U.S. FOOD & DRUG ADMINISTRATION

TOTAL DIET STUDY REPORT



Fiscal Years 2018-2020 Radionuclides Data

July 2023

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Executive Summary

The Total Diet Study (TDS) is a continuous survey and one of the tools the United States (US) Food and Drug Administration (FDA) uses to monitor the food supply. For the TDS, FDA collects foods from retail outlets and measures concentrations of potential nutrients and contaminants in the food, including radionuclides. The TDS was first conducted in 1961 and has been improved and expanded over the years. In 2013, the FDA began modernizing the TDS and in fiscal year 2018, a modernized study design was implemented. Key updates to the modernized TDS include increased surveillance, streamlined analytical methods, a population-based sampling plan, an updated food list, and a system for relating TDS data to data from What We Eat in America (WWEIA), the food consumption portion of the National Health and Nutrition Examination Survey (NHANES) (CDC, 2015). This report summarizes the analytical results for radionuclides in TDS foods collected in the US during fiscal years (FY) 2018 through 2020.

During FY2018-2020, FDA collected 3276 samples (including foods, beverages, and water) 40% of which were quantitatively analyzed for the three radionuclides strontium-90, cesium-137, and potassium-40 (^{90}Sr, ^{137}Cs, and ^{40}K). Results indicate ^{90}Sr and ^{137}Cs are at very low levels and within historical levels found (FDA, 2022c). All ^{90}Sr and ^{137}Cs levels were well below the Derived Intervention Levels (DILs) established by FDA, which are levels used by FDA to determine whether food contaminated with radionuclides presents a safety concern (FDA, 2020). ^{40}K is a naturally occurring radionuclide with no DIL, and the levels of ^{40}K are within historical and naturally occurring levels (FDA, 2022c; NRC, 1999).

Acknowledgements

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1. Introduction

Food safety is a key public health responsibility of the United States (US) Food and Drug Administration (FDA). The FDA Total Diet Study (TDS) is one of FDA's monitoring and surveillance tools that contribute to a safe food supply and has been conducted continuously since 1961. For the TDS, the FDA collects foods from retail outlets (such as grocery stores, warehouse stores, liquor stores and restaurants) and measures the concentrations of various analytes in the collected foods, including elements, pesticides, and radionuclides.

The focus of this report is the fiscal years 2018-2020 TDS radionuclide analytical results. Radionuclides are forms of elements that emit radiation, each at its own rate (EPA, 2022). Radiation is energy that can be in the form of energy waves or energized particles (EPA, 2023a). Radionuclides in food can come from natural or man-made sources such as naturally occurring radioactive minerals in the soil or nuclear weapons testing (EPA, 2023b).

One of the main impetuses for beginning TDS in 1961 was concern about radionuclides in food due to nuclear weapons testing (Pennington and Gunderson, 1987). Over time, concern about radionuclide contamination of food from other radiological events, such as nuclear reactor accidents, provided further justification to surveil the food supply for radionuclides (FDA, 2022a).

In addition to analyzing foods for radionuclide activity, FDA has established guidance levels, called Derived Intervention Levels (DILs), to determine whether radionuclide activity detected in food presents a safety concern. DILs provide FDA guidance when responding to accidental or intentional radiological events that cause radioactive contamination of food (FDA, 2020). Accidental or intentional radiological emergencies release different radionuclides. For example, nuclear weapons testing may release hundreds of different radionuclides (EPA, 2023c).

TDS conducts quantitative analysis for strontium-90 (^{90}Sr) and gamma-emitting radionuclides, including cesium-137 (^{137}Cs) and potassium-40 (^{40}K). Other gamma-emitters such as ^{131}I, ^{134}Cs, ^{103}Ru, and ^{106}Ru are also analyzed, however, their concentrations in all analyzed TDS samples are below the minimum detectable activity level (MDC) of the method used. This is expected because these gamma-emitters have short half-lives of 2 years or less (EPA, 2023d; CDC, 2011; HHS, 2023); whereas ^{90}Sr and ^{137}Cs have half-lives of 29 and 30 years, respectively (HHS, 2023). To ensure the quality of the TDS radionuclide program, quantification of ^{40}K is used as a positive control. TDS does not conduct analyses on alpha-emitting radionuclides such as ^{238}Pu, ^{239}Pu, and ^{241}Am because the levels of these radionuclides in the environment are very low (EPA, 2023e; EPA 2023f).

Based on historical data, the analysis of ^{90}Sr and ^{137}Cs as well as other gamma-emitters, when quantifiable, is an effective and efficient approach in monitoring the food supply for radioactive contamination (FDA, 2022c). TDS's radionuclide analysis enables the evaluation of existing levels and trends of radionuclides in the nation's food supply. This continuous monitoring also ensures laboratory readiness to effectively respond to radiological food emergencies.

A summary of the levels of radionuclides detected in the fiscal years 2018-2020 reporting cycle is presented in the following pages.

2. Study Design

2.1 Sample Collection

The current study design includes six regions (West, North Central, Mid-Atlantic, Northeast, Southeast, and Southwest). These regions have approximately equal population sizes, and include all 50 US states as potential sampling sites (see Figure 1). This means that Alaska and Hawaii have the potential to be chosen for TDS sampling for the first time in the history of the TDS.

