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Updating USDA's Key Foods List for What We Eat in America, NHANES 2011–12

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Abstract

The Nutrient Data Laboratory (NDL) of the U.S. Department of Agriculture (USDA) uses the Key Foods approach to select foods for nutrient analyses, allowing NDL to concentrate analytical resources on foods that contribute significant amounts of nutrients of public health interest to the diet. The Key Foods approach uses food composition data from the USDA National Nutrient Database for Standard Reference (SR26) for 14 nutrients of public health significance identified in the 2010 Dietary Guidelines for Americans, intake data from NHANES, What We Eat in America (WWEIA) 2011–12, and the USDA Food and Nutrient Database for Dietary Studies (FNDDS 2011–2012) to connect food composition with consumption data. For each food, NDL multiplies the nutrient content by the grams consumed. NDL then ranks all Key Foods for each nutrient and divides the foods into quartiles. The current Key Foods list contains 576 food items, similar to the list generated from NHANES-WWEIA 2007–08, although the number of foods per quartile and rankings of some foods have changed slightly. Key Foods help NDL provide current, representative data for researchers, policy makers, the food industry, and consumers. This article describes the Key Foods list that NDL developed using data from SR26 and 2011–12 consumption data from NHANES-WWEIA.

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1. Introduction

The Nutrient Data Laboratory (NDL) of the U.S. Department of Agriculture (USDA) has maintained food composition databases and tables for over 120 years, since Dr. Atwater published his pioneering manuscript, “Investigations upon the Chemistry and Economy of Foods,” in 1892¹. Today, the latest version of the USDA National Nutrient Database for Standard Reference (SR), Release 27², contains data on over 8,600 food items for up to 150 nutrient components.

Keeping the SR database up to date is an ongoing effort. Reanalyzing all 8,600 food items each year would require much more resources than are available. Current resources allow for the sampling and analysis of 75 to 100 foods per year, so it would take nearly 100 years to analyze all of the foods in the database. Clearly, such a complete analysis is not practical, and a method is needed to prioritize foods for sampling and analysis.

In 1987, NDL developed the Key Foods approach³ using food composition and food consumption data from the Continuing Survey of Food Intakes by Individuals (CSFII) 1985–86 and, later, the 1987–88 Nationwide Food Consumption Survey. The food composition data used to create the first Key Foods list came from data derived from Release 5 of SR and other unpublished data available to NDL. NDL updated the Key Foods list with each new release of food consumption data, starting with the CSFII in 1989–91, 1994–96, and 1998. More recently, NDL has used data from the What We Eat in America (WWEIA) component of NHANES from 2001–02, 2003–04, 2005–06, 2007–08, and 2009–10 to create a series of Key Foods lists.

In 1997, NDL collaborated with the National Heart Lung and Blood Institute of the National Institutes of Health to improve the quantity and quality of data in SR. This project, the National Food and Nutrient Analysis Program (NFNAP), generates high-quality analytical nutrient data on foods that are commonly consumed in the United States. NDL has used the Key Foods approach to identify foods and nutrients for sampling and analysis and has sampled and analyzed nearly 2,000 food items since the NFNAP began. As a result, nearly 20% of the nutrient values in SR27 contain data from NFNAP. NDL uses these analytical data to calculate numerous other values for which analytical data are not available. For example, when a nutrient profile is needed for a cooked product, and data is only available for the raw item, values can be calculated from the raw values by the use of appropriate yield and retention factors.

This article describes the process used to generate the Key Foods list that NDL developed using food composition data from Release 26 of SR⁴ and the 2011–12 WWEIA/NHANES consumption data⁵.

2. Methods

Haytowitz et al. described the procedure that NDL used to develop the earlier Key Foods lists^{6,7} with data from the CSFII. More recently data from the What We Eat in America (WWEIA) component of the National Health and Nutrition Examination Survey (NHANES) has been used⁸. For each survey cycle, NDL provides the USDA Food Surveys Research Group (FSRG) with a subset of SR, which currently contains approximately 3,200 food items. The Food Surveys Research Group uses these data to build the Food and Nutrient Database for Dietary Studies (FNDDS), a database of values for certain nutrients in foods and beverages that WWEIA/NHANES respondents report consuming.

