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Evaluation of U.S. Total Diet Study Data on Selenium

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Abstract

The potential usefulness of FDA's U.S. Total Diet Study (TDS) selenium (Se) data to the nutrition community was evaluated as part of the TDS modernization program. TDS Se data collected from 2003 – 2010 was evaluated by comparing these data to Se concentration data in USDA's Standard Reference 26 (SR26) Database. We also evaluated trends in Se concentrations over time and differences in Se concentrations by Market Basket (MB). Comparable SR26 foods were identified for most TDS foods; however, for many TDS foods, there was more than one match in SR26. TDS was found to be a unique source of analytical Se concentration data for four food mixtures and for several SR26 foods with imputed Se concentrations. Se concentrations in TDS foods were similar to analyzed Se concentrations in most corresponding SR26 foods. Se concentrations in whole wheat bread were significantly higher in MB 2 (U.S. West Region, collected in the winter) than in MB 1 (U.S. North Central Region, collected in the fall), 3 (U.S. South Region, collected in the spring), and 4 (U.S. North East Region, collected in the summer). Se concentrations in whole wheat bread were also significantly higher in MB 4 than in MB 3. Se concentrations in boiled eggs were significantly higher in MB 2 than in other market baskets. The U.S. Total Diet Study suspended analysis of Se in 2010, but FDA is evaluating the potential benefits of adding Se analysis back to the TDS program. Results of this study demonstrate the potential value of TDS concentration data for Se and other nutrients to the U.S. nutrition community. However, it is clear that TDS data on generic foods (e.g. tuna, canned in water) are less useful than TDS data on more specifically defined foods (e.g. tuna, white, canned in water). Potential geographical and/or seasonal differences in Se contents of some foods may warrant additional investigation.

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1. Introduction

The U.S. Food and Drug Administration's (FDA) Total Diet Study (TDS) currently collects samples of approximately 280 foods in each of four regional market baskets each year, and analyzes these foods for pesticides, industrial chemicals, radionuclides, toxic elements and nutrient elements. TDS regions and corresponding season in which samples are collected are shown in Figure 1. In each market basket, foods are sampled from three different cities and these three samples are composited for analysis. The TDS foods list, revised most recently in 2003¹, is designed to include representative foods from a variety of types of foods in the American diet; foods selected to represent the various categories of foods are those with the highest consumption level. For example, Sunflower seeds (shelled), roasted, salted was selected as the representative food for the nuts and seeds category. FDA is currently working to develop a new TDS foods list.

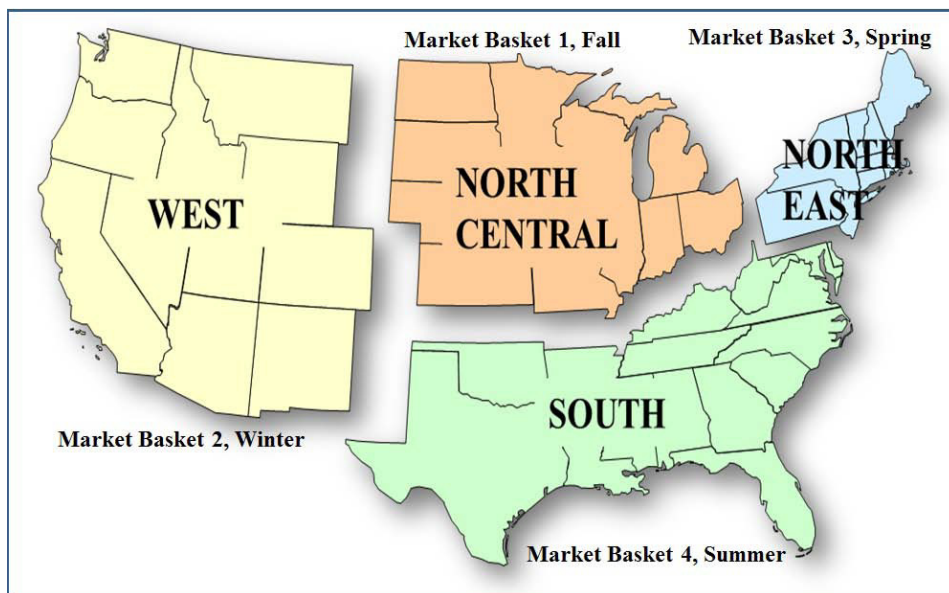


Figure 1. Total Diet Study Regions and Seasons

TDS measurement of food concentrations of selenium (Se) began in 1973, but was suspended in 2010. Se is an essential nutrient with the potential for toxic effects at relatively low dietary intakes. Results of the 2009-2010 What We Eat in America, National Health and Nutrition Examination Survey indicate that average daily Se intake by Americans 2 years and older is 108.5 μg from foods and 120.8 μg from foods and supplements²; the Tolerable Upper Intake Levels for Se set by the Institute of Medicine range from 90 $\mu\text{g}/\text{day}$ for ages 1 – 3 years to 400 $\mu\text{g}/\text{day}$ for 14 years and older³. FDA is currently evaluating the possibility of renewing the Se analysis program as part of the TDS.

The objective of this study was to evaluate the potential usefulness of TDS Se data to the nutrition community as part of modernizing the TDS program.

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