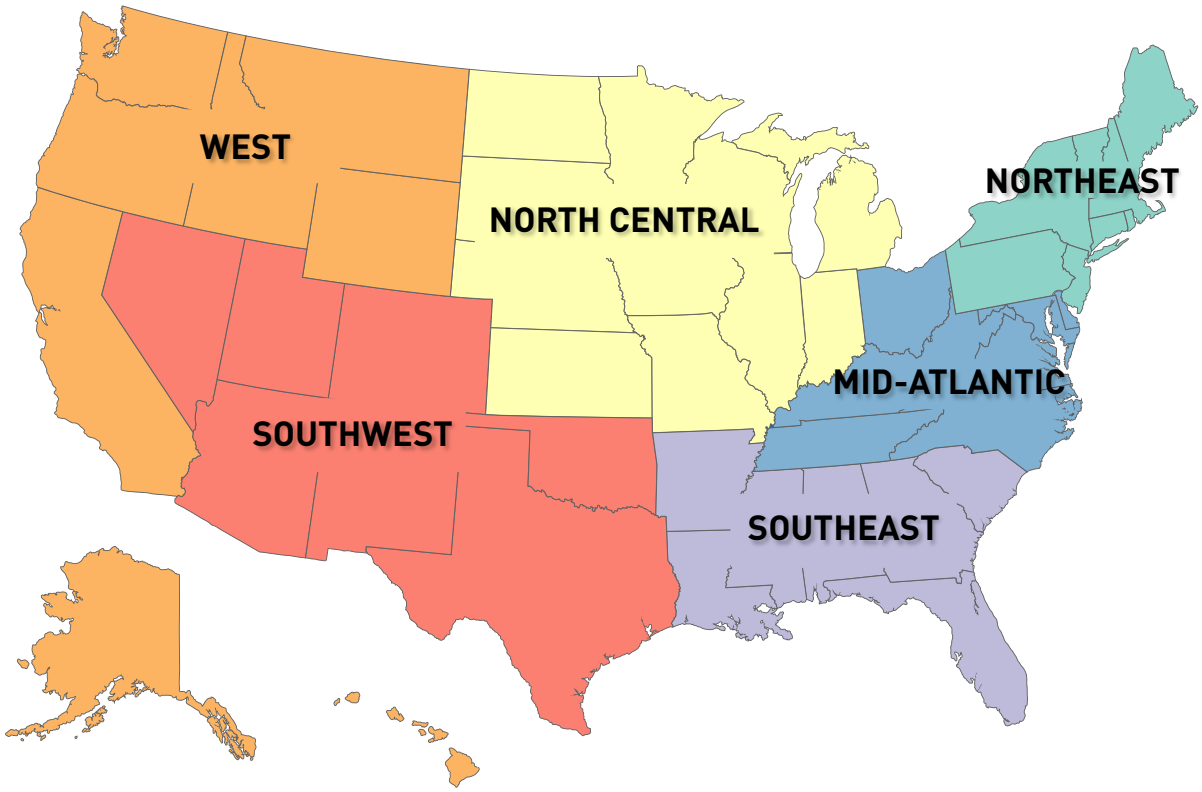

Figure 1: TDS Regions

Additionally, based on the updated sampling plan, the regional foods are collected from each region during each of two TDS seasons. TDS seasons are six months each: the "winter" season applies to October through March collections, and the "summer" season applies to April through September collections. Over time, TDS data will provide information on potential seasonal and/or regional variation and/or trends in analyte concentrations in foods.

In the modernized TDS study design, regional foods are collected each month. Since there are six regions and two seasons, the goal is to collect from each region in the winter and summer seasons each year, as depicted in Figure 2.

