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Thrifty Food Plan Cost Estimates for Alaska and Hawaii

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Thrifty Food Plan Cost Estimates for Alaska and Hawaii

Executive Summary

Background

The U.S. Department of Agriculture (USDA) established a new Thrifty Food Plan (TFP) Market Basket and its associated cost in the 48 States and the District of Columbia (hereafter referred to as the "mainland United States") in August 2021.¹ Statute (7 U.S.C. § 2012(u)) requires separate cost adjustments to the Thrifty Food Plan for Alaska and Hawaii to reflect the cost of food in those States, which USDA last calculated in the early 1980s

and has updated semiannually for inflation (i.e., held cost neutral) ever since.² Alongside the 2021 Thrifty Food Plan reevaluation, USDA set interim Thrifty Food Plan costs for Alaska and Hawaii and began a separate process of developing new costs in these two States for the first time in over 35 years. This report describes that process and its results in detail.

Methods

Thrifty Food Plan costs for Alaska and Hawaii are subject to legal definitions, standards, and requirements. The statutory and regulatory language requires that Thrifty Food Plan costs for Alaska and Hawaii be based on the fixed Thrifty Food Plan Market Basket for the reference family of four (i.e., a man and a woman twenty through fifty, a child six through eight, and a child nine through eleven years of age) and be adjusted for the price of food in Alaska and Hawaii; regulation further specifies Anchorage and Honolulu, respectively (7 U.S.C. § 2012(u), 7 CFR 273.10(e)(4)(i)). In the case of Alaska, statute and regulations require further adjustments for urban and rural areas in the State.^{3 4} These further adjustments were not examined in this report.

USDA identified a bilateral, fixed-basket price index as the best approach to calculate new Thrifty Food Plan cost estimates for Alaska and Hawaii. Such an index compares the average cost of purchasing exact amounts of specific products in the Thrifty Food Plan Market Basket for the reference family of four between the mainland United States and Anchorage and Honolulu. This approach holds as many factors as possible constant while capturing only the difference in food prices. The results of the price index can be applied as an adjustment factor to the cost of the Thrifty Food Plan in the mainland United States to yield Thrifty Food Plan cost estimates for Alaska and Hawaii.

USDA first considered four existing price indexes in the literature and evaluated their suitability to adjust the cost of the Thrifty Food Plan for food prices in Anchorage and Honolulu. None of the indexes fully aligned with the statutory and regulatory framework: only two of the options used a fixed-basket approach, and these fixed-baskets did not sufficiently reflect the foods and beverages in the Thrifty Food Plan Market Basket for the reference family of four.

Having ruled out existing indexes, USDA then considered whether an existing food price data source could be used to adjust the cost of the Thrifty Food Plan for food prices in Anchorage and Honolulu. USDA examined four food price data sources and identified the 2017 Information Resources, Inc. (IRI) InfoScan store-based scanner data, a more recent version of the same data used in the 2021

Thrifty Food Plan reevaluation, as the best available option. USDA calculated inflation-adjusted average unit prices for over 11,000 products identified by Universal Product Codes (UPCs) in the IRI InfoScan data from over 40,000 stores in the mainland United States, 20 stores in Anchorage, and 32 stores in Honolulu, representing billions of transactions across the year. The average unit prices of the UPCs were compared across locations to calculate the price indexes. The result of each index was the average ratio of unit prices between Anchorage or Honolulu and the mainland United States weighted to reflect the contribution of each UPC to the Thrifty Food Plan Market Basket for the reference family of four. In addition, USDA conducted 15 sensitivity analyses to assess how its choices and assumptions impacted the results of the analysis.

Results

The results of the IRI-based food price index for Anchorage and Honolulu were 1.3606 and 1.5240, respectively. In other words, June 2022 prices of foods and beverages in the Thrifty Food Plan Market Basket for the reference family of four were, on average, 36.06 percent higher in Anchorage and 52.40 percent higher in Honolulu than in the mainland United States. USDA applied these price-of-food adjustment factors to the June 2022 cost of the Thrifty Food Plan in the mainland United States to yield Thrifty Food Plan cost estimates for

Alaska and Hawaii and compared them to the official June 2022 Thrifty Food Plan costs for Alaska and Hawaii. The IRI-based Thrifty Food Plan cost estimate for Alaska was \$1,278.80, which is 10 percent higher than the official June 2022 Thrifty Food Plan cost. The IRI-based Thrifty Food Plan cost estimate for Hawaii was \$1,432.40, which is 20 percent lower than the official June 2022 Thrifty Food Plan cost. Results were mostly consistent across the sensitivity analyses performed, generally falling within 3 percentage points of the main results.

Discussion

Details in this report represent USDA's commitment to scientific integrity, quality assurance, and transparency. The methods, including 15 sensitivity analyses, support USDA's goals surrounding transparency by enabling readers to understand how its choices and assumptions impacted the Thrifty Food Plan cost estimates for Alaska and Hawaii. Quality assurance procedures included collaboration with Federal subject matter experts and external peer review.

The IRI-based price index reflects the best currently available measure of the difference in the price of foods and beverages in the Thrifty Food

Plan Market Basket for the reference family of four between the mainland United States, Anchorage, and Honolulu. However, there are three key considerations and limitations: (1) the nonrandom sample of primarily larger stores in the IRI InfoScan data acquired by USDA; (2) USDA's use of UPCs as the unit of analysis, which may draw distinctions between products that have no meaningful differences in product attributes; and (3) the statutory and regulatory framework, which precluded USDA from incorporating geographic differences in consumption patterns and food environments as well as consumers' substitution behaviors in response to differences in price levels.

Conclusion

USDA calculated new Thrifty Food Plan cost estimates for Alaska and Hawaii using a bilateral, fixed-basket price index and food prices from 2017 IRI InfoScan data in the mainland United States, Anchorage, and Honolulu. The price index indicated that the June 2022 cost of the Thrifty Food Plan was 36.06 percent higher in Anchorage and 52.40 percent higher in Honolulu than in the mainland United States.

USDA applied these price-of-food adjustment factors to the June 2022 cost of the Thrifty Food Plan in the mainland United States to yield Thrifty Food Plan cost estimates for Alaska and Hawaii and compared them to the official June 2022 Thrifty Food Plan costs in these States. The IRI-based Thrifty Food Plan cost estimate for Alaska was 10 percent higher than the official June 2022 Thrifty Food Plan cost. The IRI-based Thrifty Food Plan cost estimate for Hawaii was 20 percent lower than the official June 2022 Thrifty Food Plan cost.



Thrifty Food Plan Cost Estimates for Alaska and Hawaii

Introduction

The Thrifty Food Plan (TFP) represents a nutritious, practical, and cost-effective diet. The foundation of the Thrifty Food Plan is a set of Market Baskets applicable to various age-sex groups that outline nutrient-dense foods and beverages, their amounts, and associated costs that can be purchased on a limited budget to support a healthy diet through nutritious meals and snacks at home. Reevaluating the Thrifty Food Plan is a critical element in supporting the U.S. Department of Agriculture's (USDA) commitment to improve food security and nutrition security, so that all Americans have consistent and equitable access to safe, healthy, affordable foods essential to optimal health and well-being.⁵

The cost of the Thrifty Food Plan is based on a reference family of four, defined by Federal statute (7 U.S.C. § 2012(u)) as consisting of a man and a woman twenty through fifty, a child six through eight, and a child nine through eleven years of age. Federal statute (7 U.S.C. § 2012(u)(4)) also specifies that the cost of the Thrifty Food Plan in June serves as the basis for setting maximum Supplemental Nutrition Assistance Program (SNAP) benefit allotments in the following Federal fiscal year beginning each October 1. SNAP allotments for households of different sizes are calculated proportional to the allotments for the reference family of four with economies-of-scale adjustments.

As directed by Congress in the Agricultural Improvement Act of 2018,⁶ USDA conducted an evidence-driven reevaluation of the Thrifty Food Plan to reflect current food prices, food composition data, consumption patterns, and dietary guidance.¹ The reevaluation, published in August 2021, defined the content of the Thrifty Food Plan Market Baskets for 15 age-sex groups, as well as their costs in the contiguous 48 States and the District of Columbia (hereafter referred to as the "mainland United States"). The Thrifty Food Plan, 2021 reevaluation satisfied the statutory requirement to reevaluate and publish the Market Baskets of the Thrifty Food Plan by 2022 (7 U.S.C. § 2012(u)).

Core to the Thrifty Food Plan, 2021 was an optimization model that selects quantities of foods and beverages in categories that, together, represent a nutritious, practical, cost-effective diet prepared at home.¹ The reevaluation used the same optimization model applied for previous editions of the Thrifty Food Plan, with updates to the model's data sources, inputs, and constraints. The model inputs included foods and beverages weighted to reflect current consumption patterns and linked to current food prices and corresponding food group and nutrient composition data. The model was constrained such that its solutions would yield practical and cost-effective Market Baskets for each age-sex group that meet calorie needs and align with the Dietary Guidelines for Americans, 2020–2025, and current nutrient recommendations defined by the Dietary Reference Intakes.

The model's output is a set of Market Baskets for each age-sex group comprised of commonly consumed foods and beverages in the amounts—and associated costs—that can be purchased in nutrient-dense forms and conform to the model's constraints.¹ Upon completion of the Thrifty Food Plan reevaluation, the total cost of the Thrifty Food Plan, 2021 Market Basket for the reference family of four in the mainland United States in June 2021 was 21.03 percent higher than it would have been had the previous Thrifty Food Plan (i.e., the Thrifty Food Plan, 2006 inflated to June 2021 price levels) been kept in place.⁷

Statute (7 U.S.C. § 2012(u)(2)) also calls for cost adjustments to the Thrifty Food Plan to reflect the cost of food in Hawaii and urban and rural Alaska. Beginning in the early 1970s, Thrifty Food Plan costs for Hawaii and Alaska were calculated as the cost of the Thrifty Food Plan in the mainland United States adjusted for the price of food in Honolulu and Anchorage, respectively.⁸⁻¹⁰ Honolulu and Anchorage were used as the basis for the original price-of-food adjustments because they were the only locations in Hawaii and Alaska where the Bureau of Labor Statistics (BLS) routinely collected food price information.¹¹ USDA subsequently used BLS food price information collected for the Consumer Price Index (CPI) as the basis for the Thrifty Food Plans in Alaska and Hawaii through 1977.

In 1978, BLS made major changes in the methods for collecting food price data in the United States, thereby hindering the construction of price-of-food adjustments in Anchorage and Honolulu

using BLS data.¹² With the need for an alternate data source, USDA incorporated data collected in Alaska and Hawaii from the 1977–1978 Nationwide Food Consumption Survey (NFCS) into a reevaluation of the Thrifty Food Plan in the early 1980s. Since then, the Hawaii and Alaska Thrifty Food Plan costs have been updated for inflation using the semiannual CPIs for Urban Hawaii and Urban Alaska, and the cost of the Thrifty Food Plan in Alaska has undergone several revisions to incorporate different cost levels by urbanicity.^{13 14}

In June 2021, USDA used the 21.03-percent increase in the inflation-adjusted cost of the Thrifty Food Plan in the mainland United States as the basis for a temporary adjustment to the Thrifty Food Plan costs for Alaska and Hawaii.² These costs were subsequently adjusted for inflation to reflect June 2022 price levels. In June 2022, the Thrifty Food Plan costs using the temporary adjustment in Alaska and Hawaii were 23.7 percent and 90.1 percent higher, respectively, than in the mainland United States.¹⁵

Despite the inflation and temporary adjustments, the official Thrifty Food Plan costs in Alaska and Hawaii may not fully reflect current realities. To address this, USDA explored options for deriving Thrifty Food Plan cost estimates for Alaska and Hawaii based on more current information. Because it has been decades since the original price-of-food adjustments were calculated, and in the interest of continuous quality advancements, USDA explored the best approach and data available for developing new Thrifty Food Plan cost estimates for Alaska and Hawaii.

This report describes USDA's process for developing new Thrifty Food Plan cost estimates for Alaska and Hawaii. First, it identifies relevant statutory and regulatory language and the associated implications for an appropriate analytic framework. Then, it summarizes USDA's evaluation of existing price indexes and food price data sources, identifies the most appropriate data source from these options, and describes USDA's approach for using this data source to calculate June 2022 Thrifty Food Plan cost estimates for Alaska and Hawaii. This report next presents the results of the analysis and compares them to (1) the official June 2022 Thrifty Food Plan costs for Alaska and Hawaii, which include the temporary adjustment; (2) the legacy Thrifty Food Plan costs for Alaska and Hawaii, which are the official costs but exclude the

temporary adjustment; and (3) three alternative estimates: Council for Community and Economic Research (C2ER)-based estimates, Map the Meal Gap-based estimates, and estimates based on a peer-reviewed publication from 2020. Finally, it details the results of several sensitivity analyses and discusses considerations and limitations related to the analysis.

The maximum SNAP allotment for the following Federal fiscal year beginning October 1 is determined by the cost of the Thrifty Food Plan in the preceding June (7 U.S.C. § 2012(u)(4)). While this report contains June 2022 Thrifty Food Plan cost estimates for Alaska and Hawaii, they do not replace the existing SNAP maximum allotments for fiscal year 2023.^a



^a Official Thrifty Food Plan costs are available on the Food and Nutrition Service website at: <https://www.fns.usda.gov/cnpp/usda-food-plans-cost-food-reports-monthly-reports>.

Statutory and Regulatory Framework

Thrifty Food Plan costs for Alaska and Hawaii are subject to legal definitions, standards, and requirements. USDA reviewed Federal statutory and regulatory language to define what the Thrifty Food Plan costs for Alaska and Hawaii are intended to represent and how they are intended to be calculated such that any new estimates would be in alignment. The full text of the relevant excerpts of the U.S. Code and Code of Federal Regulations are provided in [Appendix A](#).

Core to defining the Thrifty Food Plan costs for Alaska and Hawaii is 7 U.S.C. § 2012(u)(2), which states that the Secretary shall "make cost adjustments in the thrifty food plan for Hawaii and the urban and rural parts of Alaska to reflect the cost of food in Hawaii and urban and rural Alaska." By specifically calling for cost adjustments, the Thrifty Food Plan Market Baskets for Alaska and Hawaii should not be separate from the Thrifty Food Plan Market Basket for the mainland United States.^b Rather, the Thrifty Food Plan Market Baskets for Alaska and Hawaii should, to the extent possible, be identical to that of the mainland United States and be adjusted only to reflect regional food costs; therefore, USDA interpreted the adjustments for the price of food discussed in 7 CFR 273.10(e)(4) to mean adjustments for the price of foods in the Thrifty Food Plan.

The Thrifty Food Plan is defined in 7 U.S.C. § 2012(u) and 7 CFR 271.2 as "the diet required to feed a family of four persons consisting of a man and a woman twenty through fifty, a child six through eight, and a child nine through eleven years of age." USDA has

discretion as to the level of aggregation at which the Thrifty Food Plan should be defined when adjusting for the price of food. The Thrifty Food Plan, 2021 has previously been presented as quantities and associated costs of 24 Market Basket Categories (e.g., dark-green vegetables, seafood); however, these categories are each made up of specific quantities and associated costs of hundreds of individual foods and beverages, which can be broken down further into quantities and associated costs of thousands of individual products in the marketplace.¹

Additional specificity is provided in 7 CFR 273.10(e)(4), which states that "the TFP for Hawaii shall be the TFP for the 48 States and DC adjusted for the price of food in Honolulu. The TFPs for urban, rural I, and rural II parts of Alaska shall be the TFP for the 48 States and DC adjusted by the price of food in Anchorage and further adjusted for urban, rural I, and rural II Alaska."^c By specifying Anchorage and Honolulu, 7 CFR 273.10(e)(4) precludes the costs of the TFP in Alaska or Hawaii from incorporating information on food prices from other areas of each State (e.g., localities bordering Anchorage and Honolulu).

The existing statutory and regulatory language require that Thrifty Food Plan costs for Alaska and Hawaii be based on a fixed Thrifty Food Plan Market Basket for the reference family of four adjusted for food prices in Anchorage and Honolulu. The following section describes an analytic framework for producing new Thrifty Food Plan cost estimates for Alaska and Hawaii that meet USDA's interpretation of the legal requirements.

^b In contrast, 7 U.S.C. § 2012(u)(3) describes separate TFPs for Guam and the Virgin Islands of the United States. The TFPs and their respective costs for Guam and the Virgin Islands are not explored in this report.

^c The adjustments for urban, rural I, and rural II parts of Alaska mentioned in 7 CFR 273.10(e)(4) are discussed in detail in 7 CFR 273.7(b). The adjustments specified in 7 CFR 273.7(b) include a 0.79 percent increase over the Anchorage cost for Urban Alaska, a 28.52 percent increase over the Anchorage cost for Rural I, and a 56.42 percent increase over the Anchorage cost for Rural II. The adjustment factors for Urban, Rural I, or Rural II Alaska are not explored in this report.

