Estimating Total Dietary Intakes

Alicia L. Carriquiry
Iowa State University

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Outline

- Intake distributions
- Measuring daily nutrient intake
  - Intake from food and supplements
- Usual *total* nutrient intake distribution
- Challenges and opportunities

Estimating usual intake distributions is important…

- Assessment of group intakes using DRIs.
- Monitoring nutritional status of groups.
- Planning food intake for groups, including intervention and fortification programs.
- Design and evaluate food assistance programs, public health programs, other.

…But it is also challenging

- Intake data present challenges for analyses
- Lots of “noise”: measurement, day-to-day variability in intakes, other effects on intake
- Large samples, but scarce information on each sample person.
- Data not well “behaved” from statistical viewpoint.
- Additional difficulties associated to infrequently consumed items and supplements.

Daily intake of a nutrient

- Can be “measured” using 24-hour recalls, food diaries, other instruments
- Is subject to measurement error: under-reporting, portion sizes, food composition database (“promiscuous fortification”, Beaton)
- Varies from day to day within an individual, and also between individuals

Usual nutrient intake

- The “habitual” or long-run average intake of a nutrient
- Unobservable in practice
- Can be estimated as the mean of several observed daily intakes
- Varies from individual to individual
- ***Distribution of usual intakes*** is typically of interest

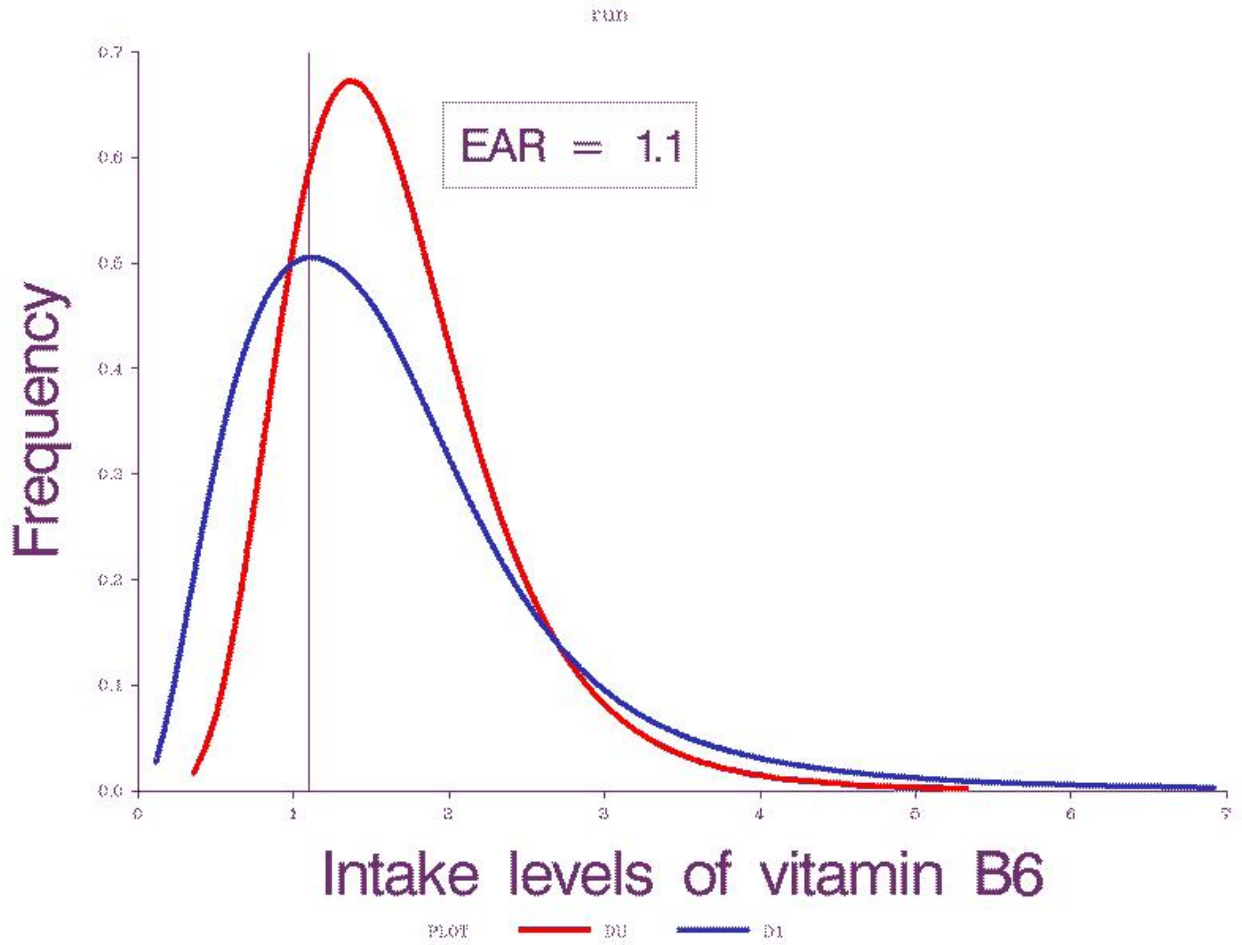
Data needed to estimate usual nutrient intake distributions