Sampling Plan by Fiscal Year

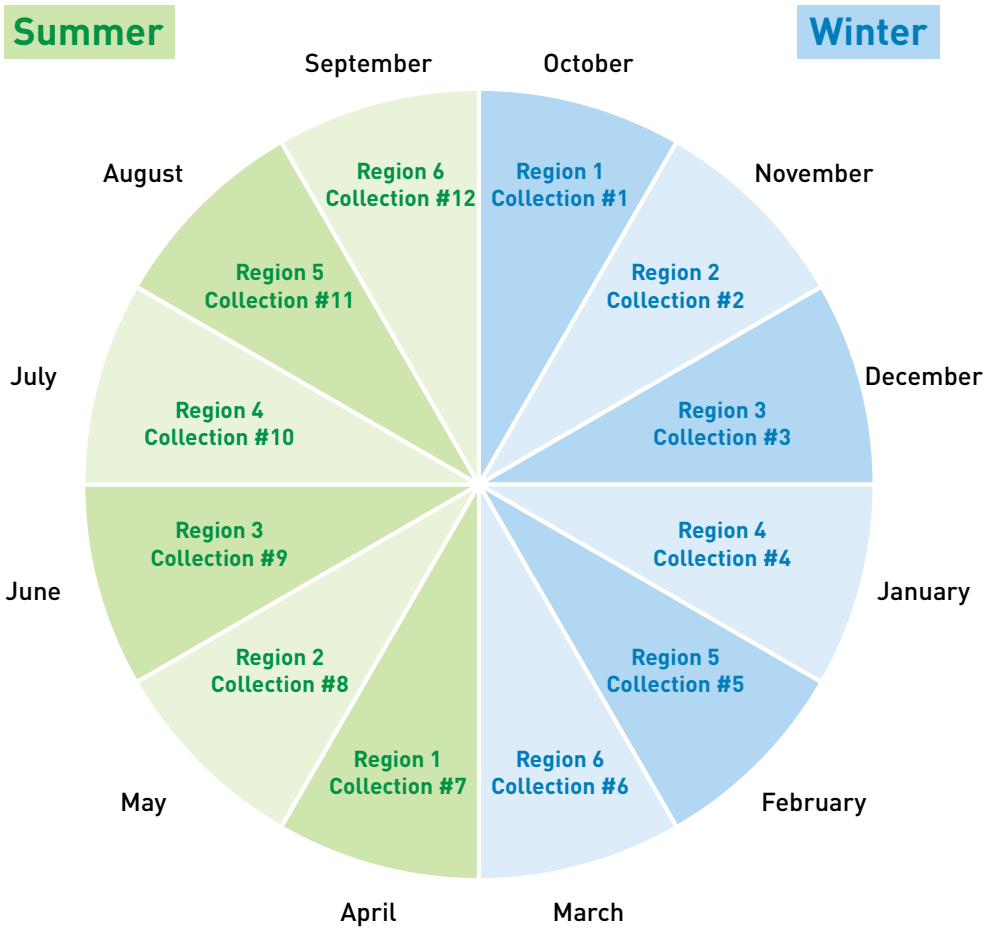

Figure 2: One year of TDS Sampling

For each regional collection, three cities are identified as collection locations in the selected region. The cities are chosen randomly under a plan in which more populated areas are more likely to be chosen as collection locations. Once these cities are chosen, three residential addresses are selected at random within the selected cities. After that, retail outlets (*i.e.*, grocery stores, warehouse stores, and restaurants) are identified that represent the most likely food shopping options near the selected residential addresses. The list of retail outlets is prioritized for FDA collectors so they can purchase the food samples efficiently. The TDS collects the same list of foods from each of the three selected cities within each region and ships the TDS collections to the Kansas City Laboratory.

A typical reporting cycle would include two years of sampling. However, for the fiscal years 2018-2020 TDS reporting cycle, the federal government furlough in December 2018/January 2019 and the COVID-19 pandemic in 2020 prevented collections eight times, which led to the reporting cycle including more than two years. Additional challenges were weather events, which led to some regions being sampled twice in a season, and others not being sampled during a season.

FDA analyzes TDS foods for radionuclides every other regional collection. Table 1 provides an overview of the regional collections for the fiscal years 2018-2020 TDS reporting cycle (also referred to as the FY2018-FY2020 TDS reporting cycle in this report) that were analyzed for radionuclides. For a more detailed table that includes collection locations, see Appendix, Table A 2.

Table 1: Fiscal Years 2018-2020 TDS Collection Overview Analyzed for Radionuclides

Collection	Month	Season	TDS Region, FY2018	TDS Region, FY2019	TDS Region, FY2020
2	November	Winter	North Central	Southeast	Southwest
4	January	Winter	Southwest	N/A	West
6	March	Winter	Northeast	Mid-Atlantic	Southeast
8	May	Summer	Northeast	North Central	N/A
10	July	Summer	Mid-Atlantic	Northeast	N/A
12	September	Summer	North Central	Southwest	N/A

N/A – Not Applicable. The US federal government shutdown December 22, 2018 to January 25, 2019; during this time, many federal workers were furloughed; this period of furlough prevented the January and February 2019 collections. The COVID-19 pandemic limited FDA sampling to mission critical samples only; this prevented the April through September 2020 collections.

TDS is a collaborative effort among FDA offices in the Washington, DC area and FDA regional and district offices and laboratories across the US. FDA's Center for Food Safety and Applied Nutrition (CFSAN) in College Park, MD provides overall management of the TDS and summarizes the analytical results. The FDA Kansas City Laboratory (KCL) in Lenexa, KS prepares and ships TDS samples to the FDA Winchester Engineering and Analytical Center (WEAC) in Winchester, MA for radionuclide analysis. The TDS relies on the FDA Office of Regulatory Affairs (ORA), which oversees district offices and field laboratories across the US, for providing the personnel to collect TDS samples from local retail outlets and shipping them to KCL.

2.2 Foods

Two unique aspects of the TDS are that many of the foods are prepared as they would be consumed (table-ready) prior to analysis, and in the modernized TDS, food ingredients are also collected and analyzed. Across the FY2018-FY2020 TDS reporting cycle, there were 99 foods sampled and analyzed for radionuclides. As discussed above, every other regional collection is analyzed for radionuclides (a total of 6 collections per year) and as depicted in Figure 2, each region is collected twice per year, so over time, TDS samples analyzed for radionuclides will be from each region in both seasons. Regional collections are the focus of radionuclide analysis, as the regional food list includes foods likely to have analyte concentrations that vary by location or by time of year, and radionuclide levels may vary by location. Table 2 groups foods analyzed for radionuclides into categories to provide an overview of the breadth of foods collected and analyzed for radionuclides (for a list of all foods analyzed for radionuclides, see Appendix, Table A 1).