Analytic Framework

This section discusses how USDA accounted for and operationalized the previously discussed statutory and regulatory framework in order to identify the methodology best suited for developing Thrifty Food Plan cost estimates for Alaska and Hawaii.

Index-Based Approach

The Thrifty Food Plan costs for Alaska and Hawaii are based on the fixed Thrifty Food Plan Market Basket for the reference family of four, not State-specific Thrifty Food Plan Market Baskets (see [Statutory and Regulatory Framework](#)). An optimization model, similar to that of the 2021 Thrifty Food Plan reevaluation, would have yielded State-specific Thrifty Food Plan Market Baskets that do not align with the intent of the statutory and regulatory language. Instead, USDA considered various price index-based approaches that, when applied, would not yield State-specific Thrifty Food Plan Market Baskets.

A price index enables the comparison of price levels between two locations by weighting price differences across a composite of goods and services by their relative importance^d at one point in time.^{16 17} By using a price index, comparisons of unit prices between locations in one time period for foods and beverages in the Thrifty Food Plan Market Basket for the reference family of four can be reduced to a single price-of-food adjustment factor that can be applied to the cost of the Thrifty Food Plan in the mainland United States to yield a Thrifty Food Plan cost estimate for Alaska or Hawaii.

Geographic Definitions

While regulation states that the Thrifty Food Plan shall be adjusted for food prices in Anchorage and Honolulu, USDA has discretion as to whether Anchorage and Honolulu should be defined using municipal boundaries (i.e., the cities of Anchorage and Honolulu) or county boundaries (i.e., Anchorage Borough and Honolulu County). For this analysis, USDA opted to define Anchorage and Honolulu

using county boundaries to maximize the available sample sizes from which to determine food prices and because the county boundaries cover larger populations than do the municipal boundaries. USDA performed a sensitivity analysis to assess the impacts of this choice (see [Sensitivity Analyses](#) and [Appendix D: Sensitivity Analyses](#)).

^d Relative importance refers to the nonuniform contribution of components to the overall index. Definitions of relative importance can vary. For this report, the relative importance of a component in the index is based on the component's contribution to the cost of the Thrifty Food Plan, 2021 Market Basket for the reference family of four. Indexes in other contexts might use other measures (e.g., quantities) to achieve the same purpose.

Unit of Analysis

The Thrifty Food Plan Market Basket for the reference family of four has previously been presented as quantities and associated costs of 24 Market Basket Categories. These categories are each made up of specific quantities and associated costs of hundreds of individual foods and beverages that can be further broken down into quantities and associated costs of thousands of individual products in the marketplace. USDA considered each of the levels of aggregation at which the Thrifty Food Plan could be expressed based on the available data and considered their respective strengths and weaknesses as the unit of analysis for a price index.

When considering the unit of analysis, it is important to first understand the underlying components of the Thrifty Food Plan, 2021. The Thrifty Food Plan, 2021 is based on Universal Product Codes (UPCs)^e in the 2015–16 IRI InfoScan store-based scanner data linked to Ensemble Codes (ECs), which are food codes from the USDA nutrient databases (i.e., the Food and Nutrient Database for Dietary Studies (FNDDS) and the National Nutrient Database for Standard Reference (SR Legacy)), using the Purchase to Plate Crosswalk (PPC).^{f 1 18 19} The PPC links UPCs to ECs and their associated forms (e.g., refrigerated, ready-to-serve; frozen, not-ready-to-serve) and refuse status (containing or not containing inedible material). For example, a specific brand and container size of conventional, creamy, shelf-stable, ready-to-serve peanut butter is represented by a UPC, which is linked to the EC for peanut butter;

the shelf-stable, ready-to-serve form; and the no-refuse status indicator in the PPC.

The 24 Thrifty Food Plan Market Basket Categories define food and beverage categories quite broadly (e.g., dark-green vegetables, seafood)⁹ and are comprised of 993 unique ECs, which can be further broken down into 1,342 unique EC-form combinations. The specificity of ECs and EC-form combinations varies. For example, the EC "peanut butter" comprises all types of peanut butter and is available in both shelf-stable and refrigerated forms. Other ECs might include a narrower set of underlying products. For example, many ECs that refer to ready-to-eat breakfast cereals using food codes from SR Legacy are brand-specific.

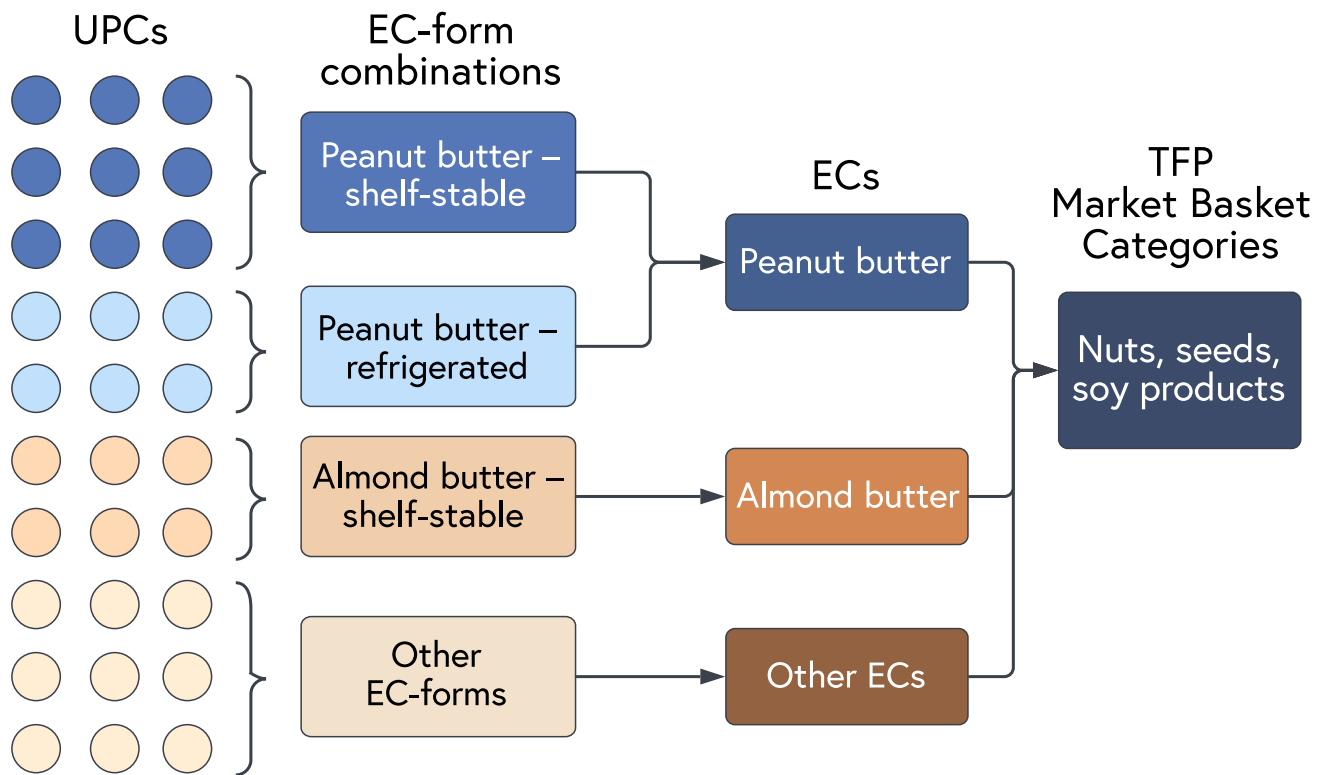
Underlying the 1,342 EC-form combinations in the Thrifty Food Plan are 96,642 unique products identified by specific UPCs. For example, an EC referring to a specific brand of ready-to-eat breakfast cereal might have multiple associated UPCs that all differ in package size. While the food itself is homogenous, the different package sizes constitute an important differentiating attribute. In other EC-form combinations, products are likely more heterogeneous. In the peanut butter example, all shelf-stable peanut butter products would be aggregated regardless of attributes such as package size, sugar content, consistency, or organic labeling. **Figure 1** provides an example of mapping UPCs to EC-form combinations, ECs, and Thrifty Food Plan Market Basket Categories using the "nuts, seeds, soy products" Thrifty Food Plan Market Basket Category.

^e UPCs are 12-digit codes that uniquely identify specific products and typically appear on products as barcodes.

^f ERS publications related to the PPC use several terms to collectively describe food codes from the USDA nutrient databases, including "EC-8" for food codes from FNDDS, "EC-4/5" for food codes from SR Legacy, or "food codes" more generally. This report uses the term Ensemble Code (EC).

⁹ The 24 Thrifty Food Plan Market Basket Categories reflect foods and beverages in their as-purchased forms and are separate from the 98 Thrifty Food Plan Modeling Categories, which reflect foods and beverages in their as-consumed forms (see [Cost Shares of UPCs Underlying the Thrifty Food Plan](#)).

Figure 1. Example of mapping UPCs to EC-form combinations, ECs, and Thrifty Food Plan Market Basket Categories



Notes:

TFP = Thrifty Food Plan; UPC = Universal Product Code; EC = Ensemble Code.

The circles under UPCs represent an example of how individual UPCs might be grouped into their associated EC-form combinations and do not reflect the actual number of UPCs underlying these specific EC-form combinations. Likewise, there are additional EC-form combinations and ECs within the "Nuts, seeds, soy products" Market Basket Category that are displayed here under "Other ECs."

Constructing an index using a unit of analysis that is more aggregate than UPCs (i.e., Thrifty Food Plan Market Basket Categories, ECs, or EC-form combinations) presents two key challenges: (1) unit value bias and (2) the creation of State-specific Thrifty Food Plan Market Baskets. Each of these challenges is described in detail below.

The first challenge related to using an aggregated unit of analysis is unit value bias. Unit value bias arises when a comparison of unit values between

locations for a bundle of goods simultaneously compares differences in prices and differences in the composition of the bundle.²⁰ For example, a comparison of unit values for the "peanut butter" EC might produce biased estimates of the true price differential for peanut butter between two locations if the volume of purchases in one location was relatively skewed towards premium brands, which tend to have higher unit prices compared to other brands. Similarly, a comparison of unit values for the "nuts, seeds, soy products"

Thrifty Food Plan Market Basket Category might produce biased estimates of the true price differential for nuts, seeds, and soy products between two locations if volume of purchases in one location was relatively skewed towards almond butter, which tends to have higher unit prices compared to peanut butter. Applying a price index that is subject to unit value bias as a price-of-food adjustment to the Thrifty Food Plan is problematic because it would adjust the cost of the Thrifty Food Plan not only to reflect the price of food, but also to reflect regional differences in other factors (e.g., food availability and preferences). Unit value bias can be reduced by using more homogenous, granular units of analysis; this is the first of two reasons why USDA preferred an index that utilizes as granular a unit of analysis as possible.

The second challenge related to using an aggregated unit of analysis is the creation of State-specific Thrifty Food Plan Market Baskets. As previously discussed, amounts and associated costs of Thrifty Food Plan Market Basket Categories and their underlying ECs and EC-form combinations were defined in the process of reevaluating the Thrifty Food Plan in 2021. However, the Thrifty Food Plan can also be more specifically defined using quantities and associated costs of 96,642 UPCs. Defining the Thrifty Food Plan at this level of specificity involves using the sales distribution of UPCs within each EC-form combination in the same 2015–16 IRI InfoScan nationwide sales data used to develop average unit prices for the 2021 reevaluation to disaggregate amounts and associated costs of EC-form combinations to the UPC-level. For example, if the Thrifty Food Plan included \$1 of a certain EC-form combination, and a particular UPC accounted for 10 percent of sales of all UPCs associated with this EC-form combination in the 2015–16 IRI InfoScan nationwide sales

data, then the Thrifty Food Plan would contain \$0.10 of this UPC. If a different purchasing pattern (i.e., data other than the 2015–16 IRI InfoScan nationwide sales data) were to be used to disaggregate the Thrifty Food Plan to the UPC-level, it would result in a different market basket than the Thrifty Food Plan, 2021.

Calculating a price index using a unit of analysis that is more aggregated than UPCs requires the calculation of location-specific prices (i.e., unit values) at that unit of analysis. Such a calculation would reflect a purchasing pattern other than the 2015–16 IRI InfoScan nationwide sales data and inevitably lead to the creation of a new Thrifty Food Plan Market Basket that is State-specific. Creating State-specific Thrifty Food Plan Market Baskets using a price-of-food adjustment presents two key problems. First, the resulting State-specific Thrifty Food Plan Market Baskets may not meet the dietary constraints or variety and convenience goals of the Thrifty Food Plan, 2021. Second, the statutory and regulatory framework calls for an adjustment for the price of food, not for the creation of State-specific Thrifty Food Plan Market Baskets. Avoiding the creation of State-specific Thrifty Food Plan Market Baskets is the second reason why USDA preferred an index that utilizes as granular a unit of analysis as possible.

The levels of aggregation at which the Thrifty Food Plan can be expressed are Thrifty Food Plan Market Basket Categories, ECs, EC-form combinations, and UPCs. Given UPCs are the most granular of these options, and because USDA preferred an index that utilizes as granular unit of analysis as possible to minimize the effects of unit value bias and to avoid the creation of State-specific Thrifty Food Plan Market Baskets, USDA favored an index that used UPCs as the unit of analysis.

Functional Form

Many forms of price indexes are present in the literature, each with different intended applications, strengths, and limitations. USDA considered two characteristics of the various options when identifying an index form that aligned with the statutory and regulatory framework.

First, the index should enable bilateral comparison of prices in Anchorage and Honolulu to the mainland United States. While more complex multilateral indexes are present in the literature,¹⁶ the statutory and regulatory framework calls for comparisons between Anchorage/Honolulu and the mainland United States, leading USDA to prefer the simplicity of a bilateral index.

Second, the index should utilize a fixed-basket framework that reflects the contribution of each UPC in the Thrifty Food Plan Market Basket for the reference family of four. In contrast to a variable-basket (or cost-of-living) approach, which compares the cost of different sets of products in each location such that each basket provides equal utility in their respective locations, a fixed-basket (or cost-of-goods) approach compares the cost of an identical amount of identical

products between locations.¹⁷ A fixed-basket approach best aligns with the statutory and regulatory framework, which calls only for adjustments for the price of food.

Two common fixed-basket, bilateral price indexes present in the literature are the Laspeyres and Paasche indexes.^h A Laspeyres index would be calculated using weights based on the relative importance of goods and services in the base location (i.e., the mainland United States), whereas a Paasche index weighs them according to their relative importance in the comparison location (i.e., Anchorage or Honolulu). Either the Paasche or Laspeyres approaches would be feasible; however, they would not align exactly with the contents of the Thrifty Food Plan Market Basket, which is based on nationwide purchasing patterns. As a result, USDA preferred an alternative approach that is similar to the Laspeyres and Paasche indexes but is weighted to reflect contribution of UPCs to the cost of the Thrifty Food Plan Market Basket for the reference family of four.

^h A variety of approaches also exist in the literature that combine the Laspeyres and Paasche. For example, the Fisher index is the geometric mean of the Laspeyres and Paasche indexes.

Existing Price Indexes

Having identified an analytic framework that best aligned with statutory and regulatory requirements, USDA considered whether an existing price index could be used to derive Thrifty Food Plan cost estimates for Alaska and Hawaii. USDA examined four indexes: (1) the Bureau of Economic Analysis (BEA) Regional Price Parities (RPPs), (2) the Feeding America Map the Meal Gap, (3) the Council for Community and Economic Research (C2ER) Cost of Living Index (COLI), and (4) the Office of Personnel Management (OPM) Cost of Living Allowance (COLA) and evaluated each index's ability to provide fixed-basket, bilateral unit price comparisons, as well as the extent to

which the foods and beverages underlying their calculation reflect the Thrifty Food Plan Market Basket for the reference family of four. None of the four existing indexes fully aligned with the analytic framework. While all of the indexes included information for Anchorage and Honolulu and could support bilateral comparisons, only two of the indexes (C2ER COLI and OPM COLA) used a fixed-basket approach, and these fixed baskets did not sufficiently reflect the Thrifty Food Plan Market Basket for the reference family of four. USDA concluded that no existing price index fully aligned with the desired analytic framework. Additional details of USDA's evaluations of each index are provided in [Appendix B](#).