- *Daily* observations of nutrient intake on representative sample of individuals
- An independent ***replicate*** observation on at least a representative sub-sample of individuals
- Replicate permits adjusting away within-individual variability in intakes.

An important use of usual nutrient intake distributions

- Assess ***prevalence of inadequate*** intakes in a group.
- Usual intake is inadequate if it does not meet individual's requirement.
- Prevalence of inadequacy in a group is the proportion of individuals with *usual* intakes below the EAR (EAR cut-point method).

Example: Vitamin B_6 in Women 19-50 yrs



Another important use of usual intake distributions

- Risk of adverse effects may increase for intake levels above the UL
- Proportion of individuals at potential risk equals proportion with usual intakes above the UL

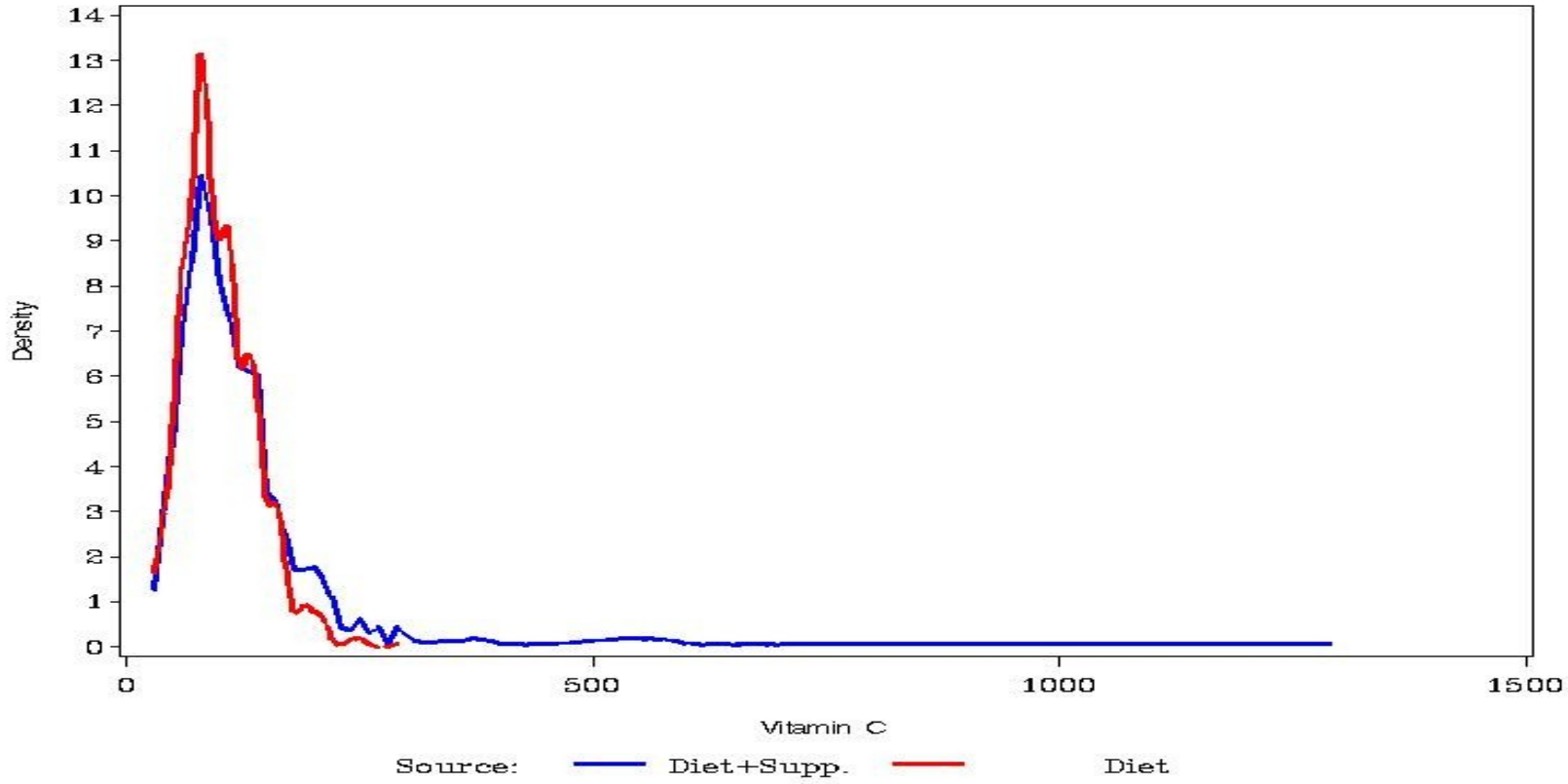
Total nutrient intake

- Total nutrient intake = nutrient intake from food and from supplement sources
- Important to evaluate total nutrient intake:
  - For some nutrients, portion of intake from supplements may be large
  - Adequacy and excess perhaps underestimated if only food sources are considered
  - Some UL's defined only for supplement-derived nutrient intake (e.g., Mg)

Total nutrient intake (cont'd)

- 33% of Caucasian women 19-50 yrs consume supplements. Hispanic and African American women: 18%, 23% (NHANES III).
- 36% of *all* respondents in NHANES 1999-2000 report consumption of at least one supplement.
- Two thirds of consumers take *daily* supplements.
- Group mean intake increases when considering total intake.
- Prevalence of inadequacy less affected.
- Effect on upper distribution tail striking.

Ex: Vitamin C, non-smoking women 19-30 yrs, NHANES III



Food only vs. food + supplements

Vit C, women 19-30, smoking

	Mean	10th	90th	Prev
Food	77	28	141	73%
Total	121	30	193	60%

Vit C, women 19-30, non-smoking

	Mean	10th	90th	Prev
Food	102	63	148	10%
Total	139	65	205	7%

Distribution of usual total nutrient intake