Table 2: Types and Examples of TDS Foods Analyzed for Radionuclides

Food Type	Number of Foods	Examples
Baby Food (BF)	4	BF peaches, BF carrots
Bakery	4	Blueberry muffin, Cinnamon rolls
Condiments/Sauces	1	Barbecue sauce
Dairy	13	Whole milk, Skim milk, Swiss cheese
Fruit	13	Apples, Bananas, Cantaloupe, Mango
Grains	9	Rice, Corn tortillas, Bagels
Meat	13	Ground beef, Turkey breast, Bacon
Nuts/Seeds	1	Walnuts
Restaurant-food	7	Chicken nuggets, French fries, Vanilla milk shake, Pizza
Seafood	5	Salmon, Tilapia, Shrimp
Vegetable	28	Cauliflower, Garlic, Tomatoes
Water	1	Bottled water

2.3 Sample Preparation

After food samples are received at the Kansas City Laboratory, they are unpackaged and inspected. Many foods are prepared and cooked in the same ways consumers prepare their food. For example, bananas are peeled, meats are cooked, and eggs are hard-boiled and then peeled. For foods prepared with water, such as rice, deionized water[6] is used (see Appendix, Table A 1 for more information about how each food is prepared). Following any necessary cooking steps, foods are then prepared for analysis by homogenizing the food. Homogenization methods vary depending on the food. For example, baby foods are mixed in a bowl with a spoon, whereas cheese and meat are blended in an industrial food processor (knife mill). For regional foods, equal portions from each collection city are combined to form the composite sample. Figure 3 below depicts how samples are collected and prepared.

6. The water used to prepare samples is purified using the Milli-Q® 7000 water purification system.

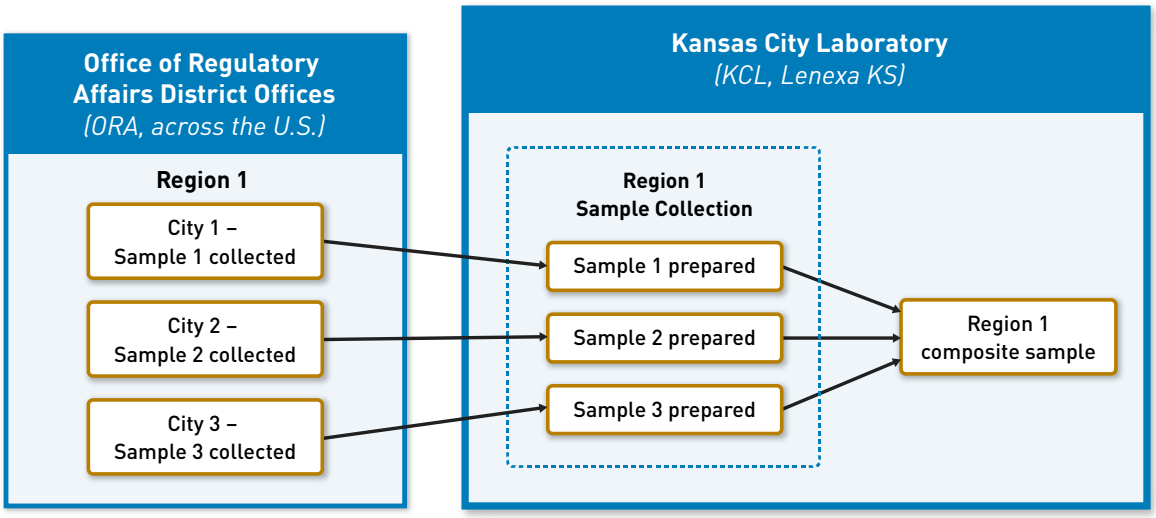

Figure 3: TDS Sample Collection and Preparation

3. Analytical Methods

After foods are prepared and combined into composite samples, they are sent to the Winchester Engineering and Analytical Center (WEAC) in Winchester, MA for radionuclide analysis.

WEAC analyzes samples for gamma-emitting radionuclides and for ^{90}Sr, a beta-emitting radionuclide (EPA, 2023a), using the methods described in WEAC-RN-Method 3.0 "Determination of Gamma-Ray Emitting Radionuclides by High-Purity Germanium Spectrometry" and WEAC-RN-Method 2.0 "Determination of Strontium-90 in Foods by Internal Gas-Flow Proportional Counting," respectively (FDA, 2016a and FDA, 2016b). TDS focuses on quantifying the gamma-emitting radionuclides such as ^{40}K and ^{137}Cs, however if other gamma-emtting radionuclides were detected, they would be quantified and reported. ^{40}K is a naturally occurring radionuclide, whereas ^{90}Sr and ^{137}Cs are man-made radionuclides (NRC, 1999; EPA, 2022).

4. Analytical Results

For the FY2018-FY2020 reporting cycle, 99 foods (including foods, beverages, and water) were sampled up to 14 times each, resulting in a total of 1302 composite food samples sent to WEAC for analysis. These 1302 samples were quantitatively analyzed for ^{40}K, ^{137}Cs and ^{90}Sr, resulting in 3896 analytical results[7]. The results above the limit of quantification (LOQ) are categorized as "detected," the results below the minimum detectable activity concentration (MDC) are categorized as "not detected," and results between the LOQ and MDC are categorized as "trace" (*i.e.*, present, but not at a level that can be quantified with confidence). There were 10 samples not analyzed for ^{90}Sr due to a laboratory accident, which are excluded in the reporting summaries or graphs.

7. 10 samples were not analyzed for ^{90}Sr due to a laboratory accident; no reserve sample was available to complete the analysis.

