nutrient *j* in food commodity *i*, per 100 g.

- ✓ $N_{ij} = n_{ij} \cdot 10000$:   Content of nutrient *j* in food commodity *i*, per 1 MT.

- ✓ r_i :   Daily hypothetical individual minimal requirement per nutrient *i*.

- ✓ $R_i = r_i \cdot 365$:   Yearly hypothetical individual minimal requirement per nutrient *i*.

- ✓ Q_i :   Total food aid quantities in MT of ith commodity.

- ✓ $Q = \sum_{i=1}^{I} Q_i$:   Total food aid quantities in MT.

- ✓ $d_i = Q_i / Q$:   Share in 1 ton of commodity *i* in selected *K* food aid deliveries in percentage.

- ✓ $\sum_{i=1}^{I} d_i = 1$

Potentially Average Requirements met – PAR$_{ij}$

$$PAR_{ij} = \frac{n_{ij} \cdot 10000}{r_j \cdot 365} = \frac{N_{ij}}{R_j}$$

Individual Requirements Met on Average *total* - IRMAt$_j$ (#14 indicators)

$$IRMAt_j = \sum_{i=1}^{I} PAR_{ij} \cdot Q_i$$

Individual Requirements Met on Average *per 1 ton* – IRMA$_j$ (#14 indicators)

$$IRMA_j = \sum_{i=1}^{I} PAR_{ij} \cdot d_i = \sum_{i=1}^{I} PAR_{ij} \cdot \frac{Q_i}{Q} = \frac{IRMAt_j}{Q}$$

Individual Requirements Met on Average *score* - IRMAs (#1 indicator)

$$IRMAs = \frac{\sum_{j=2}^{J} \min\left[\dfrac{\sum_{i=1}^{I} PAR_{ij} \cdot d_i}{\sum_{i=1}^{I} PAR_{i1} \cdot d_i}, 1 \right]}{J-1} = \frac{\sum_{j=2}^{J} \min\left[\dfrac{IRMA_j}{IRMA_1}, 1 \right]}{J-1}$$

where j=1 refers to Energy