As the first step in developing the Key Foods list (Figure 1), NDL uses the list of ingredients and their amounts in the “FNDDSSRLinks” file of the FNDDS⁵. It contains those components needed to develop a nutrient profile for each food item and can be either a single item, such as a raw fruit or vegetable or a complex multi-ingredient food, such as a casserole or an ethnic dish. Perloff first described the development of an early version of this file in 1985⁹. In this file, ingredient amounts are often expressed in common household units, such as cups or tablespoons. However, for calculations of nutrient values, all ingredient amounts must be expressed as the percentage of the total recipe made up by that ingredient. So a food item which contains a list of ingredients in terms of common household units, e.g. cups, tablespoons, and pieces with their respective weights, are converted to percents. In the “FNDDSSRLinks” file,

one food can be an ingredient in another food. For example, “Milk, not further specified” is a weighted composite of four milks with different fat levels. This item is a component of other food items in the “FNDDSSRLinks” file containing milk whose exact fat level is not known. These foods are all expanded to show the percent contribution of each of the different milks to the composite food. NDL repeats this step several times to reduce all foods like “Milk, not further specified” used as an ingredient in other foods to their component parts. NDL then ranks the Key Foods in the list based on the percent contributions of certain nutrients in each food.

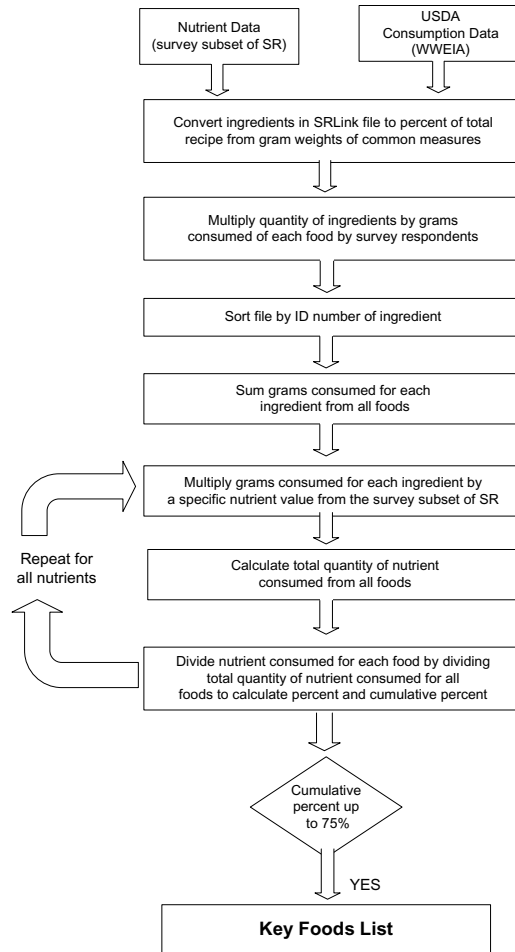


Figure 1. Overview of procedure for developing the Key Foods list

The 2010–11 WWEIA provides data on the amount of each food that survey respondents reported consuming. The amounts of these foods are weighted to represent the amounts consumed by the U.S. population on each of two days. The weighted grams consumed are multiplied by the percentage contribution of each ingredient in each food to yield the total consumption for that day by the U.S. population. NDL repeats this step for all foods reported consumed. NDL then sums the amount consumed of each ingredient in all foods to produce the total amount consumed of that ingredient or food.

As part of their work on the 2010 Dietary Guidelines for Americans, the Dietary Guidelines Advisory Committee¹⁰ identified a number of nutrients of public health concern, including nutrients that the U.S. population consumes in insufficient or excessive amounts (Table 1). Although choline and vitamin D were on the list the committee developed, NDL did not include them as they are highly concentrated in eggs and milk, and these foods would have dominated the first quartile of the list of food items. The list of nutrients considered in the Key Foods list has changed over the years, so the order of items in the Key Foods list has also changed over the years.

Table 1. List of nutrients used to develop the Key Foods list.