For ^{40}K, 21.5% of the analytical results were detected (280 samples), 60.7% had trace levels (790 samples), and 17.8% were not detected (232 samples). ^{137}Cs was not detected in any of the samples. ^{90}Sr was not detected in 95.2% of the samples. ^{90}Sr was detected in 1 sample (0.1%), and 4.7% of the samples had trace levels (61 samples). Figure 4 below depicts these analytical results.

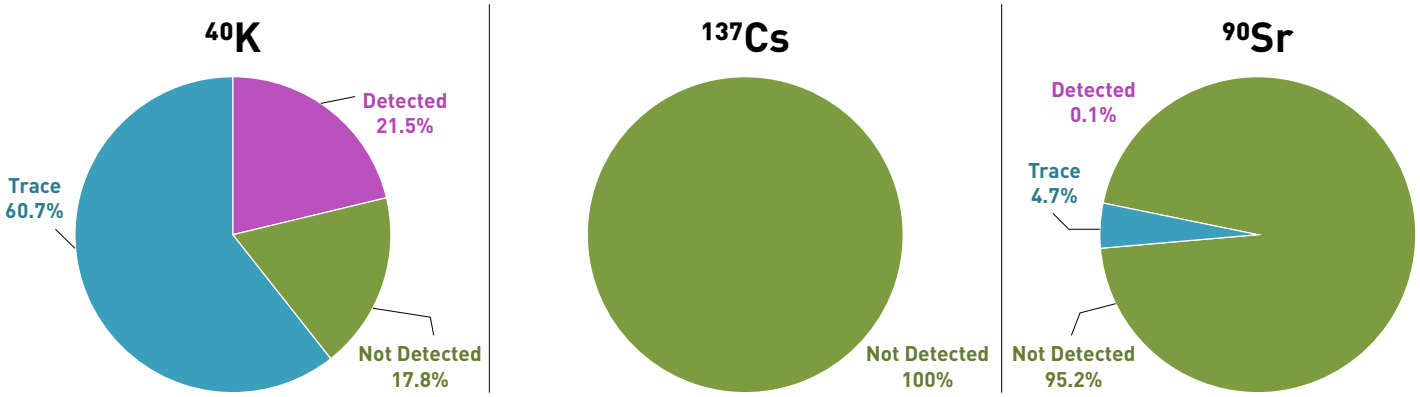

Figure 4: Summary of FY2018-FY2020 TDS Radionuclide Analytical Results

Quantified analytical results measure the concentration or level of radionuclide activity in a food sample, and the unit of radioactivity is the becquerel. As discussed above, radionuclides are forms of elements that emit radiation, and when a radionuclide emits radiation, that radionuclide is disintegrating (also called radioactive decay). One becquerel (Bq) is equal to one disintegration per second (NRC, 2021). An example of a radionuclide activity concentration is 1 becquerel (Bq) of radionuclide activity in 1 kilogram (kg) of a sample, or 1 Bq/kg.

4.1 Potassium-40 (^{40}K)

The majority of detected and trace radionuclide analytical results are for ^{40}K, a naturally occurring radionuclide found in food, soil, and water (EPA, 2023b). ^{40}K is considered a positive control for the WEAC method that detects gamma-emitting radionuclides (FDA, 2016a). As ^{40}K is present in the element potassium (K) at about 0.01% (NRC, 1999), ^{40}K concentrations in food correlate with the amount of K in the food. This is demonstrated in Figure 5 below where ^{40}K levels found in the FY2018-2020 radionuclide analytical results are plotted against the K concentrations found in the FY2018-2020 element analytical results[8].

