

measurement ERROR webinar series

Estimating usual total nutrient intake distributions from diet and supplements (Webinar 5)

Objectives:

- Identify key challenges and considerations in combining dietary and supplement intake data.
- Explain statistical approaches to estimating total nutrient intakes.
- Describe assumptions and caveats of current techniques of estimating total nutrient intakes.

Recommended resources:

- Bailey RL, Dodd KW, Goldman JA, Gahche JJ, Dwyer JT, Moshfegh AJ, Sempos CT, Picciano MF. Estimation of total usual calcium and vitamin D intakes in the United States. *J Nutr.* 2010;140(4):817-22.
- Dodd KW, Guenther PM, Freedman LS, Subar AF, Kipnis V, Midthune D, Tooze JA, Krebs-Smith SM. Statistical methods for estimating usual intake of nutrients and foods: a review of the theory. *J Am Diet Assoc.* 2006;106(10):1640-50.
- Garriguet D. Combining nutrient intake from food/beverages and vitamin/mineral supplements. *Health Rep.* 2010;21(4):71-84.
- Park SY, Murphy SP, Wilkens LR, Yamamoto JF, Kolonel LN. Allowing for variations in multivitamin supplement composition improves nutrient intake estimates for epidemiologic studies. *J Nutr.* 2006;136(5):1359-64.

Key terms:

Back-transformation	A mathematical technique used to restore a variable to its original scale after a transformation has been applied.
Complex survey sample	A sample of the population of interest that is drawn using stratification and/or clustering techniques; probability of inclusion in the sample varies among individuals in the population and each member of the population has a known probability of selection.
Consumption day	A day on which a particular nutrient or food is consumed by a specific individual.
Day-of-week effect	A phenomenon indicating how overall mean intake varies according to the day of the week.
Dietary intake	Intake from foods and beverages (excludes supplements).

Dietary Reference Intakes (DRI)	A set of intake recommendations from the Institute of Medicine (IOM) of the National Academies for nutrients and other dietary components. DRIs include estimated average requirement and tolerable upper intake level.
Dietary supplement	Vitamins, minerals, herbs or other botanicals, amino acids, and other substances taken orally, which are intended to supplement the diet.
Distribution	The pattern of values taken on by a random variable.
Epidemiology	The study of the distribution and determinants of health outcomes or diseases among populations and the application of that study to enhancing public health.
Estimated Average Requirement (EAR)	The average daily nutrient intake level estimated to meet the requirements of half of the healthy individuals in a particular age and sex group. The EAR can be used to estimate the prevalence of the population of interest with inadequate intakes of a particular nutrient.
Iowa State University (ISU) method	A statistical modeling approach used to estimate distributions of usual intake.
Measurement error	The difference between the observed or measured value and the true value.
National Cancer Institute (NCI) method	A unified approach for estimating usual intake distributions and predicting individual intakes for use in diet and health models; can be used for dietary components consumed nearly daily by nearly all persons and those consumed episodically.
National Health and Nutrition Examination Survey (NHANES)	A representative survey of the civilian, noninstitutionalized U.S. population conducted by the National Center for Health Statistics; used to monitor diet and study associations between diet, nutrition, and health.
National Research Council (NRC) method	An early statistical modeling approach to estimate usual intake distributions; extended by researchers at Iowa State University.
Normal (Gaussian) distribution	A probability distribution that is symmetrical (i.e., density function resembles a bell-shaped curve); occurs commonly in nature, such as heights of adults in a homogeneous population.
Nuisance effect	A variable that has an effect on observations but is of no intrinsic interest itself. Examples include interview sequence and mode of administration of the instrument.
Sequence effect	The effect of repeated administration of an instrument on reported intakes.

Simulation study	A method used to validate statistical procedures that involves generating random samples from a hypothetical distribution and computing statistical estimates for each sample.
Skewed distribution	A distribution that is not symmetrical.
Standard error	The standard deviation of the sampling distribution of an estimated population parameter; used to assess the precision of an estimate.
Surveillance	A general term for monitoring; in the context of nutrition, refers to tracking the population's diet- and nutrition-related health events.
Tolerable Upper Intake Level (UL)	The highest average daily nutrient intake level likely to pose no risk of adverse health effects to almost all individuals in the general population; as intake increases above the UL, the potential risk of adverse effects increases.
Total nutrient intake	A term referring to nutrient intake from all sources, including food, beverages, and dietary supplements.
Twenty-four-hour dietary recall (24HR)	A dietary instrument that requires the respondent to remember and report all foods and beverages consumed in the preceding 24 hours or during the preceding day.
Usual intake	Long-term average daily intake, taking into account both consumption and nonconsumption days.
Usual intake distribution	A distribution that describes usual intakes, including the mean and percentiles, among a population.
Variance	A measure of the spread in a set of observations; it is equal to the mean squared difference between observations and their mean value.
What We Eat in America (WWEIA)	The dietary intake interview component of the National Health and Nutrition Examination Survey (NHANES).
Within-person variance	A measure of the variation in repeated observations of a variable in the same person. In dietary measurement using 24-hour recalls, it is the day-to-day variation in reported dietary intake of an individual.