Food Price Data Sources

After ruling out existing food price indexes, USDA considered whether existing data sources could support the development of a new price index tailored to the Thrifty Food Plan Market Basket for the reference family of four. USDA considered four food price data sources: (1) food price data collected by BLS for the CPI; (2) the underlying metropolitan area average unit prices from the C2ER COLI; (3) food price data collected in Anchorage, Honolulu, and Washington, DC, under a USDA cooperative agreement with the University of Hawaii; and (4) the Information Resources, Inc. (IRI) InfoScan store-based scanner data. USDA closely examined the attributes of each existing data source and relative strengths and weaknesses before selecting an option with which to develop final price-of-food adjustments.

In determining which of the data sources was most appropriate to use as the basis of a new price index, experts at the USDA Food and Nutrition Service (FNS), Economic Research Service (ERS), and Office of the Chief Economist (OCE) reviewed CNPP descriptions and evaluations of the food price

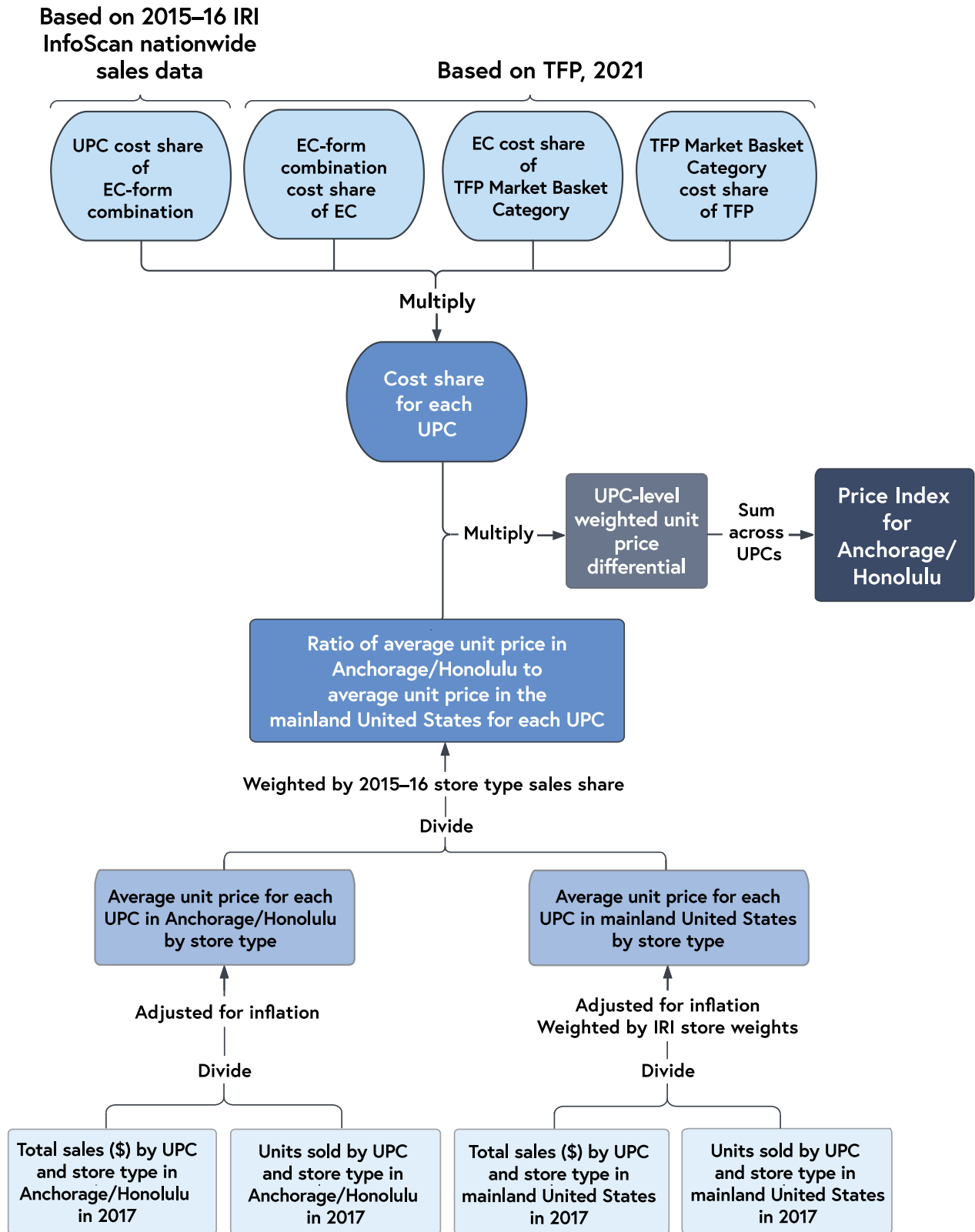
data source options. CNPP evaluated each data source's sample size; applicability to the Thrifty Food Plan, 2021; data quality and documentation; appropriateness as a price-of-food adjustment; and the applicability to future updates and reevaluations. The evaluation focused solely on methodological strengths and weaknesses; the results of the respective approaches were not considered. Additional details of USDA's evaluations of each data source are provided in [Appendix B](#). The consensus among CNPP and the USDA reviewers was that, while all options had limitations, the IRI InfoScan was the best available data with which to calculate price-of-food adjustments to the cost of the Thrifty Food Plan for Alaska and Hawaii. The IRI InfoScan data enables USDA to adjust the cost of the Thrifty Food Plan in the mainland United States to reflect the price of food in Anchorage and Honolulu in alignment with the analytic framework and all statutory and regulatory requirements. Additional details of USDA's evaluations of each data source are provided in [Appendix B](#).

Development of an IRI-Based Food Price Index

The next sections of this report describe the development of a food price index based on the IRI InfoScan store-based scanner data, the results of which USDA applied to the June 2022 cost of the Thrifty Food Plan in the mainland United States to yield Thrifty Food Plan cost estimates for Alaska and Hawaii. Technical details of the price index are presented in [Appendix C](#). Generally, calculating the index required two components: (1) the share of the cost of the Thrifty Food Plan Market Basket for the reference family of four attributable to each UPC and (2) average unit prices for these UPCs in Anchorage, Honolulu, and the mainland United States. The details of these inputs to the index and their application are outlined in [Figure 2](#) and discussed in the following sections:

- **Cost Shares of UPCs Underlying the Thrifty Food Plan:** Identified specific UPCs that make up the foods and beverages underlying the Thrifty Food Plan Market Basket for the reference family of four and are available in both Anchorage or Honolulu and the mainland United States and calculated each UPC's cost share in the index.
- **Food Prices:** Calculated average unit prices for UPCs in Anchorage, Honolulu, and the mainland United States using a subset of stores in the 2017 IRI InfoScan data.
- **Price-of-Food Adjustments for Anchorage and Honolulu:** Combined average unit prices in the mainland United States, Anchorage, and Honolulu with cost shares for UPCs to calculate price-of-food adjustments for Anchorage and Honolulu using the price index. Applied the result of the index as a price-of-food adjustment to the cost of the Thrifty Food Plan in the mainland United States to yield Thrifty Food Plan cost estimates for Alaska and Hawaii.

Figure 2. Calculation of the price indexes for Honolulu and Anchorage



Notes: TFP = Thrifty Food Plan; UPC = Universal Product Code; EC = Ensemble Code.

Cost Shares of UPCs Underlying the Thrifty Food Plan

Calculating the price index required information on the contribution of each UPC to the total cost of the Thrifty Food Plan Market Basket for the reference family of four (see [Appendix C](#)). This section describes the process used to break each Thrifty Food Plan Market Basket Category down into individual UPCs and calculate their respective shares of the cost of the Thrifty Food Plan, 2021.

In developing the Thrifty Food Plan, 2021, the Thrifty Food Plan mathematical optimization model's solution was expressed in quantities and associated costs of 98 Thrifty Food Plan Modeling Categories.¹ The Thrifty Food Plan Modeling Categories were then disaggregated into quantities and costs of FNDDS food codes based on consumption shares in What We Eat In America 2015–16, the dietary component of the National Health and Nutrition Examination Survey, and were finally converted to quantities and costs of foods and beverages in their as-purchased forms (i.e., EC-form combinations) using the Purchase to Plate Ingredient Tool (PPIT).^{i 19} As a final step, quantities and costs of foods and beverages in their as-purchased forms were aggregated into quantities and costs of 24 Thrifty Food Plan Market Basket Categories as presented in the Thrifty Food Plan, 2021 final report.

However, the contents of the Thrifty Food Plan, 2021 can be defined at several levels of aggregation (see [Unit of Analysis](#)). The 24 Thrifty Food Plan Market Basket Categories (e.g., nuts, seeds, soy products) are the most aggregate level, followed by 993 ECs (e.g., peanut butter), and 1,342

EC-form combinations (e.g., shelf-stable, ready-to-serve peanut butter). USDA linked these 1,342 EC-form combinations to the 2015–16 IRI InfoScan data, which supported the 2021 Thrifty Food Plan reevaluation, using the PPC and identified the 96,642 UPCs (e.g., a specific brand and container size of conventional, creamy, shelf-stable, ready-to-serve peanut butter), which underly the Thrifty Food Plan Market Basket for the reference family of four.

In addition to identifying each UPC underlying the Thrifty Food Plan Market Basket for the reference family of four, USDA identified the common sets of UPCs that are available in the mainland United States and Anchorage or Honolulu. The full set of 96,642 UPCs was narrowed to these common sets because the price index calculation directly compares the average price for a UPC in Anchorage or Honolulu with the average price for the same UPC in the mainland United States (see [Appendix C](#)). Therefore, a UPC sold only in the mainland United States would have nothing to be compared against in Anchorage and Honolulu. The common sets of UPCs included 10,545 UPCs in the Anchorage index and 11,593 in the Honolulu index, representing 11 and 12 percent of the UPCs in the Thrifty Food Plan Market Basket for the reference family of four in the Anchorage and Honolulu indexes, respectively. The common sets of UPCs used in the Anchorage and Honolulu index calculations represent EC-form combinations that account for 95 and 98 percent of the cost of the Thrifty Food Plan Market Basket for the reference family of four, respectively.

ⁱ The PPIT defines the quantity and respective cost of each food and beverage needed to yield 100 edible grams of FNDDS food codes after accounting for cooking loss and refuse.

There are multiple possible reasons why many of the UPCs underlying the Thrifty Food Plan are not present in the common set between Anchorage and Honolulu, and the mainland United States. For one, private-label products sold at retailers that were not available in the Anchorage or Honolulu data would not be available in those States. Some products are only available in certain regions of the country and some products that are very similar might be marketed under different brand names in different regions. Since UPCs identify very specific items by product attributes such as flavor or container size, it is plausible that not all variations are available everywhere. For example, a particular brand of soda could be sold in a variety of package sizes (e.g., 12-pack of cans, 6-pack of plastic bottles, 2-liter bottles, etc.) in the country, as a whole, but only in a few of these variations in a specific location. For reasons such as these, the common sets of UPCs are smaller than the original set of UPCs used to calculate the Thrifty Food Plan, 2021.

The Thrifty Food Plan cost share of each UPC in the common set was calculated by combining cost shares at each of the previously mentioned levels of aggregation: (1) each UPC's cost share of its associated EC-form combination based on the 2015–16 IRI InfoScan, (2) the cost share of each form within each EC, (3) the cost share of each EC within each Thrifty Food Plan Market Basket Category, and (4) the cost share of each Thrifty Food Plan Market Basket Category in the total cost of the Thrifty Food Plan for the reference family of four ([Figure 2](#)). Combined, their products represent the final weight on each individual UPC in the final index.

To illustrate the construction of these UPC weights, consider the following example. The Thrifty Food Plan Market Basket Category "nuts, seeds, soy products" accounts for 2.6 percent of the total cost of the Thrifty Food Plan Market Basket for the reference family of four¹ and the EC "peanut butter" makes up 90 percent of the cost of the "nuts, seeds, soy products" Market Basket Category. Peanut butter is available in both shelf-stable and refrigerated forms with cost shares of 99.9 percent and 0.1 percent, respectively. Finally, a UPC representing a specific brand of conventional, creamy, shelf-stable peanut butter in a 16-ounce jar might account for 15 percent of the 2015–16 sales of shelf-stable peanut butters. The final cost share of this UPC in the Thrifty Food Plan, 2021 could be calculated by multiplying the four cost shares described above: the share of the Thrifty Food Plan Market Basket Category in the total cost of the Thrifty Food Plan (0.026), the share of the EC in the Thrifty Food Plan Market Basket Category (0.900), the share of the form in the EC (0.999), and the share of the UPC in the EC-form combination (0.150), yielding a final weight of 0.0035. Cost shares for UPCs in the Thrifty Food Plan Market Basket for the reference family of four, but not in the common set, were proportionately reallocated to other similar UPCs following a hierarchical approach (see [Appendix C](#)).

Food Prices

Calculating the price index required average unit prices for UPCs in the mainland United States, Anchorage, and Honolulu, which USDA calculated using sales data from stores in these regions in the 2017 IRI InfoScan store-based scanner data. Because the intention of the index is to measure the difference in price levels between two locations, the average unit prices in each region were calculated to be as comparable as possible between

IRI InfoScan

The IRI InfoScan data acquired by USDA reports weekly data on sales collected through in-store scanners and includes all food items sold by a set of over 50,000 affiliated grocery stores, mass merchandisers, club stores, convenience stores, drug stores, dollar stores, liquor stores, and Department of Defense (DoD) commissaries in urban, suburban, and rural communities across the United States.²¹ These data represent billions of transactions annually and a mix of both brand-name and private-label products. The IRI InfoScan data is well suited for making regional food price comparisons since products are uniquely defined by UPCs, making it possible to compare the exact same items across locations without confounding for differences in product attributes. In addition, the IRI InfoScan data as acquired by USDA collects data continuously and reports sales on a weekly basis throughout the year, reducing seasonality biases. Using this data source to calculate price-of-food adjustments to the cost of the Thrifty Food Plan is consistent with the 2021 Thrifty Food Plan reevaluation, which used these same data.

Each year of IRI InfoScan data acquired by USDA includes more than 6 billion records.²¹ However,

locations. In doing so, the influence of other differences between the regions, such as differences in the availability or relative importance of different store types, was minimized. The following sections describe the IRI InfoScan data in detail, as well as USDA's process for defining a subset of stores within the 2017 IRI InfoScan and the process for calculating average unit prices from this subset. [Appendix C](#) includes a technical discussion of these steps and all associated equations.

the data does not cover private-label products for certain retailers, nor does it fully cover online transactions that represent a small but growing segment of U.S. grocery sales. IRI InfoScan data were used as the food price data source for the 2021 Thrifty Food Plan reevaluation and support a range of other USDA data products and analyses.^{1 22-25} In November 2021, after the publication of the Thrifty Food Plan, 2021 report, USDA released weights that could be used to improve the representativeness of the 2012–18 IRI InfoScan data at the national level, for the four Census regions, and for the 10 largest metropolitan regions.²⁶

The IRI InfoScan data are compiled and provided to USDA annually. As a result, IRI InfoScan data within each calendar year tend to be consistently organized but the data and format can change from year to year. IRI implemented major changes in the product dictionary starting in 2019. As a result, the 2015–16 Purchase to Plate Crosswalk (PPC)—which the Thrifty Food Plan, 2021 is based on—is largely incompatible with IRI data after 2018. For this reason, USDA did not consider any IRI data after 2018 for use in this analysis.^{1 19}

USDA considered IRI InfoScan data from 2015^j through 2018 for the basis of the price index and determined that the data from 2017 is uniquely suited to support this analysis because of the granularity in which sales at grocery stores in Anchorage and Honolulu were provided to USDA in this year. Data from some retailers may be released to USDA at the store level, while for others, data is provided at the retailer marketing area (RMA) level, aggregating sales across all stores within the RMA. The geographic areas for the RMAs are defined separately by each retailer and often cross county and/or State borders, complicating or inhibiting direct regional comparisons.²⁷

For example, a retailer with stores in Anchorage, Fairbanks, and Juneau could choose either to have each store's data released separately in the

Inclusion Criteria

In contrast to the 2021 Thrifty Food Plan reevaluation, in which average unit prices were based on sales from all available stores, average unit prices for the price-of-food adjustments were based on a carefully defined subset of stores. USDA implemented three inclusion criteria related to stores and store types in the data to ensure that the average unit prices calculated for each location were as comparable as possible while minimizing the potential for bias.