8. The K analytical results in TDS samples are available on the TDS website (FDA, 2022b).

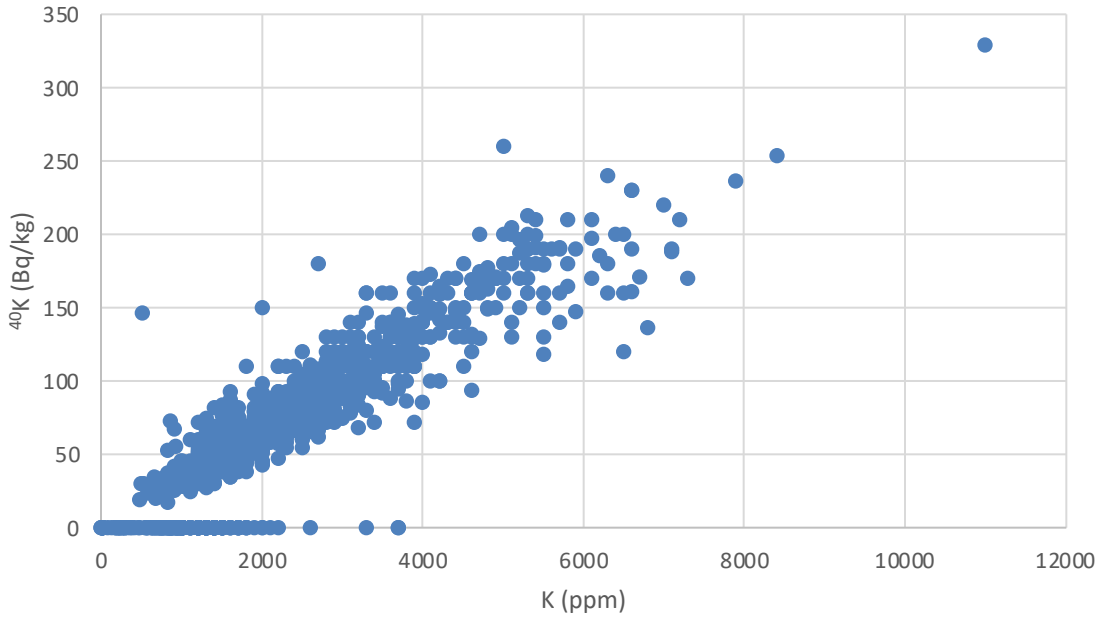

Figure 5: Potassium-40 (^{40}K) versus Potassium (K) in TDS foods

The levels of ^{40}K found in the FY2018-2020 radionuclide analytical results are found to align with past TDS ^{40}K analytical results (FDA, 2022c).

4.2 Cesium-137 (^{137}Cs)

^{137}Cs was not detected in any of the 1302 TDS food samples, which aligns with past TDS analytical results for ^{137}Cs. Over the past three decades, ^{137}Cs was only detected in four samples at low levels (1995, honey; 2007, squash baby food; 2009 raisin bran cereal; 2014 creamy low calorie salad dressing) (Capar and Cunningham, 2000; FDA, 2022c).

4.3 Strontium-90 (^{90}Sr)

^{90}Sr was detected above the LOQ in one of the 1292 TDS food samples analyzed (FY2018, tomato 0.58 Bq/kg), and trace amounts of ^{90}Sr were detected in 61 of the samples (ranging from 0.11 to 0.41 Bq/kg). The one detected level of ^{90}Sr is 276 times lower than the DIL for ^{90}Sr, and therefore, the ^{90}Sr analytical results are not a safety concern (FDA, 2020).

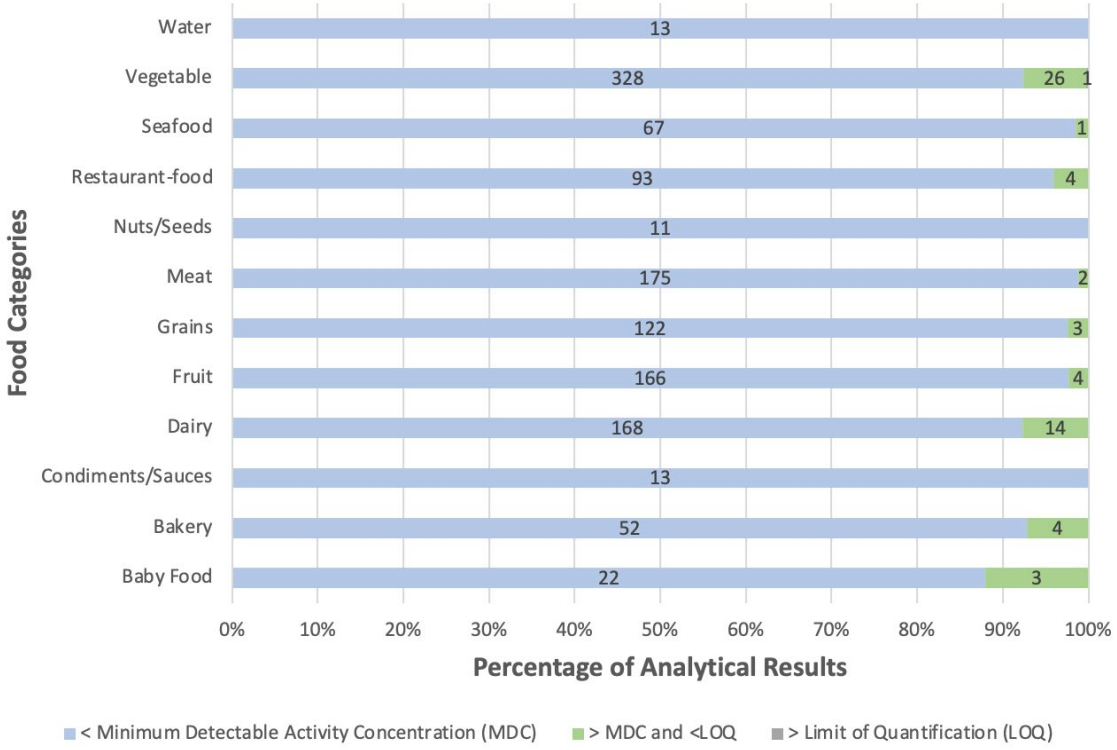

Figure 6: Number and Percentages of FY2018-2020 ^{90}Sr Analytical Results below MDC, between MDC and LOQ, and above LOQ in TDS Food Types categories

^{90}Sr may be detected more frequently than ^{137}Cs because the method used for analyzing ^{90}Sr is more sensitive (by about an order of magnitude) than the method used for analyzing ^{137}Cs (FDA 2022c, FDA, 2016b and FDA, 2016a). Table 3 below summarizes the MDC and LOQ mean, minimum, and maximum values for the FY2018-2020 ^{90}Sr and ^{137}Cs analytical results.