Fat	Retinol *
Energy (kcal)	β -Carotene *
Total Sugar *	Vitamin B ₁₂ *
Dietary fiber, total	Folate, DFE
Calcium	Cholesterol
Iron	Saturated FA, Total
Potassium	
Sodium	

* Not used in Key Foods list based on CSFII 94-96

3. Results and Discussion

The Key Foods list based on the 2011–2012 WWEIA/NHANES food consumption survey contains 576 foods. NDL divided this list into quartiles based on the sum of the percent contribution of each nutrient in each food listed in Table 1. The number of foods in each quartile is provided in Table 2. Quartile 1 has the fewest items (11) and is dominated by commonly consumed, basic food items such as eggs, milk, cheese, and bread (Table 3). Eggs, the top item on the list, contributed some amount of 11 of the 14 nutrients that NDL considered in developing the list. Carrots (raw) are on the list due to their high contribution of beta-carotene, although they also contributed small amounts of other nutrients. NDL removed table salt, which would have been sixth on the list, from the calculation used to assign Key Foods to quartiles. Table salt is the top contributor of sodium and would have comprised most of the first quartile foods for that nutrient. The second quartile contains predominately basic foods (40 foods) as well as a few processed foods. The third and fourth quartiles contain more processed foods. Foods will not be analyzed each year or even in each NHANES-WWEIA cycle; however, foods in the first quartile will be analyzed more frequently than foods in the 2nd, 3rd, or 4th quartiles.

Table 2. Distribution of foods per quartile

Quartile	Number of Food Items
1	11
2	40
3	92

4	433
Total	576

Several foods have been in the first quartile since NDL developed the first Key Foods lists using the 1994–96 CSFII. But the ranking of some of these foods has changed slightly (Table 3). Some of these changes are due to differences in choices made by consumers. For example, tortillas moved from the third quartile in 1994–96 to the first quartile in 2009–10 because of the growth in the Hispanic population, which is now the largest minority group in the United States, and the growing popularity of Mexican and Tex-Mex foods in the general population; these foods make up the largest segment of the ethnic food market¹¹. Although whole milk is still popular, its consumption has dropped in favor of various reduced-fat milks (containing 2% fat, 1% fat, or no fat).

Other changes in the rankings of the Key Foods are due to improvements in the SR that FSRG has adopted over the years in developing the FNDDS. One example is hamburger rolls. At one time, the nutrient values for hamburger sandwiches served in quick-service restaurants in the FNDDS were based solely on the nutrient values for their parts—a beef patty, roll, cheese, and condiments. More recent releases of SR use values obtained from analyses of hamburger samples from popular hamburger chains and these have been used by FSRG in developing the FNDDS. As a result, the rankings of hamburger rolls and pasteurized process cheese have changed slightly. All of the foods listed in Table 3 have been analyzed through USDA’s NFNAP.

Table 3. First quartile Key Foods in NHANES 2011–12 and ranking from earlier NHANES (1994–2010)

Food Description	NHANES 2011–12	NHANES 2009–10	NHANES 2003–04 Rank	NHANES 1999- 2000	CSFII 1994–96
Eggs, whole, raw, fresh	1	2	2	3	3
Milk, fluid, 2% milk fat	2	1	1	2	2
Cheese, cheddar	3	5	13	12	15
Milk, whole, 3.25% milk fat	4	3	3	1	1
Carrots, raw	5	4	6	11	10
Cheese product, pasteurized process, American	6	10	8	7	9
Rolls, hamburger or hot dog	7	6	7	4	6
Ice cream, vanilla	8	8	10	17	17
Tortillas, flour, refrigerated	9	22	31	44	92
Milk, fluid, 1% milk fat	10	9	20	21	19
Milk, fluid, nonfat	11	7	12	13	14

Many foods are consumed in a number of different forms, and each form has a unique nutrient profile in SR. As a result, each distinct form of a particular food is listed separately and is therefore lower on the Key Foods ranking than a composite of all forms of that food. For example, the FNDDS contains 13 different forms/cooking methods for chicken from SR. If the amount consumed for all forms were combined, chicken would be higher on the Key Foods list.

One nutrient of particular public health interest is sodium. Both the Institute of Medicine¹² and the World Health Organization¹³ have called for individuals to reduce their sodium intake. Table 4 shows the foods in the first quartile

of the Key Foods list for sodium—one of the nutrients used to create the Key Foods list. This list is heavily influenced by the popularity of Mexican foods and hamburger sandwiches from quick-service restaurants; most sodium in the U.S. diet comes from processed and restaurant foods^{14, 15}. Two foods in the Key Foods list for sodium—tap water and eggs—do not contain added sodium but are consumed in such large quantities that their naturally-occurring sodium places them high on the list. Sodium (most often as salt) is typically added during processing to the remaining items. The list in Table 4 does not include table salt (or salt added to recipes) as a separate item, as it would have been the first item on the list; the remainder of the first quartile would have consisted of only the first three items currently in the list.