IRI Store Weights

The first inclusion criterion was to only include stores in the mainland United States for which IRI store weights were developed. Since the IRI data represent a nonrandom sample, applying these store weights could potentially improve the representativeness of the data (see [IRI InfoScan](#)). For

IRI InfoScan data (i.e., store level data) or as one aggregated unit (an RMA). If data were released at the RMA level in this example, sales at the store in Anchorage would be aggregated with sales in Fairbanks and Juneau, making it impossible to determine Anchorage-specific average unit prices for this retailer. All grocery stores in Anchorage and Honolulu in the IRI InfoScan data in 2015, 2016, and 2018 were released to USDA as part of an RMA. These RMAs also included store locations outside of Anchorage and Honolulu, preventing sales at stores in Anchorage or Honolulu from being attributed solely to their respective locations. However, the 2017 IRI InfoScan provided to USDA contains sales at grocery stores in Anchorage and Honolulu released at the store level, whose sales could therefore be attributed to locations within those counties.

this analysis, USDA applied the IRI store weights to make the data more representative when calculating average unit prices for the mainland United States. USDA's decision to apply the IRI weights to make the results more geographically representative was informed by recent recommendations from the National Academies of Sciences, Engineering, and Medicine (NASEM) on how USDA can best leverage commercial data sources in the Consumer Food Data System.²⁸

While applying nationally representative weights to the mainland United States may produce under or over estimates of average unit prices due to the slight incongruence of the geographies, this effect is likely minimal because the mainland United States is very similar to the nationwide geographic area that the weights were designed to represent.

^j The 2021 Thrifty Food Plan reevaluation utilized 2015–16 IRI InfoScan data. Therefore, USDA did not consider any IRI InfoScan data prior to 2015 for use in this analysis.

USDA did not apply these weights when calculating average prices for Anchorage or Honolulu because the weights are not appropriate for these smaller geographic areas. USDA conducted a sensitivity analysis around applying the IRI store weights (see [Sensitivity Analyses](#) and [Appendix D](#)). This criterion resulted in the exclusion of 2,008 stores from the mainland United States: 133 convenience stores, 497 DoD commissaries, 574 dollar stores, 5 drug stores, 9 grocery stores, 789 liquor stores, and 1 mass merchandiser.

Alignment With Geographic Definitions

The second inclusion criterion was to only include stores with data released at the store level or as part of an RMA that does not include stores outside of Anchorage, Honolulu, or the mainland United States. As previously discussed, the IRI InfoScan regionally aggregates data by certain vendors; some of the InfoScan data are provided at the store level, while others are provided at the RMA level (see [IRI InfoScan](#)). The geographic areas for the RMAs are defined separately by each retailer and often cross county and/or State borders, complicating or inhibiting direct regional comparisons.²⁷

USDA used the 2017 IRI InfoScan as the basis for average unit price estimates in this analysis, in part, because it allows USDA to include data from grocery stores in the average unit price calculations without making the assumption of uniformity of prices within RMAs. In Anchorage, this criterion resulted in the exclusion of five grocery stores, two club stores, and four mass merchandisers with data released as part of an RMA that included additional locations outside of the borough. In Honolulu, this criterion resulted in the exclusion of 6 mass merchandisers and 33 drug stores with data released as part of an RMA that included additional locations outside of the county.

Researchers working with retail scanner data have commonly assumed that unit prices are uniform within RMAs, enabling them to impute store-level sales and unit prices based on RMA-level data.^{29 30} USDA considered relaxing the "alignment with geographic definitions" inclusion criterion such that sales at stores in Anchorage and Honolulu with data released as part of an RMA could be included in the calculation by assuming that unit prices are uniform with RMAs. This alternative approach would have enabled a larger sample size to be included in the analysis; however, this approach was ruled out for two reasons. First, certain RMAs include sales in both Alaska and Hawaii; USDA did not consider it appropriate to assume that prices are uniform across these two States solely because retailers may choose to report their sales in the aggregate. Second, this approach may not align with the statutory and regulatory framework, which calls only for adjustments for the price of food in Anchorage and Honolulu. USDA conducted sensitivity analyses around this alternative approach (see [Sensitivity Analyses](#) and [Appendix D](#)).

Consistent Store Types

The final inclusion criterion was to only include consistent store types between the two compared locations. In other words, if a store type was excluded or not available in one location, it would also be excluded in the location it was compared to. The assumption underlying this criterion is that unit prices for otherwise identical products may systematically differ across store types. As a result, including sales data from a different set of store types in the compared locations would introduce bias into the calculation; the price index would then reflect differences in the presence and data availability of store types in each location rather than prices alone, as is called for in the statutory and regulatory framework.

Because all DoD commissaries were excluded from the mainland United States due to their lack of IRI store weights, 1 DoD commissary in Anchorage and 25 DoD commissaries in Honolulu were excluded. Similarly, because no convenience stores were available in the data for Anchorage and Honolulu, 15,484 convenience stores were excluded in the mainland United States. Finally, because all club stores were excluded from Anchorage due to alignment with geographic definitions, 860 club stores were also excluded from the mainland United States when calculating the price-of-food adjustment for Anchorage. These 860 club stores were included in the price-of-food adjustment for Honolulu.

USDA considered not applying the "consistent store types" criterion described in this section but ultimately ruled this option out because of the risk of bias it presented to the results. This alternative approach would have enabled a larger sample size to be included in the analysis but would have created systematic differences in the Anchorage/Honolulu and mainland United States analytic samples that would bias the results. For example, club stores may have lower unit prices for certain products compared to other store types. By including club stores in unit price estimates in the mainland United States but not in Anchorage (where club stores operate but were excluded under the "alignment with geographic definitions" criterion), estimates of price differentials might have been overstated. USDA conducted sensitivity analyses around this alternative approach to understand how the decision to apply this inclusion criterion impacted the results of the analysis (see [Sensitivity Analyses](#) and [Appendix D](#)).

The total nationwide sales value of UPCs in the Thrifty Food Plan Market Basket for the reference family of four at the excluded or unavailable store types (i.e., the weight these store types would have carried in the index had they been available or included) is small in comparison to total sales; less than 2 percent of sales of UPCs underlying the Thrifty Food Plan in the IRI InfoScan data were attributable to the excluded or unavailable store types (i.e., convenience stores, dollar stores, DoD commissaries, and liquor stores). Club stores, which represent 6 percent of sales of UPCs in the Thrifty Food Plan in the InfoScan data, were also excluded in the index calculation for Anchorage.

One challenge in creating a comparable set of stores across locations is that the actual presence of store types and retail chains in each location is unknown since the IRI InfoScan data is comprised of a nonrandom sample of primarily larger retail chains. As a result, the data may not be representative of the food environment in any given location. [Table 1](#) shows the number of stores by store type and location in the 2017 IRI InfoScan data as released to USDA and those that met the criteria for inclusion in the price-of-food adjustments. The absence of convenience stores, liquor stores, and dollar stores in Anchorage and Honolulu in the IRI data should not be interpreted as evidence that these store types did not exist in Anchorage and Honolulu in 2017; they are merely not observed in these data.

Analytic Sample

After identifying the stores available for comparison according to the assumptions outlined above, this analysis included over 40,000 stores in the mainland United States, 20 stores in Anchorage, and 32 stores in Honolulu (Table 1) with millions of transactions in each location representing sales across the year (Table 2).

Table 1. Number of stores present in 2017 IRI InfoScan and included in the analysis by store type and location

Store type	Mainland United States	Anchorage	Honolulu
Number of stores present in 2017 IRI InfoScan ^a			
Grocery	12,331	15	14
Mass merchandiser	7,501	6	10
Drug	20,112	8	45
Club	860	2	2
Convenience	15,617	0	0
DoD commissary	497	1	25
Dollar	574	0	0
Liquor	789	0	0
Total	58,281	32	96
Number of stores included in analysis ^b			
Grocery	12,322	10	14
Mass merchandiser	7,500	2	4
Drug	20,107	8	12
Club ^c	860	0	2
Convenience	0	0	0
DoD commissary	0	0	0
Dollar	0	0	0
Liquor	0	0	0
Total	40,789	20	32

Notes: IRI = Information Resources Inc.; DoD = Department of Defense.

^a Includes all stores identified in the 2017 IRI InfoScan, including those without IRI weights and with sales that cannot be attributed to either Anchorage or Honolulu because of reporting at the RMA level.

^b Includes stores in the 2017 IRI InfoScan that met the three inclusion criteria: IRI store weights, alignment with geographic definitions, and consistent store types.

^c Club stores in the mainland United States were included in the index calculation for Honolulu because sales from club stores could be attributed to stores located in Honolulu. Conversely, club stores were excluded from the index calculation for Anchorage because sales from club stores were reported at the RMA level and could not be attributed solely to store locations in Anchorage.

The IRI InfoScan data is released to USDA as total sales value and units sold in weekly intervals for each UPC sold by participating retailers. Because sales per UPC and store are released to USDA not as individual transactions but as weekly totals, it is not possible to identify how many individual transactions are represented. To estimate the lower bound of the number of transactions, USDA calculated the number of total observations as

number of UPCs sold in each week of sales data for each store-by-store type and location ("UPC-week-store" count).^k The total UPC-week-store count underlying the index calculation was over 1.6 billion, including 2.9 million and 3.5 million in Anchorage and Honolulu, respectively (Table 2). Because each observation may include several individual transactions, the number of individual transactions captured may be orders of magnitudes higher.

Table 2. Number of UPC-week-store observations (in thousands) of sales included in the analysis by store type and location

Store type	Mainland United States	Anchorage	Honolulu
Grocery	1,242,881	2,261	3,065
Mass merchandiser	254,032	198	491
Drug	151,265	139	236
Club	3,847	0	34
Total^a	1,652,024	2,598	3,825

Note: UPC = Universal Product Code.

^a Number of UPC-week-store observations by store type may not add up to total due to rounding.

While there is no standard benchmark for determining sample size adequacy for a price-of-food adjustment, USDA carefully evaluated the number of stores and volume of sales in the analysis in comparison to other data sources and considered it sufficient.

The 2017 IRI InfoScan contained sales from more stores in Anchorage and Honolulu than the minimum of six per region recommended in a recent USDA study that considered options for measuring the cost of a Thrifty Food Plan outside the main-

land United States.³¹ Further, this sample is also larger than other sources of food price data in Anchorage and Honolulu: peer-reviewed research in the Pacific region and the OPM living-cost surveys included 3 stores per community and the C2ER COLI includes 3 to 10 establishments per urban area.³²⁻³⁵

USDA compared the number of 2017 IRI InfoScan stores included in this analysis in the mainland United States, Anchorage, and Honolulu to the number of stores in these locations in the 2017

^k Sales from some retailers that are provided to USDA at the RMA level are only counted as one observation even though the underlying sales occurred at multiple stores.

County Business Patterns (CBP), an annual series published by the U.S. Census Bureau that provides subnational economic data by industry.³⁶ The CBP includes information on the number of stores by county organized by North American Industry Classification System (NAICS) codes. For these comparisons, USDA used information on the NAICS codes for supermarkets and other grocery (except convenience) stores (NAICS 445110), pharmacies and drug stores (NAICS 446110), and general merchandise stores (NAICS 452). Because NAICS codes do not align perfectly with IRI channels, coverage is assessed overall rather than broken down by store type.²⁷ The 2017 CBP included 162,654 stores assigned these NAICS codes in the mainland United States, 66 in Anchorage, and 332 in Honolulu. Therefore, the 2017 IRI InfoScan stores included in this analysis covered a higher share of stores in Anchorage (30 percent) than in the mainland United States (25 percent), but a lower share of stores in Honolulu (10 percent).

USDA also compared the value of food sales at the stores included in this analysis in the mainland United States, Anchorage, and Honolulu to the total value of all sales in the 2017 Economic Census, the official 5-year measure of American business published by the U.S. Census Bureau.³⁷ The Economic Census includes information on the total value of all sales by county organized by NAICS codes. For these comparisons, USDA used information on the NAICS codes for supermarkets and other grocery (except convenience) stores (NAICS 445110), health and personal care stores

(NAICS 4461), and general merchandise stores (NAICS 452). USDA used health and personal care stores (NAICS 4461) rather than pharmacies and drug stores (NAICS 446110), as was used in the CBP comparison, because information for this category is censored in Anchorage. As previously stated, because NAICS codes do not align perfectly with IRI channels, coverage is assessed overall rather than broken down by store type.²⁷ Unfortunately, while the values of food sales by NAICS code are available in the Economic Census data at the national level, they are not available at the county level, and therefore are not available for this comparison. Food sales at the stores included in this analysis covered 11 percent of total sales in Anchorage and 9 percent of total sales in Honolulu, compared to 27 percent of total sales in the mainland United States.

Coverage of stores in Anchorage is higher than in the mainland United States, but coverage of stores in Honolulu and sales in both Anchorage and Honolulu are lower than in the mainland United States. There is no standard benchmark for classifying subnational coverage rates as insufficient, and therefore, any consideration of the sufficiency of the sample size would be subjective. Given the substantially higher sample sizes, both in number of stores and volume of sales, compared to all available alternatives, USDA considered the sample size sufficient for the purposes of this analysis. USDA recognizes that even higher levels of coverage or similar levels of coverage drawn from a random sample of retailers could improve the accuracy of future analysis; however, such data are currently unavailable.

Calculating Average Unit Prices

USDA used the IRI InfoScan data to calculate average unit prices by UPC in Anchorage, Honolulu, and the mainland United States. This section describes the USDA's approach for calculating average unit prices, which control for the relative importance of store types and incorporate IRI store weights (Figure 2). Additional details on these calculations, including detailed formulas, are included in Appendix C.

Research using store-based scanner data has supported the assumption that prices are set uniformly within chains but may systematically differ across retail chains and store types, confounding the index if not controlled for (i.e., the index might reflect differences in chain and store type availability between regions rather than food prices).³⁸ Since USDA cannot distinguish between the case where data is missing due to stores not reporting to IRI and the case where stores are not present in a location, USDA made the assumption that store types have the same relative importance in each location. USDA used nationwide sales data from the 2015–16 IRI InfoScan to construct the store type weights for consistency with the 2021 Thrifty Food Plan reevaluation. While prices might also systematically differ across retail chains within a store type (e.g., a regular grocery store versus a premium grocery store), USDA did not control for this factor for two reasons. First, the sample size of stores would have been reduced by more than half in the mainland United States. Second, this would bias the analysis toward those locations in the mainland United States in which the retail chains that operate in Anchorage and Honolulu are available.

First, USDA calculated unit prices for each UPC in each location (i.e., Anchorage, Honolulu, and the mainland United States) by store type. In Anchorage and Honolulu, this unit price was calculated for each store type for each UPC as the sum of sales in dollars divided by the sum of units sold across the year. For example, a UPC might have accounted for \$1,000,000 and 500,000 units in sales at grocery stores in Honolulu in the 2017 IRI InfoScan data, indicating an average unit price of \$2.00 per unit at grocery stores. The same UPC might have accounted for \$800,000 and 300,000 units in sales at mass merchandisers in Honolulu in the 2017 IRI InfoScan data, indicating an average unit price of \$2.67 per unit at mass merchandisers. In the mainland United States, average unit prices by UPC and store type were calculated in a similar fashion, but total sales and units sold at each store were weighted using the IRI store weights that were developed to make the IRI data nationally representative (see IRI InfoScan).

USDA calculated average unit prices by UPC in each location as the average of the store type level unit prices, weighted to reflect the relative importance of each store type for the UPC nationally, using sales shares in the 2015–16 IRI InfoScan data. Doing so ensured that the relative importance of store types in the index was consistent with the 2021 Thrifty Food Plan reevaluation and between Anchorage, Honolulu, and the mainland United States. USDA did not use the IRI store weights to calculate store type sales shares for consistency with the methodology used for the 2021 Thrifty Food Plan reevaluation, which used these same data and was published prior to the release of the IRI store weights.

Building on the previous example, national sales for the same UPC in the 2015–16 IRI InfoScan data might have been \$3,000,000 and \$2,000,000 at grocery stores and mass merchandisers, respectively. In other words, grocery stores accounted for 60 percent of sales of this UPC, while mass merchandisers accounted for 40 percent of sales of this UPC. The average unit price of this UPC in Honolulu would be calculated as the average of the store type-specific unit prices weighted by the store type sales shares. In this example, the weighted average unit price for this UPC would be \$2.27 per unit ($\$2.00 \times 0.6 + \2.67×0.4).

The weighted average unit price for each UPC was calculated using only sales of the UPC at store types observed in both compared locations. For example, if a UPC was sold at grocery stores, mass merchandisers, and drug stores in the mainland United States but only at grocery stores and mass merchandisers in Honolulu, the weighted average unit price for the UPC in both Honolulu and the mainland United States would be based only on sales at grocery stores and mass merchandisers—drug stores would be excluded because no sales of the UPC were recorded at this store type in Honolulu in the 2017 IRI InfoScan data. This approach assumes that individual stores within each store type are comparable to each other but that prices are systematically different across store types. For example, grocery stores are assumed to be comparable to all other grocery stores regardless of geographic location or corporate

ownership; whereas grocery stores are not directly compared to mass merchandisers because they are assumed to be systematically different. USDA conducted sensitivity analyses around this assumption (see [Sensitivity Analyses](#) and [Appendix D](#)).