Table 3: Summary of ^{90}Sr and ^{137}Cs MDCs and LOQs

Analyte	MDC Mean (Min, Max) (Bq/kg)	LOQ Mean (Min, Max) (Bq/kg)
^{90}Sr	0.11 (0.09, 0.31)	0.55 (0.43, 1.5)
^{137}Cs	1.9 (0.96, 4.7)	7.4 (3.9, 19)

5. Conclusion

The analytical results of the FY2018-FY2020 reporting cycle showcase the value of the modernized TDS as a source of surveillance information on radionuclide levels in foods consumed by the US population. The results from FY2018-FY2020 did not identify radionuclide concentrations outside of historical levels for foods collected previously, nor any concentrations above a DIL.

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Appendix

Appendix – Table A 1: TDS Foods, Collection Amounts, and Preparation Information

TDS Food Description[a]	TDS List	Amount Collected	Prepare/ Wash	Prepare / Peel	Cook/ Fry	Cook/ Bake	Cook/ Boil	Cook/ Micro-wave	Toast	Notes
Apple, red, with peel, raw	Regional	5443 g	X							
Asparagus, fresh/frozen, boiled	Regional	4762 g	X				X			
Avocado, raw	Regional	5443 g	X	X						
Bagel, plain, toasted	Regional	2721 g							X	
Banana, raw	Regional	5443 g		X						
Beef steak, loin/sirloin, oven-roasted	Regional	4082 g				X				
Beef, ground, pan-cooked	Regional	4082 g			X					
BF, carrots	National	2721 g								
BF, cereal, rice, dry	National	2041 g								
BF, cereal, rice, dry, prepared with water	Regional	6123 g								Prepare with water.
BF, peaches	National	1814 g								
Biscuits, fast-food	Regional	60 biscuits								
Blueberries, raw	Regional	2664 g	X							
Bread, white roll/bun (hamburger/hotdog)	Regional	2721 g								
Bread, white, enriched, pre-sliced	Regional	2721 g								
Bread, whole wheat, pre-sliced	Regional	3401 g								
Broccoli, fresh/frozen, boiled	Regional	5443 g	X				X			
Brussels sprouts, fresh/frozen, boiled	Regional	4082 g	X				X			
Cabbage, raw	Regional	4082 g	X							
Cake, chocolate with chocolate icing	Regional	4082 g								
Cake, white with white icing	Regional	4082 g								
Cantaloupe, raw/frozen	Regional	5443 g	X	X						Remove rind.
Carrot, baby, raw	Regional	2721 g	X							
Catfish, pan-cooked with oil	Regional	4082 g			X					
Cauliflower, fresh/frozen, boiled	Regional	4082 g	X				X			
Celery, raw	Regional	2721 g	X							
Cheese, cheddar (sharp/mild)	Regional	4082 g								
Cheese, Monterey jack	Regional	4082 g								
Cheese, mozzarella	Regional	4082 g								
Cheese, Swiss	Regional	4082 g								

[a] Bolded TDS Food Descriptions are core TDS foods (sampled all three years of the FY2018-FY2020 reporting cycle)

TDS Food Description[a]	TDS List	Amount Collected	Prepare/ Wash	Prepare / Peel	Cook/ Fry	Cook/ Bake	Cook/ Boil	Cook/ Micro-wave	Toast	Notes
Chicken breast, fried with skin, fast-food	Regional	4082 g								
Chicken breast, oven-roasted, skin removed	Regional	5443 g				X				
Chicken leg, fried with skin, fast-food	Regional	4082 g								
Chicken nuggets, fast-food	Regional	2721 g								
Chicken thigh, oven-roasted, skin removed	Regional	4082 g				X				
Cinnamon roll, iced	Regional	3401 g								
Cod, baked	Regional	4082 g				X				
Collards, fresh/frozen, boiled	Regional	4762 g	X				X			
Corn, frozen, boiled	Regional	4082 g					X			
Cream, half and half	Regional	5678 mL								
Cucumber, peeled, raw	Regional	5443 g	X	X						
Eggplant, baked with peel	Regional	6803 g	X			X				
Eggplant, fresh, peeled, boiled	Regional	20411 g	X	X			X			
Eggs, hard-boiled	Regional	12 dozen eggs		X			X			Peel after cooking.
English muffin, plain, toasted	Regional	2721 g							X	
Frankfurter, (all beef/beef and pork), boiled	National	2494 g					X			
Garlic, raw	Regional	2721 g		X						
Grapefruit, raw	Regional	4082 g	X	X						
Grapes, seedless, red/green, raw	Regional	4082 g	X							
Green beans, fresh/frozen, boiled	Regional	5443 g	X				X			
Ham, cured (not canned), baked	Regional	4082 g				X				
Ice cream, chocolate	Regional	5678 mL								
Ice cream, vanilla	Regional	11356 mL								
Kale, fresh, pan-cooked	Regional	4082 g	X		X					
Lamb chop, pan-cooked with oil	Regional	8164 g			X					
Lettuce, iceberg, raw	Regional	5443 g	X	X						Remove outer leaves.
Lettuce, leaf, raw	Regional	4082 g	X							Remove outer leaves.
Mango, raw/frozen	Regional	6803 g	X	X						
Milk shake, vanilla, fast-food	Regional	11711 mL								
Milk, chocolate, reduced fat, fluid	Regional	5678 mL								
Milk, reduced fat, fluid	Regional	5678 mL								
Milk, skim, fluid	Regional	5678 mL								

[a] Bolded TDS Food Descriptions are core TDS foods (sampled all three years of the FY2018-FY2020 reporting cycle)