Table 4. First quartile nutrients for sodium, WWEIA/NHANES 2011–12

Tortillas, flour
Rolls, hamburger or hot dog
Cheese product, pasteurized process, American
Sauce, salsa
Ham, sliced, packaged (96% fat free, water added)
Cheese, cheddar
Turkey breast, sliced, prepackaged
Bread, white
Sauce, pasta, spaghetti/marinara
Water, tap, drinking
Soup, chicken
Pizza, fast-food chain, cheese topping, regular crust
Milk, 2% milk fat
Pizza, fast-food chain, pepperoni topping, regular crust
Catsup
Egg, whole, raw, fresh
Pork, cured, bacon, pre-sliced, cooked, pan fried

Many foods are consumed as “mixed dishes” away from home, as take-out meals, or as frozen dishes that only need to be heated before being eaten. Until recently, NDL disaggregated these foods into their component parts in the Key Foods list.

For these reasons, NDL decided to identify the nutrients in multi-component foods rather than in their component parts. NDL identified a subset of the foods identified as mixed dishes and reported in the WWEIA/NHANES 2011–12 to develop a Key Foods list for mixed dishes. NDL multiplied the grams consumed for each food in this list by the percent contribution of nutrients in the list (Table 1) used for single-ingredient Key Foods. NDL then calculated the percent intake for each nutrient in each mixed dish and summed the values for all nutrients. The next step was to calculate the total percentage of each nutrient in each mixed dish and divide the mixed dishes based on these results into quartiles.

The foods in the first quartile for mixed dishes are presented in Table 5. Pepperoni pizza from a restaurant is the top item on the list, which includes four other types of pizza. Other Italian foods (spaghetti and lasagna) and several Mexican or Tex-Mex foods (chili con carne, soft tacos, quesadillas, and burritos) are also in the first quartile. NDL develops the nutrient profiles for these Mexican food items using lists of ingredients, which often include tortillas.

The frequent inclusion of tortillas in Mexican and Tex-Mex mixed dishes accounts, in part, for the higher ranking of tortillas, shown in Table 3, in 2011–12 (9th place) than in 2009 (22nd place). Similarly, tortillas are the top contributor in the sodium list (Table 4). As NDL continues to analyze mixed foods under NFNAP and add them to SR, and as they are adopted for use in the FNDDS by FSRG, the ranking of components, such as tortillas, will drop in the Key Foods list. For this reason, treating mixed dishes as mixed dishes, rather than as their disaggregated components, is important.

Table 5. First quartile Key Foods for mixed dishes, WWEIA/NHANES 2011–12

Pizza with pepperoni, from restaurant or fast food, regular crust
Chili con carne with beans
Spaghetti with tomato sauce and meatballs/meat sauce
Soft taco with meat
Macaroni or noodles with cheese
Egg omelet or scrambled egg, made with oil
Pizza, cheese, from restaurant or fast food, regular crust
Double cheeseburger (2 patties), with tomato and/or catsup, on bun
Quesadilla, cheese, meatless
Pizza with meat, prepared from frozen, thin crust
Macaroni or noodles with cheese, made from packaged mix
Lasagna with meat
Spaghetti with tomato sauce, meatless
Burrito with beans, meatless
Pizza with meat and vegetables, regular crust
Pizza with pepperoni, from restaurant or fast food, thin crust

4. Conclusion

The Key Foods list is a critical component of the NFNAP, providing one of the principal elements that allow NDL to prioritize foods and nutrients for analysis based on what American consume. As a result, the limited funds available can be directed to the analysis of the most highly consumed foods and those nutrients of public health concern for the U.S. diet. Thus, use of the Key Foods approach keeps SR up to date and ensures that this database reflects the composition of the U.S. food supply. When funds are available, foods not on the list such as fresh fruits and vegetables can be selected for analysis. The complete Key Foods list is available on NDL's web site: www.ars.usda.gov/nutrientdata.

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