To account for potential regional differences in inflation since 2017, USDA adjusted average unit prices calculated for 2017 to reflect June 2022 price levels using region-specific major food-at-home category index values from the CPI for All Urban Consumers (CPI-U's) (see [Appendix C, Table C.1](#)). Average unit prices in the mainland United States, Anchorage, and Honolulu were adjusted using CPI-U's for the national average, Urban Alaska, and Urban Hawaii, respectively. While June 2022 price levels were used as the basis for this analysis because the Thrifty Food Plan for each fiscal year is based on the cost of the Thrifty Food Plan in the preceding June, the average unit prices by UPC and store type were calculated using sales data from throughout the entire year for three reasons: (1) the Thrifty Food Plan is intended to represent a diet that is applicable throughout the full year rather than June alone; (2) the IRI store weights are based on full-year sales rather than June sales; and (3) using a full year of sales data incorporates a larger, more reliable sample size. USDA conducted a sensitivity analysis to assess the impact of this methodological choice (see [Sensitivity Analyses](#) and [Appendix D](#)).

Price-of-Food Adjustments for Anchorage and Honolulu

Average unit prices in the mainland United States, Anchorage, and Honolulu, as well as the cost share attributable to each UPC in the combined Thrifty Food Plan Market Basket for the reference family of four, were used to calculate the price indexes, the results of which serve as price-of-food adjustments for Anchorage and Honolulu. The first step in calculating the price index was to calculate the ratio of unit prices of each UPC between the two locations. In other words, the inflation-adjusted unit price of each UPC in Anchorage/Honolulu was divided by the unit price of the corresponding UPC in the mainland United States. Second, the resulting unit price ratio was multiplied by the cost share of the UPC in the Thrifty Food Plan Market

Basket for the reference family of four. Next, the products of the unit price ratio and the cost share were summed across all UPCs. Additional details on the calculation of the price index are found in [Appendix C](#).

The final step was to apply the price-of-food adjustments for Anchorage and Honolulu to the cost of the Thrifty Food Plan in the mainland United States. USDA calculated June 2022 Thrifty Food Plan cost estimates for Alaska and Hawaii by multiplying the June 2022 cost of the Thrifty Food Plan in the mainland United States (\$939.90) by the price-of-food adjustments for Anchorage and Honolulu, respectively.



Results

The results of the food price index (i.e., the price-of-food adjustment factors) for Anchorage and Honolulu were 1.3606 and 1.5240, respectively (Table 3). In other words, the prices of foods and beverages in the Thrifty Food Plan Market Basket for the reference family of four were, on average, 36.06 percent higher in Anchorage and 52.40 percent higher in Honolulu than in the mainland United States in June 2022. The monthly cost of the Thrifty Food Plan in the mainland United States for the reference family of four was \$939.90 in June 2022. Applying these price-of-food adjustments results in Thrifty Food Plan cost estimates of \$1,278.80 in Alaska and \$1,432.40 in Hawaii.

Average unit price ratios varied between Anchorage/Honolulu and the mainland United States, and therefore, the value of the price index varied by Thrifty Food Plan Market Basket Category (Table 4). For Anchorage, the value of the index ranged from 1.181 (18.1 percent higher than the mainland United States) for coffee and tea to 1.717 (71.7 percent higher than the mainland United States) for other vegetables (e.g., iceberg lettuce, green beans, onions, etc.). For Honolulu, the value of the index ranged from 1.234 (23.4 percent higher than the mainland United States) for other foods and beverages (e.g., soft drinks, fruit drinks, ice cream, etc.) to 2.087 (108.7 percent higher than the mainland United States) for other vegetables.

Table 3. Price index values relative to the mainland United States and monthly Thrifty Food Plan cost estimates for the reference family of four in Anchorage and Honolulu

Location	Price index value relative to mainland United States ^a	IRI-based monthly Thrifty Food Plan cost estimate ^b
Alaska (Anchorage)	1.3606	\$1,278.80
Hawaii (Honolulu)	1.5240	\$1,432.40

Notes:

The reference family of four is defined by Federal statute (7 U.S.C. § 2012(u)) as consisting of a man and a woman twenty through fifty, a child six through eight, and a child nine through eleven years of age.

IRI = Information Resources, Inc.

^a All index values are rounded to the fourth decimal.

^b IRI-based estimates using a price-of-food adjustment from the 2017 IRI InfoScan data applied to the June 2022 cost of the Thrifty Food Plan for the reference family of four in the mainland United States and rounded to the nearest \$0.10.

Table 4. Thrifty Food Plan cost shares and price index values in Anchorage and Honolulu by Thrifty Food Plan Market Basket Category

Thrifty Food Plan Market Basket Category	Thrifty Food Plan cost share ^a (%)	Price index value relative to mainland United States ^b Anchorage	Price index value relative to mainland United States ^b Honolulu
Vegetables			
Dark green vegetables	3.05	1.378	1.624
Red and orange vegetables	6.55	1.551	1.856
Beans, peas, lentils	2.81	1.461	1.614
Starchy vegetables	6.59	1.417	1.571
Other vegetables	4.91	1.717	2.087
Fruits			
Whole fruit	10.10	1.521	1.766
100% fruit juice	3.85	1.204	1.413
Grains			
Whole-grain staple grains	8.39	1.400	1.446
Whole-grain cereals	1.73	1.279	1.314
Refined-grain staple grains	4.62	1.494	1.741
Refined-grain other	1.17	1.379	1.442
Dairy			
Low- and non-fat milk, yogurt, soy alternatives	7.75	1.183	1.514
Higher fat milk, yogurt, soy alternatives	5.33	1.200	1.426
Cheese	1.41	1.341	1.267
Protein foods			
Meats	4.65	1.213	1.236
Poultry	8.98	1.263	1.264
Eggs	1.73	1.275	1.777
Seafood	6.64	1.190	1.257
Nuts, seeds, soy products	2.62	1.307	1.318
Miscellaneous			
Pre-prepared entrees and side dishes	1.92	1.329	1.365
Coffee and tea	1.15	1.181	1.352
Table fats and oils	2.13	1.321	1.378
Sauces, condiments, jams, honey, sugars, spices	1.21	1.440	1.378
Other foods and beverages	0.72	1.284	1.234

^a Percentages may not add to 100 due to rounding.

^b Index values are rounded to three decimals.

Comparisons to Official Thrifty Food Plan Costs, Legacy Thrifty Food Plan Costs, and Alternative Estimates

This section compares the IRI-based Thrifty Food Plan cost estimates for Alaska and Hawaii to (1) the official June 2022 Thrifty Food Plan costs for Alaska and Hawaii, which include the temporary adjustment; (2) the legacy Thrifty Food Plan costs for Alaska and Hawaii, which are the official costs but exclude the temporary adjustment; and (3) three alternative estimates: C2ER-based estimates, Map the Meal Gap-based estimates, and estimates based on a peer-reviewed publication from 2020.

Comparison to Official and Legacy Thrifty Food Plan Costs

As part of the Thrifty Food Plan, 2021 reevaluation, USDA applied a temporary adjustment to the June 2021 Thrifty Food Plan costs for Alaska and Hawaii based on the 21.03-percent permanent increase in the cost of the Thrifty Food Plan in the mainland United States.^{2 15} The official June 2022 Thrifty Food Plan costs in Alaska and Hawaii were calculated by adjusting the June 2021 Alaska and Hawaii Thrifty Food Plan costs for inflation using region-specific major food-at-home category CPI-U's. The IRI-based estimate for Alaska is \$1,278.80, which is \$115.80 (10 percent) more than the official Thrifty Food Plan cost for Alaska. The IRI-based estimate for Hawaii is \$1,432.40, which is \$362.20 (20 percent) less than the official Thrifty Food Plan cost for Hawaii ([Table 5](#)). For comparative purposes, USDA also calculated the legacy June 2022 Thrifty Food Plan costs for Alaska and Hawaii, which are the official Thrifty Food Plan costs excluding the 21.03 percent temporary adjustment. The IRI-based estimates are \$317.90 (33 percent) more and \$50.40 (3 percent) less than the legacy Thrifty Food Plan cost for Alaska and Hawaii, respectively ([Table 5](#)).

Several potential factors may be driving the differences between the official Thrifty Food Plan costs and the IRI-based estimates.¹ The official Thrifty Food Plan costs in Alaska and Hawaii were initially developed using food prices from the 1977–78 NFCS and have subsequently been updated for food price inflation.² These data, collected in the winter of 1978 in both Alaska³⁹ and Hawaii,⁴⁰ have notably different collection methods than the IRI InfoScan data. First, the NFCS data were collected only in January through March, whereas the IRI InfoScan data used for this analysis represent the entire year. Seasonal differences in prices, therefore, may play a role in the differences observed. Second, while the IRI InfoScan data is collected directly from retailers, the NFCS data were self-reported by households, and are therefore more exposed to recall and social desirability biases. Further, the NFCS data collection instrument has previously been identified as overly burdensome, which may have induced a high degree of response and non-response bias.⁴¹

¹ These factors also apply to the legacy Thrifty Food Plan costs in Alaska and Hawaii, which are based on the same calculations as the official Thrifty Food Plan costs but exclude the temporary adjustment.

Since the initial Thrifty Food Plan costs for Alaska and Hawaii were developed over 35 years ago, the food environment, market structures, and supply chains have changed significantly, with factors such as innovations in food products, the increase in women's participation in the labor force, the rise in the share of meals eaten away from home, and the presence of new store types such as wholesale club stores impacting the foods people eat, where they shop, how meals are prepared, and by whom. In addition, while the Market Basket underlying the cost of the Thrifty Food Plan in the mainland United States has undergone several revisions that reflected updated dietary guidance since 1983, the Market Basket underlying the costs of the Thrifty Food Plan for Alaska and Hawaii has not been revised since that time—its cost has been updated only for inflation and by the temporary adjustment of 21.03 percent in 2021. The composition of the Thrifty Food Plan Market Basket Categories in 1983 reflects the commonly consumed, cost-effective foods and beverages that contributed to meeting dietary guidance at that time. Such changes in the underlying Market Basket may contribute to differences between the official Thrifty Food Plan costs in Alaska and Hawaii compared to the IRI-based estimates.

After initial cost levels were determined over 35 years ago, USDA updated the Thrifty Food Plan costs for Alaska and Hawaii for inflation using the semiannual CPI-U's for Urban Alaska and Urban Hawaii for specific food-at-home categories (i.e., bread, fresh vegetables, poultry, etc.).^m Due to imperfect alignment between Thrifty Food Plan Market Basket Categories and lower level CPI food-at-home categories, it is possible that changes over time in the CPI-U in Urban Alaska and Urban Hawaii did not accurately represent increases in food prices since winter 1978 for key foods in the Thrifty Food Plan Market Basket. Additionally, using nonpublished, lower level CPI-U's for specific food-at-home categories in Urban Alaska and Urban Hawaii, which contain relatively small sample sizes, may have led to higher variance in estimates of price changes over time. Even estimates with slightly increased variance can yield large differences in inflation-adjusted values when compounded for decades as in the calculation of the Thrifty Food Plan costs for Alaska and Hawaii.

^m These specific food-at-home category CPI-U's, not published by BLS, were provided to USDA by BLS and included the same lower level CPI-U's used for monthly updates to the cost of the Thrifty Food Plan in the mainland United States.

Comparison to Alternative Estimates

USDA compared the IRI-based Thrifty Food Plan cost estimates for Alaska and Hawaii to three alternative estimates: (1) C2ER-based estimates, (2) Map the Meal Gap-based estimates, and (3) estimates based on a peer-reviewed publication from 2020. This section describes each of these alternative estimates and how their results compare to the IRI-based estimates.

Despite its limitations for calculating the costs of the Thrifty Food Plan for Alaska and Hawaii, the general approach used to construct the C2ER grocery index is most similar to the IRI-based estimates (see [Appendix B](#)). The C2ER grocery index and IRI-based food price index have key differences though, including different time points for deriving the price differentials and different location boundaries (i.e., city versus county boundaries).³³ The IRI-based estimate of the cost of the Thrifty Food Plan is \$94.60 (8 percent) higher in Anchorage and \$2.80 (less than 1 percent) lower in Honolulu than C2ER-based estimates, which use the grocery index C2ER published for the first quarter of 2022 ([Table 5](#)).

While Map the Meal Gap has limitations in producing Thrifty Food Plan cost estimates for Alaska and Hawaii, it is the only set of Thrifty Food Plan cost estimates for Alaska and Hawaii based on retail scanner data available to compare against (see [Appendix B](#)). Although they are both based on scanner data, the Map the Meal Gap index and the IRI-based food price index have differences, particularly that the Map the Meal Gap index is

calculated without explicitly controlling for regional differences in the local food environment or food selections. USDA calculated the ratio of Map the Meal Gap's 2020 estimate of the average meal cost for Anchorage Borough (\$4.13) and Honolulu County (\$3.98) to the national average meal cost (\$3.25), then applied that ratio as a price-of-food adjustment factor to the cost of the Thrifty Food Plan in the mainland United States.⁴² The IRI-based Thrifty Food Plan cost estimates are \$84.40 (7 percent) and \$281.40 (24 percent) higher than the Map the Meal Gap-based estimates in Anchorage and Honolulu, respectively.

The IRI-based estimates are also substantially higher than estimates derived through the methodology used by Greenberg et al. (2020), which was not based on a price index.³² In 2014, Greenberg et al. collected food price data throughout the Pacific region, including in Alaska and Hawaii. They estimated the cost of the Thrifty Food Plan in Alaska and Hawaii using the ERS Community Food Security Toolkit, which is based on the Thrifty Food Plan, 1999 and represents a substantially different set of foods than does the Thrifty Food Plan, 2021. Another key difference is that Greenberg et al. based their Thrifty Food Plan cost estimates for Alaska and Hawaii on four communities in each State rather than Anchorage and Honolulu alone. The IRI-based estimates are \$299.20 (31 percent) and \$186.70 (15 percent) higher than the Greenberg et al. estimates for Alaska (Anchorage) and Hawaii (Honolulu), respectively.

Table 5. IRI-based, official, legacy, and three alternative June 2022 Thrifty Food Plan cost estimates for the reference family of four in Anchorage and Honolulu

Source	June 2022 Thrifty Food Plan cost ^a	June 2022 Thrifty Food Plan cost ^a
	Anchorage	Honolulu
New estimates:		
IRI-based estimates ^b	\$1,278.80	\$1,432.40
Official and legacy Thrifty Food Plan costs:		
Official Thrifty Food Plan cost ^c	\$1,163.00	\$1,794.60
Legacy Thrifty Food Plan cost ^d	\$960.90	\$1,482.80
Alternative estimates:		
C2ER-based estimates ^e	\$1,184.30	\$1,435.20
Map the Meal Gap-based estimates ^f	\$1,194.40	\$1,151.00
Greenberg et al. (2020)-based estimates ^g	\$979.70	\$1,245.70

Notes:

The reference family of four is defined by Federal statute (7 U.S.C. § 2012(u)) as consisting of a man and a woman twenty through fifty, a child six through eight, and a child nine through eleven years of age.

IRI = Information Resources, Inc.; C2ER = Council for Community and Economic Research.

^a Values are rounded to the nearest \$0.10.

^b IRI-based estimates using a price-of-food adjustment from the 2017 IRI InfoScan data applied to the June 2022 cost of the Thrifty Food Plan for the reference family of four in the mainland United States.

^c Official Thrifty Food Plan costs are the costs of the Thrifty Food Plan for the reference family of four in June 2021 with the temporary 21.03 percent adjustment and inflated to June 2022 dollars using the major food-at-home category CPI-U's for Urban Alaska and Urban Hawaii.

^d Legacy Thrifty Food Plan costs are the costs of the Thrifty Food Plan for the reference family of four in June 2021 without the temporary 21.03 percent adjustment and inflated to June 2022 dollars using the major food-at-home category CPI-U's for Urban Alaska and Urban Hawaii.

^e C2ER-based estimates using a price-of-food adjustment from the C2ER Cost of Living Index Quarter 1 2022 grocery index applied to the June 2022 cost of the Thrifty Food Plan for the reference family of four in the mainland United States.

^f Map the Meal Gap-based estimates using the 2020 price index as a price-of-food adjustment applied to the June 2022 cost of the Thrifty Food Plan for the reference family of four in the mainland United States.

^g Greenberg et al. (2020) estimates are estimates of the weekly cost of the Thrifty Food Plan in Alaska and Hawaii in 2014 using the ERS Community Food Security Toolkit. USDA converted the weekly estimates to monthly estimates by multiplying by 4.333 and adjusted for inflation to June 2022 dollars using the major food-at-home category CPI-U's for Urban Alaska and Urban Hawaii.