TDS Food Description[a]	TDS List	Amount Collected	Prepare/ Wash	Prepare / Peel	Cook/ Fry	Cook/ Bake	Cook/ Boil	Cook/ Micro-wave	Toast	Notes
Milk, whole, fluid	Regional	5678 mL								
Muffin, blueberry	Regional	4762 g								
Mushrooms, raw	Regional	3401 g	X							
Onion, mature, raw	Regional	2721 g		X						Remove outer skin.
Orange, raw	Regional	5443 g	X	X						
Peach, raw/frozen	Regional	4082 g	X							
Pear, with peel, raw	Regional	5443 g	X							
Pepper, bell, green, raw	Regional	5443 g	X							
Pineapple, raw/frozen	Regional	4082 g	X	X						Peel if raw.
Pizza, cheese, fast-food	Regional	6 medium pizzas								
Pork bacon, oven-cooked	Regional	6803 g				X				
Pork chop, pan-cooked with oil	Regional	5443 g			X					
Pork sausage (link/patty), pan-cooked	Regional	5443 g			X					
Potato, peeled, boiled	Regional	6803 g	X	X			X			
Potato, with peel, baked	Regional	6803 g	X			X				
Potatoes, French fries, fast-food	Regional	4082 g								
Rice, brown, cooked	Regional	1360 g					X			
Rice, white, enriched, cooked	Regional	1360 g					X			
Salami, dry/hard	Regional	2721 g								
Salmon, steaks/fillets, baked	Regional	4082 g				X				
Sauce, barbecue	Regional	4082 g								
Shrimp, pre-cooked, shells removed, no tails	Regional	2721 g								
Spinach, raw	Regional	4082 g								
Squash, winter, fresh/frozen, boiled	Regional	6123 g	X	X		X				Peel after baking.
Strawberry, raw/frozen	Regional	5443 g	X							
Sweet potato, baked, peel removed	Regional	4082 g	X	X						Peel after baking.
Tilapia, baked	Regional	4082 g				X				
Tomato, raw	Regional	4082 g	X							
Tortilla, corn	Regional	150 tortillas								
Tortilla, flour	Regional	4082 g								
Turkey breast, oven-roasted	Regional	5443 g				X				
Turkey, ground, pan-cooked	Regional	2721 g			X					

[a] Bolded TDS Food Descriptions are core TDS foods (sampled all three years of the FY2018-FY2020 reporting cycle)

TDS Food Description[a]	TDS List	Amount Collected	Prepare/ Wash	Prepare / Peel	Cook/ Fry	Cook/ Bake	Cook/ Boil	Cook/ Micro-wave	Toast	Notes
Walnuts, shelled	National	2721 g								
Water, bottled, mineral/spring	Regional	6387 mL								
Watermelon, raw/frozen	Regional	6803 g	X	X						Remove rind.
Yogurt, frozen, vanilla	Regional	11356 mL								
Zucchini, fresh/frozen, boiled	Regional	4762 g	X				X			

[a] Bolded TDS Food Descriptions are core TDS foods (sampled all three years of the FY2018-FY2020 reporting cycle)

Appendix – Table A 2: Fiscal Years 2018-2020 FDA TDS Collection Sites

Fiscal Year	Collection	Month	Season	TDS Region	City 1	City 2	City 3
2018	2	November	Winter	North Central	Clio, MI	Holland, MI	South Bend, IN
2018	4	January	Winter	Southwest	Dallas, TX	Denver, CO	Coolidge, TX
2018	6	March	Winter	Northeast	Allentown, PA	Syracuse, NY	Philadelphia, PA
2018	8	May	Summer	Northeast	Buffalo, NY	Billerica, MA	Jackson, NJ
2018	10	July	Summer	Mid-Atlantic	Stow, OH	High Point, NC	Richmond, VA
2018	12	September	Summer	North Central	Milwaukee, WI	Savage, MN	Detroit, MI
2019	2	Nov	Winter	Southeast	Baton Rouge, LA	Albertville, AL	Conyers, GA
2019	4	Jan	Winter	Furlough	Furlough	Furlough	Furlough
2019	6	Mar	Winter	Mid-Atlantic	Glouster, OH	Kannapolis, NC	Greeneville, TN
2019	8	May	Summer	North Central	Chicago, IL	Indianapolis, IN	Wahpeton, ND
2019	10	July	Summer	Northeast	Jamaica, NY	Warren, PA	Saco, ME
2019	12	Sept	Summer	Southwest	Mission, TX	El Mirage, AZ	Austin, TX
2020	2	November	Winter	Southwest	Houston, TX	Cypress, TX	Oklahoma City, OK
2020	4	January	Winter	West	San Francisco, CA	Los Angeles, CA	Topanga, CA
2020	6	March	Winter	Southeast	Ft. McCoy, FL	Huntsville, AL	Doral, FL
2020	8	May	Summer	COVID-19 Pandemic	COVID-19 Pandemic	COVID-19 Pandemic	COVID-19 Pandemic
2020	10	July	Summer	COVID-19 Pandemic	COVID-19 Pandemic	COVID-19 Pandemic	COVID-19 Pandemic
2020	12	September	Summer	COVID-19 Pandemic	COVID-19 Pandemic	COVID-19 Pandemic	COVID-19 Pandemic