- Ideally, add daily food and supplement nutrient intake and then adjust.
- Resulting distribution is total usual intake distribution in group.
- Day-to-day variability in supplement intake should be investigated.

Questions:

- Are supplements like frequently consumed items?
  - Recent NHANES data suggest that most supplement users may consume daily or weekly
  - Two 24-hr recalls might capture consumption of daily and weekly users
- What about occasional and non-consumers?
  - Need an FFQ-type question to ask about frequency of supplement consumption

Total nutrient intake (cont'd)

- What data are needed?
  - Replicate 24-hr recalls to capture daily supplement intake
  - A *propensity* question to augment the 24-hr recalls and identify occasional consumers.
- 24-hr recalls not enough to capture the "sometimes" consumer of supplements.
- Standard methods for estimating usual intake distributions would apply to "corrected" 24-hr recalls.

Challenges and opportunities

- Supplements an important nutrient source.
- Accounting for supplements in dietary assessment is a challenge:
  - Myriad different formulations.
  - Rapidly changing market.
  - Only partially understood consumption patterns.

Challenges and opportunities (cont)

- Daily, almost daily, weekly consumption pattern: no major difficulties from survey and statistical analysis viewpoint.
- Non-consumers cause no difficulty.
- Occasional consumers not easily captured with two 24-hr recalls.
- Propensity question to help “calibrate” data.

Challenges and opportunities (cont)

- Supplements and infrequently consumed items are different beasts:
  - Supplements add to food nutrient intake.
  - Infrequently consumed items (e.g., spinach, lycopene) are either consumed or not.
- For estimation of usual intake distributions, including nutrient intake from supplements is challenge similar to analyzing vitamin A.

Thanks for listening!

- Background literature:

  Dietary Reference Intakes: Applications in Dietary Assessment, IOM, 2000

- My e-mail:

  alicia@iastate.edu