Sensitivity Analyses

USDA made several choices and assumptions in estimating the Thrifty Food Plan costs for Alaska and Hawaii; the rationales and justifications for these choices and assumptions used in the main analysis are described in previous sections. In addition to documenting these rationales, USDA conducted sensitivity analyses to assess how plausible adjustments to choices and assumptions affect Thrifty Food Plan cost estimates for Alaska and Hawaii. A complete discussion of the sensitivity analyses is provided in [Appendix D](#).

USDA conducted sensitivity analyses regarding nine general choices and assumptions it could have made:

- (1) using only June prices instead of prices for the whole year,
- (2) relaxing the assumption that retail chains within store types are comparable to each other,
- (3) not applying the IRI store weights that were developed to make the data more nationally representative,
- (4) excluding UPCs below a minimum sales value in each location,
- (5) excluding drug and club stores from the index calculation,
- (6) calculating the index using a geometric mean instead of an arithmetic mean,
- (7) changing the geographic definitions of Anchorage and Honolulu to the cities rather than the counties,
- (8) assuming that unit prices are uniform within RMAs, and
- (9) using location-specific sales shares to weight UPCs within ECs.

Suboptions were explored for some of these analyses. For example, one analysis considered three different minimum sales values. USDA performed a total of 15 sensitivity analyses. For 12 of the 15 analyses, the price-of-food adjustment factors for Anchorage were within 3 percentage points of the main analysis. For 11 of the 15 analyses, the price-of-food adjustment factors for Honolulu were within 3 percentage points of the main analysis.

Discussion

This report provides a detailed accounting of new Thrifty Food Plan cost estimates for Alaska and Hawaii. The following sections discuss USDA's process for ensuring transparency and accuracy in the analysis as well as limitations and additional considerations related to the methodology used to produce the new estimates.

USDA is committed to scientific integrity, quality assurance, and transparency. The details in this report, including 15 sensitivity analyses, support USDA's goals surrounding transparency by enabling readers to understand how statutory language along with analytic choices influence the

new Thrifty Food Plan cost estimates for Alaska and Hawaii. Quality assurance procedures included collaboration with Federal subject matter experts and external peer review.

The analyses detailed in this report were conducted by a team of economists at the USDA, Food and Nutrition Service (FNS) Center for Nutrition Policy and Promotion (CNPP). For quality assurance, the calculations were performed independently by two economists at CNPP using two different statistical computing packages (SAS and R).^{43 44} Data management and analysis results were compared at each step. The economists worked collaboratively

to identify and resolve any inconsistencies that emerged and confirmed that their final analyses yielded consistent results. The SAS code used to calculate the price index was reviewed by USDA's Economic Research Service (ERS) and was confirmed to execute the described methodology. CNPP collaborated with Federal stakeholders throughout the process and followed a rigorous process to complete this work. The report, including the final methodology and results, was peer reviewed at various multiple stages during the development by staff at USDA's FNS, ERS, and Office of the Chief Economist (OCE) prior to publication, and feedback from these agencies was incorporated in the final report. USDA also conducted a formal, comprehensive, and independent peer review. USDA provided the report to six researchers outside of the Federal Government with demonstrated knowledge and expertise in price indexes, scanner data, and the Thrifty Food Plan. All peer review comments were considered, and most of their feedback was incorporated into the final publication. FNS responded to the peer reviewers, including rationale for the few comments not incorporated in the report.

The IRI-based price index reflects the best currently available measure of the difference in the price of foods and beverages in the Thrifty Food Plan Market Basket for the reference family of four between the mainland United States, Anchorage, and Honolulu. However, there are considerations and limitations related to the IRI InfoScan data, USDA's use of UPCs as the unit of analysis, and the statutory and regulatory framework.

First, while the IRI InfoScan data reflect the best currently available information on food prices in Anchorage, Honolulu, and the mainland United States, there are challenges associated with using these data to perform regional price comparisons. As discussed previously, the IRI InfoScan data is

comprised of a nonrandom sample of primarily larger stores. This sample may over or under estimate differences in average unit prices between locations and such differences may influence the price-of-food adjustments to the extent that the differences vary in magnitude and/or direction across the mainland United States and Anchorage/Honolulu.

While USDA applied IRI store weights to improve the representativeness of the data in the mainland United States, there are no weights available to USDA that could have improved the representativeness of the data in Anchorage and Honolulu. Additionally, some retailers were excluded from the analysis because their sales data is aggregated at a level that made it impossible to attribute sales solely to stores located in Anchorage or Honolulu as required by regulation (see [Inclusion Criteria](#)). USDA carefully examined the number of stores and volume of sales in the analysis. Although coverage of stores in Honolulu and sales in both Anchorage and Honolulu are lower than in the mainland United States, USDA considered the IRI InfoScan sample size sufficient (see [Analytic Sample](#)). USDA recognizes that even higher levels of coverage or similar levels of coverage drawn from a random sample of retailers could improve the accuracy of future analysis, but such data are currently unavailable.

Constructing an index using UPCs as the unit of analysis has advantages in that it guarantees that the exact same products are compared across locations. However, USDA's use of UPCs as the unit of analysis, and the associated inclusion and exclusion of certain UPCs, presents a limitation of the analysis in that distinctions might be drawn between products where there is no meaningful difference in product attributes. For example, two identical products may be marketed in different areas under different brand names with different

UPCs. There might also be some product categories that have few national brands, such as eggs. Matching on UPCs might miss that there are broadly comparable products sold in each location under different brands (e.g., a dozen conventionally produced large grade AA white eggs) with different UPCs. USDA considered matching some product categories for which this might be the case on other characteristics such as production method, organic versus conventional, grade, and color but determined that this would have several limitations that outweigh the potential benefit. For one, it would introduce some level of subjectivity into the analysis that is absent when comparing strictly by UPC. In addition, the product descriptions in the IRI InfoScan data are not so exhaustive that it could be guaranteed that exactly comparable products are matched. Using UPCs as the unit of analysis presents limitations when combined with the nonrandom sample of primarily larger stores in IRI InfoScan, as the common set of UPCs is likely biased toward national brands available at major retailers. Products available only in local markets (i.e., specific localized geographic regions) that do not provide data to IRI InfoScan cannot be included in the analysis.

In other contexts, indexes that capture local foodways, consumption patterns, and/or local food environment related to consumers' substitution behaviors in response to differences in price levels may be more desirable when comparing the cost of living between locations. The statutory and regulatory framework for this analysis aligned best with a fixed-basket approach, which

excludes the substitution effects that are incorporated in the cost-of-living approach. For example, the fixed-basket price index was calculated using weights that reflect each Thrifty Food Plan Market Basket Category's share of the total cost of the Thrifty Food Plan Market Basket for the reference family of four determined in the 2021 Thrifty Food Plan reevaluation. Fruits and vegetables make up almost 14 percent and 24 percent of the cost of the Thrifty Food Plan, respectively, and these categories have a higher price index value compared to the other categories (Table 4). Because the index calculation holds these cost shares constant, the index does not reflect the response of consumers to relatively higher prices for fruits and vegetables in each location.

There are two important considerations related to interpreting the results presented in this report. First, because the price index is designed to enable bilateral comparisons between Anchorage/Honolulu and the mainland United States, the results of the index should not be interpreted as informing differences in the price of food between Anchorage and Honolulu. Comparing prices between these two locations would require a new bilateral price index to be specified or for the analysis to be conducted using a multilateral index. Second, in alignment with the statutory and regulatory framework, the price-of-food adjustments reflect differences in food prices weighted to reflect the Thrifty Food Plan Market Basket for the reference family of four. As a result, the price-of-food adjustment factors may not be applicable to any specific age-sex group.

Conclusion

USDA calculated new Thrifty Food Plan cost estimates for Alaska and Hawaii using a bilateral, fixed-basket price index and food prices from 2017 IRI InfoScan data in the mainland United States, Anchorage, and Honolulu. The price index indicated that the June 2022 cost of the Thrifty Food Plan was 36.06 percent higher in Anchorage and 52.40 percent higher in Honolulu than in the mainland United States. These adjustment factors were then applied to the cost of the Thrifty Food Plan in the mainland United States in June 2022 to estimate the monthly costs of the Thrifty Food Plan in Anchorage and Honolulu and were compared to the official June 2022 Thrifty Food Plan costs in

Alaska and Hawaii. In Alaska, the IRI-based Thrifty Food Plan cost estimate was 9 percent higher than the official June 2022 Thrifty Food Plan cost. In Hawaii, the IRI-based Thrifty Food Plan cost estimate was 20 percent lower than the official June 2022 Thrifty Food Plan cost. USDA conducted 15 sensitivity analyses to examine the effect of various changes to analytic choices and assumptions on the results of the analyses. Results were mostly consistent across the sensitivity analyses performed, with most of the resulting price indexes falling within 3 percentage points of the main results.



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Appendix A: Relevant Statutes and Regulations

This report discusses the implications of existing statutory and regulatory language as it relates to the calculation of price-of-food adjustments to the Thrifty Food Plan (see [Statutory and Regulatory Framework](#)). In support of these discussions, this appendix provides text from referenced portions of the U.S. Code and Code of Federal Regulations.

7 U.S.C. § 2012(u)

'Thrifty food plan' means the diet required to feed a family of four persons consisting of a man and a woman twenty through fifty, a child six through eight, and a child nine through eleven years of age, determined in accordance with the Secretary's calculations. By 2022 and at 5-year intervals thereafter, the Secretary shall re-evaluate and publish the market baskets of the thrifty food plan based on current food prices, food composition data, consumption patterns, and dietary guidance. The cost of such diet shall be the basis for uniform allotments for all households regardless of their actual composition, except that the Secretary shall-

(1) make household-size adjustments (based on the unrounded cost of such diet) taking into account economies of scale;

(2) make cost adjustments in the thrifty food plan for Hawaii and the urban and rural parts of Alaska to reflect the cost of food in Hawaii and urban and rural Alaska;

(3) make cost adjustments in the separate thrifty food plans for Guam, and the Virgin Islands of the United States to reflect the cost of food in those States, but not to exceed the cost of food in the fifty States and the District of Columbia; and

(4) on October 1, 1996, and each October 1 thereafter, adjust the cost of the diet to reflect the cost of the diet in the preceding June, and round the result to the nearest lower dollar increment for each household size, except that on October 1, 1996, the Secretary may not reduce the cost of the diet in effect on September 30, 1996, and except that on October 1, 2003, in the case of households residing in Alaska and Hawaii the Secretary may not reduce the cost of such diet in effect on September 30, 2002.

7 CFR 271.2 "Thrifty food plan"

Thrifty food plan means the diet required to feed a family of four persons consisting of a man and a woman 20 through 50, a child 6 through 8, and a child 9 through 11 years of age, determined in accordance with the Secretary's calculations. The cost of such diet shall be the basis for uniform allotments for all households regardless of their

actual composition. In order to develop maximum SNAP allotments, the Secretary shall make household size and other adjustments in the Thrifty Food Plan taking into account economies of scale and other adjustments as required by law.

7 CFR 273.10(e)(4)

(i) Maximum SNAP allotment level. Maximum SNAP allotments shall be based on the TFP as defined in § 271.2, and they shall be uniform by household size throughout the 48 contiguous States and the District of Columbia. The TFP for Hawaii shall be the TFP for the 48 States and DC adjusted for the price of food in Honolulu. The TFPs for urban, rural I, and rural II parts of Alaska shall be the TFP for the 48 States and DC adjusted by the price of food in Anchorage and further adjusted for urban, rural I, and rural II Alaska as defined in § 272.7(c). The TFPs for Guam and the Virgin Islands shall be adjusted for changes in the cost of food in the 48 States and DC, provided that the cost of these

TFPs may not exceed the cost of the highest TFP for the 50 States. The TFP amounts and maximum allotments in each area are adjusted annually and will be prescribed in a table posted on the FNS web site, at www.fns.usda.gov/fsp.

(ii) Adjustment. Effective October 1, 1996, the maximum SNAP allotments must be based on 100% of the cost of the TFP as defined in § 271.2 of this chapter for the preceding June, rounded to the nearest lower dollar increment, except that on October 1, 1996, the allotments may not fall below those in effect on September 30, 1996.

7 CFR 272.7(b)

(1) Rural I Alaska TFP refers to a Thrifty Food Plan (TFP) that is the higher of the TFP that was in effect in each area on October 1, 1985, or 28.52 percent higher than the Anchorage TFP, as calculated by FNS, with rounding and other reductions that are appropriate. It is to be used in the following areas: In all places in Kodiak Island Borough with the exception of Kodiak; in all places in the Kenai Peninsula Borough that are west of Cook Inlet (including Tyonek, Kustatan, Kalgin Island, Iliamna, Chenik, and Augustine Island) and Chugach Island, English Bay, Port Graham, Portlock, Pt. Gore, Pye Island, and Seldovia. In the Yukon-Koyukuk Census Area, the city of Nenana; and Skwentna in the Matanuska-Susitna Borough. In the Valdez-Cordova Census Area, all places except Dayville and Valdez; and in the Southeast Fairbanks Census Area all places except Big Delta, Delta Junction, and Fort Greely. In the Skagway-Yakutat-Angoon Census Area, all places except Skagway; in Sitka Borough all places except Sitka; in the Wrangell-Petersburg Census Area, all places except Wrangell and Petersburg; in the Ketchikan Gateway Borough, all places except Ketchikan, Saxman, and Ward Cove; in the Prince of Wales-Outer Ketchikan Census Area, all places except Craig, Hyder, and Metlakatla.

(2) Rural II Alaska TFP refers to a TFP that is 56.42 percent higher than the Anchorage TFP, as calculated by FNS, with rounding and other reductions that are appropriate. It is to be used in the following areas: North Slope Borough; Kobuk Census Area; Nome Census Area; Yukon-Koyukuk Census Area except for the city of Nenana; Wade Hampton Census Area; Bethel Census Area; Denali in the Matanuska-Susitna Borough; Dillingham-Bristol Bay Borough; and in all places in the Aleutian Islands except for Cold Bay and Adak.

(3) Urban Alaska TFP refers to a TFP that is the higher of the TFP that was in effect in each area on October 1, 1985, or .79 percent higher than the Anchorage TFP, as calculated by FNS, with rounding and other reductions that are appropriate. It is to be used in the following areas: Cold Bay and Adak in the Aleutian Islands; Kodiak in Kodiak Island Borough; Valdez and Dayville in the Valdez-Cordova Census Area; all places in Kenai Peninsula Borough that are on the Kenai Peninsula except for those specifically designated as Rural I; the entire Anchorage Borough; the entire Matanuska-Susitna Borough except for Denali and Skwentna; the entire Fairbanks-North Star Borough; the entire Juneau Borough; the entire Haines Borough; Sitka in the Sitka Borough; Skagway in the Skagway-Yakutat-Angoon Census Area; Wrangell and Petersburg in the Wrangell-Petersburg Census Area; Ketchikan, Saxman, and Ward Cove in the Ketchikan-Gateway Borough; Craig, Hyder, and Metlakatla in the Prince of Wales-Outer Ketchikan Census Area; and Big Delta, Delta Junction, and Fort Greely in the Southeast-Fairbanks Census Area.

(4) The State agency may, in consultation with FNS, change the designation of any Alaska subdivision contained in the Plan of Operation to reflect changes in demographics or the cost of food within the subdivision.

Appendix B: Existing Price Indexes and Other Food Price Data Sources Considered

Earlier sections of this report discuss options for estimating Thrifty Food Plan costs for Alaska and Hawaii, which USDA considered but ultimately ruled out (see [Existing Price Indexes](#) and [Food Price Data Sources on page 11](#)). This appendix provides additional descriptions of these options and USDA's rationale for not using them. This appendix first discusses the Federal data and price index options: BLS CPI data, BEA RPP, OPM COLA, and the data collected under a cooperative agreement between the University of Hawai'i and USDA, followed by non-Federal data and price index options: the Feeding America Map the Meal Gap index and the C2ER COLI.

Bureau of Labor Statistics Consumer Price Index

BLS collects monthly data on food prices throughout the country, including in Anchorage and Honolulu, to support the food-at-home component of the CPI. These data represent the largest ongoing Federal food price data collection effort. BLS food price data served as the basis for the official Thrifty Food Plan costs for Alaska and Hawaii through 1977,⁸⁻¹⁰ indicating that there is precedent for utilizing these data for this purpose. However, in 1978, BLS made major changes in the methods for collecting food price data in the United States, thereby hindering the construction of price-of-food adjustments in Anchorage and Honolulu using BLS data.¹² Namely, BLS started varying the set of items sampled and priced in each geographic area, making comparisons of average

prices across locations challenging. This sampling procedure has benefits for CPI calculations in that it enables the CPI to reflect price changes based on consumption behavior specific to each geographic area, resulting in a more accurate measure of price changes over time. However, it also results in data that are not appropriate for comparing price levels across geographic areas, and so are not well suited for the creation of a price-of-food adjustment for Anchorage and Honolulu relative to the mainland United States. USDA did not include BLS CPI data in its complete evaluation of food price data sources (i.e., it was not reviewed by experts at FNS, ERS, and OCE alongside other food price data options) because it had already been ruled out after consultation with BLS.

Bureau of Economic Analysis Regional Price Parities

The RPPs published by BEA are price indexes that measure geographic price level differences for one time period within the United States using a weighted average of the price level of goods and services for the average consumer in one geographic region compared to all other regions in the United States.⁴⁵ The RPPs are the only ongoing Federal estimates of regional differences in prices. While food prices are included in the RPPs, BEA does not publish food-specific RPPs. Instead, regional differences in the price of food are included in the overall RPP for all goods, which, in addition

to food, includes apparel, education, housing, medical, recreation, transportation, and other goods. The RPP for all goods is not appropriate as the basis for Thrifty Food Plan cost estimates for Alaska and Hawaii because it does not provide information specifically on regional differences in the price of food as is required under the statutory and regulatory framework. USDA did not evaluate other aspects of the RPPs (e.g., alignment with the Thrifty Food Plan, 2021 Market Basket) because the lack of a food-specific index number caused this option to be infeasible.

Office of Personnel Management Cost-of-Living Allowance

Until the passage of the Nonforeign Area Retirement Equity Assurance Act in 2010,⁴⁶ OPM conducted triannual living-cost surveys outside the mainland United States, including in Anchorage and Honolulu, to support the calculation of cost-of-living allowances for Federal employees by comparing prices in these areas with prices in Washington, DC. The results of the most recent living-cost surveys for Anchorage and Honolulu were published in 2008 based on data collected in 2006 and included a food price index based on the prices of more than 50 food items priced at three outlets in each area.^{34 35} While the OPM COLA has been mentioned as a potential option for estimating the cost of the Thrifty Food Plan outside of the mainland United States,³¹ there are several limitations of using it to inform a price-of-food adjustment to the Thrifty Food Plan. First, the most recent OPM living-cost survey was conducted more than 15 years ago. While this is considerably more current than the 1977–78 NFCS data on which the official Thrifty Food Plan costs for Alaska and Hawaii are currently based, it is still less recent than other alternatives and may not reflect current realities. Second, the relative importance of each food item in the index is

based on expenditures of households from the Consumer Expenditure Survey, which represents a substantially different purchasing pattern than the Thrifty Food Plan, 2021. Third, the OPM living-cost surveys do not include prices collected throughout the mainland United States, only prices in Washington, DC. While this supported the development of a COLA that met OPM's needs, it is not appropriate to apply to the cost of the Thrifty Food Plan in the mainland United States without the incorporation of an additional data source or index because average food prices in Washington, DC, may not be representative of average food prices in the mainland United States. Had alternative indexes or food price data sources not been feasible solely due to insufficient or unavailable data in Anchorage and Honolulu, USDA could have considered using the OPM COLA to reflect the difference in the food prices between Anchorage/Honolulu and Washington, DC, and an additional data source or index (e.g., IRI InfoScan) to reflect the difference in food prices between Washington, DC, and the mainland United States. Because the 2017 IRI InfoScan data contained sufficient data in Anchorage and Honolulu, such an approach was not needed.

Cooperative Agreement With the University of Hawaii

Following the publication of the Thrifty Food Plan, 2021, USDA entered into a cooperative agreement with the University of Hawai'i at Mānoa Children's Healthy Living Center of Excellence (CHL) to collect data on food prices in Anchorage and Honolulu. The data collection was tailored to represent key foods and beverages in the Thrifty Food Plan Market Basket for the reference family of four and to sample food retail establishments in Anchorage and Honolulu. Using the OPM living-cost surveys as a precedent and to support the development of an index, data was also collected in Washington, DC (see [Office of Personnel Management Cost-of-Living Allowance](#)).

Data collection was conducted in the last week of March 2022 and included 20 stores in Anchorage (11 grocery stores, 2 mass merchandisers, and 7 other stores), 16 stores in Honolulu (13 grocery stores, 2 mass merchandisers, and 1 other store), and 29 stores in Washington, DC (16 grocery stores, 8 mass merchandisers, and 5 other stores). In addition to being much more recent, an advantage of these data over the OPM COLA is that the sample size is more than five times larger in each region. However, as with the OPM COLA, this approach has limitations for calculating a price-of-food adjustment to the extent that food prices in Washington, DC, may not be representative of food prices throughout the mainland United States, requiring an additional adjustment factor from a separate data source to facilitate comparison to the mainland United States.

The CHL data collection included 60 foods and beverages that were selected to represent the Thrifty Food Plan Market Basket for the reference family of four and reflect the main drivers of the cost of each Thrifty Food Plan Market Basket Category. To limit confounding in regional average unit price comparisons, specific product characteristics (e.g., brands, container sizes, forms, types, flavors, and varieties) of each food and beverage were identified as the target for data collection. In cases where the target product was not available, a protocol was developed that would enable data collectors to consistently identify substitute items (e.g., a different container size or brand). Despite these protocols, some foods and beverages priced in each location had systematically different characteristics than the foods and beverages priced elsewhere, which has limitations for using this data as the basis of a price index.

These data have not yet been finalized and, as a result, have not yet been used to calculate Thrifty Food Plan cost estimates for Alaska and Hawaii. However, such estimates may be produced in the future and compared to the IRI-based estimates produced in this report as well as to the official Thrifty Food Plan costs for Alaska and Hawaii.

Feeding America Map the Meal Gap

The primary goal of the Map the Meal Gap analysis is to assess food insecurity at the community level, and a cost-of-food index is published as part of the annual report and online interactive graphic.⁴⁷ The index is calculated by assigning individual UPCs in the NielsenIQ scanner data to a food category from the Thrifty Food Plan, 2006; calculating average unit values by category; and calculating average unit values weighted by the quantities of each category for the adult male in the Thrifty Food Plan reference family. Two limitations exist for using this index as a price-of-food adjustment to the Thrifty Food Plan. First, while the index is weighted to reflect the Thrifty Food Plan, it does not reflect the combined Thrifty Food Plan Market Basket for the reference family of four. Instead,

it is based on the Thrifty Food Plan, 2006 rather than the reevaluated Thrifty Food Plan, 2021 and on the Thrifty Food Plan Market Basket of a single age-sex group (i.e., the adult male in the reference family) rather than the reference family of four. Second, this index is fixed at a high level of aggregation, leading to a high degree of regional variation in the products underlying each category. As a result, applying the results of this index as a price-of-food adjustment would implicitly create new Thrifty Food Plan Market Baskets in Alaska and Hawaii. For these reasons, the Map the Meal Gap index is not appropriate as the basis for Thrifty Food Plan cost estimates for Alaska and Hawaii.

Council for Community and Economic Research Cost of Living Index

The C2ER COLI is a commercially available dataset designed to describe differences in the cost of living between urban areas throughout the United States, including Anchorage and Honolulu. USDA considered two separate approaches that would have employed the C2ER COLI to derive Thrifty Food Plan cost estimates for Alaska and Hawaii: (1) using the grocery index published by C2ER and (2) using the underlying urban area average price data to construct a new index.

C2ER Grocery Index

The C2ER COLI includes a grocery component based on price differentials of 26 products.³³ While the C2ER COLI has been mentioned as a potential option for estimating the cost of the Thrifty Food Plan outside of the mainland United States,³¹ there are several limitations of using it to

inform a price-of-food adjustment to the Thrifty Food Plan.

Primarily, C2ER advises against interpreting the COLI as describing exact price differences between geographic areas because of the uncertain impact of three sources of nonsampling error: (1) the items included in the index may not accurately represent their respective categories as a whole; (2) prices set by the surveyed establishments may not accurately represent prices in their respective regions; and (3) prices collected may contain errors for several reasons, such as recording prices for products that do not meet the intended specifications or mislabeling in store.³³

In addition to the sources of nonsampling error identified by C2ER, this index has two properties that limit its appropriateness as a price-of-food

adjustment to the Thrifty Food Plan. First, while the C2ER COLI is a fixed-basket index, the relative importance of each item (i.e., the weight of each item in the grocery index) is based on expenditures of households in the highest income quintile from the Consumer Expenditure Survey, which represents a substantially different purchasing pattern than the Thrifty Food Plan Market Basket for the reference family of four (e.g., fruits and vegetables account for 13 percent of the C2ER grocery index but 38 percent of the cost of the Thrifty Food Plan). Second, the C2ER COLI includes higher cost food products (e.g., ribeye steak) that may not represent the price dynamics of the products included in the Thrifty Food Plan Market Basket, which emphasizes lower cost options within each Thrifty Food Plan Market Basket Category. Third, the C2ER COLI's inclusion of two nonfood items (i.e., facial tissues and dishwasher detergent) does not align with the statutory and regulatory framework for the price-of-food adjustments. Due to these limitations, this index is not appropriate as the basis for Thrifty Food Plan cost estimates for Alaska and Hawaii.

C2ER Urban Area Average Prices

After ruling out the C2ER grocery index, USDA considered using the underlying urban area average food price data as the basis for the development of an index that reflects the Thrifty Food Plan, 2021. This approach has been previously raised as a potential option for estimating the cost of the Thrifty Food Plan outside of the mainland United States.³¹

C2ER collects food price quotes from at least 3 grocery stores in each of approximately 250 urban areas 3 times per year for a total sample size of at least 2,250 price quotes per food per year, with at

least 9 price quotes per item per year in Anchorage and Honolulu.³³ C2ER only samples grocery stores, and their data may not represent overall regional differences in the price of food, which would include regional differences in the price of food at other store types (e.g., mass merchandisers). Additionally, the data are exposed to seasonality bias; the three quote periods each year occur in January, April, and July and no data is collected in the final 5 months of the year.

The areas covered by the C2ER data are not selected randomly; data are provided by volunteers in places within federally designated Metropolitan Statistical Areas or nonmetropolitan areas meeting C2ER's minimum population requirements.³³ This nonrandom sampling presents several issues. The exclusion of rural areas in the C2ER data may bias average unit prices in the mainland United States upward, as food prices in rural areas in the United States may be lower than in urban areas.⁴⁸ C2ER also does not provide weights with which the data could be made more nationally representative.

C2ER's data collection protocol was designed to obtain price quotes for consistent products between urban areas to minimize confounding in regional unit price comparisons. Prices are also quoted in all places during the same 3-day pricing period so that sudden shifts in price do not affect unit prices in some areas but not others.³³ C2ER provides data collectors with specific product characteristics (e.g., brand, container size, form, and type) to target when obtaining price quotes.⁴⁹ However, according to C2ER (T. Baines, personal communication, January 10, 2021), a range of container sizes are observed during data collection for certain items, and average unit prices are calculated per unit by C2ER without additional interpolation to account for the size of the item.

As a result, the average prices of these items may be confounded by differences in container size availability, although this effect is likely marginal.

The 24 foods in the C2ER data cover the 6 broad categories of the Thrifty Food Plan Market Basket: fruits, vegetables, grains, dairy, protein foods, and miscellaneous. However, they only cover 17 of the 24 Thrifty Food Plan Market Basket Categories. The following seven Thrifty Food Plan Market Basket Categories are not represented in the C2ER data: dark-green vegetables; red and orange vegetables; beans, peas, lentils; whole-grain cereals; refined-grain staple grains; lower fat milk; and nuts, seeds, and soy products. While the 24 foods in the C2ER data could be weighted to better

reflect the Thrifty Food Plan Market Basket, the omission of foods in these 7 Thrifty Food Plan Market Basket Categories prevent such an exercise from yielding an index that is sufficiently representative of the Thrifty Food Plan, 2021.

The C2ER COLI data are collected specifically to support the construction of a fixed-basket price index to compare the price of food across regions. However, the low coverage of foods and beverages in the Thrifty Food Plan Market Basket for the reference family of four and nonrandom underlying sample made the data less advantageous to use as the basis for price-of-food adjustments to the cost of the Thrifty Food Plan compared to alternatives.

Appendix C: Price Index Technical Notes

USDA used a price index to estimate the difference in food prices between the mainland United States compared to Anchorage and Honolulu (see [Equation 1](#)).

Equation 1. Price Index

$$P_i = \sum_{v \in V_{m,i}} \left(\frac{p_{v,i}}{p_{v,m}} \right) c_v$$

Where P_i is the value of the price index; i refers to either Anchorage or Honolulu; m refers to the mainland United States; $p_{v,i}$ and $p_{v,m}$ are the inflation-adjusted average unit prices of UPC v in location i and the mainland United States,

respectively (see [Average Unit Prices](#)); $V_{m,i}$ is the common set of UPCs in the Thrifty Food Plan Market Basket sold in both the mainland United States and location i in 2017; and c_v is the cost share of UPC v in the Thrifty Food Plan Market Basket given the common set $V_{m,i}$ (see [Cost Shares](#)).

The price index can be expressed in either of two forms: a quantity-based form or a cost share-based form. While the two forms are equivalent, USDA chose to use a cost share-based form for this analysis because of the ease of managing Thrifty Food Plan cost shares rather than quantities, since quantity measures in the data vary by UPC. Additional details on the calculation of average unit prices and cost shares are included below.

Average Unit Prices

USDA calculated average unit prices for each UPC in each location as the weighted average unit price by store type inflated to June 2022. Each step of this calculation is described in detail below.

First, USDA calculated region-specific adjustment factors to reflect inflation between 2017 and June 2022 using the overall food-at-home and major food-at-home category CPI-U's as shown in [Equations 2a, 2b, and 2c](#). Category-specific CPI-U adjustment factors were calculated and applied to UPCs based on the Thrifty Food Plan Market Basket Category associated with the UPC ([Table C.1](#)). National-level CPI-U's were used to inform inflation adjustments to average unit prices in the mainland United States; Urban Alaska CPI-U's were used to inform inflation adjustments to average unit prices in Anchorage; and Urban Hawaii CPI-U's were used to inform inflation adjustments to average unit prices in Honolulu. Major food-at-home category CPI-U's in Urban Alaska and Urban Hawaii were not part

of BLS published data until the 2018 geographic revision to the CPI-U,⁵⁰ and therefore, major food-at-home category CPI-U's for these regions are not available for 2017. To account for this, two separate inflation adjustment factors were calculated and then combined. The first adjustment factor ([Equation 2a](#)) addresses inflation from 2017 to 2018 using the overall food-at-home CPI-U's, which are available in Urban Alaska and Urban Hawaii prior to the 2018 geographic revision. The second adjustment factor ([Equation 2b](#)) addresses inflation from 2018 to June 2022 using the major food-at-home category CPI-U's. The final inflation adjustment factor is the combination of the two adjustment factors ([Equation 2c](#)). For consistency across regions, this same approach was used to calculate the inflation adjustments to unit prices in the mainland United States even though national-level major category CPI-U's were regularly published prior to 2018.

Equation 2a. Inflation adjustment: 2017 to 2018

$$I_r^a = \frac{CPI_{FAH,r}^{2018}}{CPI_{FAH,r}^{2017}}$$

Where I_r^a is the 2017 to 2018 inflation adjustment for region r (Urban Alaska, Urban Hawaii, or national); $CPI_{FAH,r}^{2017}$ is the 2017 average food-at-home CPI-U value for region r ; and $CPI_{FAH,r}^{2018}$ is the 2018 average food-at-home CPI-U value for region r .

Equation 2b. Inflation adjustment: 2018 to June 2022

$$I_{v,r}^b = \frac{CPI_{v,r}^{June\ 2022}}{CPI_{v,r}^{2018}}$$

Where $I_{v,r}^b$ is the 2018 to June 2022 inflation adjustment for UPC v in region r ; $CPI_{v,r}^{2018}$ is the 2018 average CPI-U value for the major food-at-home category associated with UPC v (Table C.1) in region r ; and $CPI_{v,r}^{June\ 2022}$ is the June 2022 CPI-U value for the major food-at-home category associated with product v in region r .

Equation 2c. Inflation adjustment: 2017 to June 2022

$$I_{v,r} = I_r^a I_{v,r}^b$$

The final inflation adjustments for each UPC from 2017 to June 2022 ($I_{v,r}$) were calculated by multiplying the 2017 to 2018 inflation adjustment (I_r^a , Equation 2a) and the 2018 to June 2022 inflation adjustment ($I_{v,r}^b$, Equation 2b).

USDA used the 2017 IRI InfoScan data for sales in Anchorage, Honolulu, and the mainland United States; the IRI store weights for the mainland United States; and the inflation adjustment factors

calculated in Equation 2c to calculate inflation-adjusted average unit prices for each UPC in each region by store type as shown in Equations 3 and 4. The UPCs were linked to final inflation adjustments for each CPI-U major food category ($I_{v,r}$) via the PPC linked to Thrifty Food Plan Market Basket Categories.

Equation 3. Inflation-adjusted average UPC unit price by store type in Anchorage and Honolulu

$$p_{v,i,t}^{2022} = \frac{\sum_{o \in O_{i,t}} (S_{v,o})}{\sum_{o \in O_{i,t}} (U_{v,o})} I_{v,i}$$

Where $p_{v,i,t}^{2022}$ is the inflation-adjusted average unit price for UPC v in location i (Anchorage or Honolulu, but not the mainland United States) at store type t ; $o_i \in O_{i,t}$ indicates the set of retailers in location i belonging to store type t ; $S_{v,o}$ and $U_{v,o}$ are the total value of sales and total number of units sold, respectively, at retailer o , for UPC v , in location i . The inflation factor $I_{v,r}$ (Equation 2c) is used to adjust region-specific UPC-level average prices from 2017 to June 2022.

Equation 4. Inflation-adjusted average UPC unit price by store type in the mainland United States

$$p_{v,m,t}^{2022} = \frac{\sum_{o \in O_{m,t}} (S_{v,o} w_o)}{\sum_{o \in O_{m,t}} (U_{v,o} w_o)} I_{v,m}$$

The unit price for UPC v in the mainland United States, $p_{v,m,t}^{2022}$, is calculated in the same way as for Anchorage and Honolulu (Equation 3), but the total value of sales and total number of units sold are summed across outlets in the mainland United States ($o_m \in O_{m,t}$) and are weighted by the IRI store weights, w_o .

Table C.1. CPI-U major food-at-home category associated with each Thrifty Food Plan Market Basket Category

Thrifty Food Plan Market Basket Category	Major food-at-home category CPI-U
Vegetables	
Dark green vegetables	Fruits and vegetables
Red and orange vegetables	Fruits and vegetables
Beans, peas, lentils	Fruits and vegetables
Starchy vegetables	Fruits and vegetables
Other vegetables	Fruits and vegetables
Fruits	
Whole fruit	Fruits and vegetables
100% fruit juice	Nonalcoholic beverages and beverage materials
Grains	
Whole-grain staple grains	Cereals and bakery products
Whole-grain cereals	Cereals and bakery products
Refined-grain staple grains	Cereals and bakery products
Refined-grain other	Cereals and bakery products
Dairy	
Low- and non-fat milk, yogurt, soy alternatives	Dairy and related products
Higher fat milk, yogurt, soy alternatives	Dairy and related products
Cheese	Dairy and related products
Protein foods	
Meats	Meat, poultry, fish, and eggs
Poultry	Meat, poultry, fish, and eggs
Eggs	Meat, poultry, fish, and eggs
Seafood	Meat, poultry, fish, and eggs
Nuts, seeds, soy products	Other food at home
Miscellaneous	
Pre-prepared entrees and side dishes	Other food at home
Coffee and tea	Nonalcoholic beverages and beverage materials
Table fats and oils	Other food at home
Sauces, condiments, jams, honey, sugars, spices	Other food at home
Other foods and beverages	Other food at home

Note: CPI-U = Consumer Price Index for All Urban Consumers.

USDA used data from all retailers and geographies in the 2015–16 IRI InfoScan to calculate sales shares by store type for each UPC, as shown in [Equation 5](#). The calculation of store type sales shares uses un-weighted 2015–16 IRI data for consistency with the methodology used for the Thrifty Food Plan, 2021, which used these same data and was published prior to the release of IRI store weights.

Equation 5. Store type sales shares

$$\tau_{v,t} = \frac{S_{v,t}}{\sum_{t \in T} S_{v,t}}$$

Where $\tau_{v,t}$ is the store type sales share, $S_{v,t}$ is the total value of sales for UPC v at store type t in 2015–16, and T is the common set of store types in which sales of UPC v were observed in the compared locations. In cases where sales of UPC v at store type t in 2017 were observed in only one of the compared locations, the associated sales value was excluded from the analysis. For example, if a UPC is sold at grocery stores, club stores, and mass merchandisers in the mainland United States but only at grocery stores and mass merchandisers in Honolulu, sales of the UPC at club stores in the mainland United States would be excluded and the store type sales share would be calculated only with the common store types included.

USDA used the 2017 IRI data to calculate average UPC unit prices in Anchorage, Honolulu, and the mainland United States by weighting the average UPC unit price by store type (e.g., grocery store, mass merchandiser, etc.) in the mainland United States ([Equation 4](#)) by the store type sales share ([Equation 5](#)) as shown in [Equation 6](#) and [Equation 7](#).

Equation 6. Average UPC unit price in Anchorage and Honolulu

$$p_{v,i} = \sum_{t \in T} (p_{v,i,t}^{2022} \tau_{v,t})$$

Equation 7. Average product unit price in the mainland United States

$$p_{v,m} = \sum_{t \in T} (p_{v,m,t}^{2022} \tau_{v,t})$$

As in [Equation 1](#), $p_{v,i}$ and $p_{v,m}$ are the inflation-adjusted average unit prices of UPC v in location i (Anchorage or Honolulu) and the mainland United States, respectively; $p_{v,i,t}^{2022}$ is the unit price for UPC v in location i at store type t ([Equation 3](#)); $p_{v,m,t}^{2022}$ is the unit price for UPC v in the mainland United States at store type t ([Equation 4](#)); $\tau_{v,t}$ is the store type sales share ([Equation 5](#)).

Cost Shares

As an interim step of the Thrifty Food Plan, 2021 reevaluation, USDA calculated the share of the Thrifty Food Plan Market Basket cost attributable to each EC and EC-form within each Thrifty Food Plan Market Basket Category (see [Unit of Analysis](#)). For this analysis, USDA further disaggregated the cost shares of each combination of EC and form into UPCs using the PPC. However, not every UPC in the Thrifty Food Plan Market Basket is sold in all locations and some of these UPCs were no longer present in the marketplace in 2017 (see [Cost Shares of UPCs Underlying the Thrifty Food Plan](#)). Cost shares for UPCs in the Thrifty Food Plan Market Basket that were not in the common set ($V_{m,i}$) were proportionately reallocated to other UPCs following a hierarchical procedure as follows.

First, cost shares for UPCs in the Thrifty Food Plan Market Basket, but not in the common set, were proportionately reallocated to other UPCs associated with the same EC-form that were in the common set. For example, if a particular brand and package size of shelf-stable mozzarella sticks (identified by a unique UPC) was in the Thrifty Food Plan Market Basket but not in the common set, this UPC's cost share was reallocated to all shelf-stable mozzarella stick UPCs in the common set, maintaining the remaining UPCs' relative importance.

Second, cost shares for EC-forms that contained no UPCs in the common set were proportionately reallocated to the other foods and beverages associated with the same EC. For example, if mozzarella sticks were in the Thrifty Food Plan Market Basket in both shelf-stable and refrigerated forms, but only the refrigerated form of the EC was in the common set, the cost share originally allocated to the shelf-stable form was reallocated to the refrigerated form.

Third, cost shares for ECs that contained no UPCs in the common set were proportionately reallocated to the other ECs associated with the same Thrifty Food Plan Market Basket Category with UPCs that were present in the common set. For example, if mozzarella sticks were included in the Thrifty Food Plan Market Basket Category "Cheese" but no UPCs in this EC were available in the common set, the cost share for mozzarella sticks would be reallocated to other ECs in the "Cheese" category (e.g., American cheese, cheddar cheese, etc.), maintaining the remaining ECs' relative importance.

There were no cases in which an entire Thrifty Food Plan Market Basket Category contained no UPCs in the common set.

Appendix D: Sensitivity Analyses

USDA conducted sensitivity analyses regarding nine choices and assumptions it could have made:

- (1) using only June prices instead of prices for the whole year,
- (2) relaxing the assumption that retail chains within store types are comparable to each other,
- (3) not applying the IRI store weights that were developed to make the data more nationally representative,
- (4) excluding UPCs below a minimum sales value in each location,
- (5) excluding drug and club stores from the index calculation,
- (6) calculating the index using a geometric mean instead of an arithmetic mean,
- (7) changing the geographic definitions of Anchorage and Honolulu to the cities rather than the counties,
- (8) assuming that unit prices are uniform within RMAs, and
- (9) using location-specific sales shares to weight UPCs within ECs.

Suboptions were explored for some of these analyses. For example, one analysis considered three different minimum sales values. This appendix provides additional details on the rationale for these choices and assumptions as well as details of the results of sensitivity analyses.

June Food Prices

The average unit prices calculated for the index are based on average unit prices calculated using the full year of 2017 IRI InfoScan data (see [Food Prices](#)). Because maximum SNAP allotments each fiscal year are based on the cost of the Thrifty Food Plan in the preceding June, USDA considered developing an index based only on June 2017 IRI InfoScan data. USDA conducted a sensitivity analysis using only June 2017 prices as the basis for the construction of the index.

Using only June 2017 sales from the IRI InfoScan had a small effect; the sample size of UPCs in the common set decreased by around 1,500 UPCs (14 percent) and around 1,900 UPCs (17 percent) for

the Anchorage and Honolulu indexes, respectively, and the price-of-food adjustments decreased by 0.2 and increased by 2.3 percentage points for Anchorage and Honolulu, respectively ([Table D.1.1](#)).

This approach would have reduced the available sample size by over 90 percent and is sensitive to any anomalous price differentials (e.g., due to temporary promotions or seasonal differences in price and availability) present in June 2017. Using a full year of sales data, rather than only data from June, is consistent with the methodology used for the Thrifty Food Plan, 2021, which used data from throughout the full 2015–16 period and an inflation adjustment to June 2021.

Heterogeneity Within Store Types

Average unit prices for each UPC were calculated as the weighted average unit price across store types (i.e., grocery stores, mass merchandisers, drug stores, and club stores) to minimize confounding due to differences in quality and services associated with store type in the index (see [Food Prices](#)). However, it is also plausible that quality and services can vary within certain store types and that a more granular unit of analysis (i.e., retailer) could be used to further minimize this source of bias. USDA conducted two sensitivity analyses to measure the impact of this assumption on the price-of-food adjustments: (1) assuming that mass merchandiser retailers are heterogeneous and (2) assuming that retailers in all store types are heterogeneous. In these sensitivity analyses, average unit prices were calculated by retailer rather than by store type for those store types assumed to be heterogeneous, and the average unit price of each UPC was calculated using only the common set of retailers between the two compared locations.

Assuming that mass merchandisers are heterogeneous had a small effect; the number of stores in the mainland United States decreased by over 5,600, and the price-of-food adjustment decreased

by 1.0 and 1.3 percentage points for Anchorage and Honolulu, respectively ([Table D.1.1](#)). Assuming that retailers within all store types are heterogeneous had a larger impact; the number of stores in the mainland United States decreased by over 28,000, and the price-of-food adjustment decreased by 8.2 and 7.3 percentage points in Anchorage and Honolulu, respectively.

While the assumption of heterogeneity of retailers within store types is plausible, it has a substantial downward effect on the sample size of stores available to analyze in the mainland United States, especially when retailers within all store types are assumed to be heterogeneous. This results in a sample that may no longer be compatible with the IRI store weights, which were developed to be applied to all stores within each store type. Further, retail companies are unevenly distributed across the mainland United States. Restricting the sample of retailers in the mainland United States may lead to unit price estimates in the mainland United States that are not representative. Additionally, ownership structures can be complex, potentially leading to limitations with how retailers and their parent companies are defined in the IRI data provided to USDA.

Not Applying IRI Store Weights in Mainland United States

Average unit prices for each UPC in the mainland United States were calculated using nationally representative IRI store weights (see [Food Prices](#)). USDA also considered not applying the IRI store weights when calculating average unit prices for each UPC in the mainland United States because the weights were developed for a slightly different geographic area (i.e., to represent the entire United States instead of the 48 contiguous States and DC) and for consistency with Anchorage and Honolulu, which were not adjusted using the IRI store weights as the weights are not appropriate to apply to these smaller geographic areas. USDA tested the sensitivity of the results to store weights in two ways: (1) using the same set of stores in the mainland United States as in the main analysis but using unweighted average prices and (2) expanding the set of stores in the mainland United States to include those stores that were excluded from the main analysis due to missing store weights (see [Inclusion Criteria](#)).

In the first part of this sensitivity analysis, the price-of-food adjustment factors decreased by 2.2 percentage points in Anchorage and by 1.2 percentage points in Honolulu when average prices for the mainland United States are calculated without applying the store weights ([Table D.1.1](#)). DoD commissaries were excluded in the main analysis because store weights were not developed for these stores, but they are available at the

store level in both Anchorage, Honolulu, and the mainland United States and can be included in the second part of this sensitivity analysis. Because average prices are calculated using store type weights based on sales in all of the United States, the inclusion of DoD commissaries is not expected to have a large impact on average prices because they represent only a small share of sales. The impact on the adjustment factors in this scenario include both the effect of not using store weights in the mainland and of including DoD commissaries. The additional effect on the adjustment factors is a 0.4 percentage point decrease in Anchorage and a 0.6 percentage point decrease in Honolulu.

The store weights were specifically developed to make the IRI InfoScan data more nationally representative, but their use in the main analysis excludes DoD commissaries because weights were not developed for this store type. USDA considered the methodological strength of making the data more nationally representative to outweigh the disadvantage of excluding DoD commissaries since this store type accounts for a very small share of sales nationally and is only accessible to military service members and their families. The sensitivity analyses show that the application of IRI store weights does not have a large impact on the resulting adjustment factors.

Minimum Sales Value as an Inclusion Criterion

The IRI-based food price index is based on sales data for all UPCs with sales observed in at least one common store type between the compared locations (see [Cost Shares of UPCs Underlying the Thrifty Food Plan](#) and [Food Prices](#)). USDA also considered implementing an additional inclusion criterion around minimum sales values to avoid UPCs that are rarely sold from playing an outsized role in the index. USDA did not implement this option in the main analysis because there was no evidence on which a specific sales value minimum could be based. However, USDA tested the sensitivity of the analysis to values at multiple orders of magnitude (\$10, \$100, \$1,000) to better understand the impact of this decision on the results ([Table D.1.2](#)).

Implementing a \$10 minimum sales value decreases the number of UPCs in the index by over 150 UPCs, resulting in a decrease of 0.1 percentage points in the price-of-food adjustment factor in Anchorage and a percentage point decrease of less than 0.1 in Honolulu. Excluding sales values below \$100 leads to excluding over 700 UPCs in both locations, with resulting decreases in the adjustment factor of less than 0.1 percentage points in Anchorage and an increase in 0.2 percentage points in Honolulu. Implementing a \$1,000 sales minimum resulted in the exclusion of over 3,000 UPCs in Anchorage and over 2,500 in Honolulu. The resulting adjustment factors are 1.1 percentage points higher in Anchorage and 0.1 percentage points higher in Honolulu.

Store Type Inclusion Criteria

The IRI-based food price index includes all store types in the IRI InfoScan for which IRI store weights were developed: grocery stores, mass merchandisers, and drug stores, as well as club stores in the index for Honolulu (see [Food Prices](#)). USDA also considered including only store types where the largest share of expenditures on foods and beverages in the Thrifty Food Plan Market Basket for the reference family of four occur, namely grocery stores and mass merchandisers. USDA did not implement this option because there was no definitive way to define which store types contributed to a "substantial" share of expenditures on foods and beverages in the Thrifty Food Plan Market Basket for the reference family of four. These two store types typically carry foods that represent the range of foods in the Thrifty Food Plan Market Basket Categories, whereas drug

and club stores may be less likely to sell a full selection of products, particularly in the fruits and vegetables categories that play an important role in the Thrifty Food Plan.

Including only grocery stores and mass merchandisers in the analysis increases the adjustment factor by 0.1 percentage point in Anchorage and by 3 percentage points in Honolulu ([Table D.1.2](#)). In Anchorage, this effectively only excludes drug stores from the analysis because club stores were not part of the main analysis, resulting in data from 12 stores used in this analysis. In Honolulu, both drug stores and club stores are excluded, resulting in data from 18 stores being used in this analysis. In the mainland United States, the number of stores decreases from around 40,000 in the main analysis to just under 20,000.

Geometric Mean

The main analysis uses a weighted arithmetic mean to calculate the index value (see [Appendix C](#)). However, other price indexes have also been calculated using a geometric mean. For example, BLS uses a geometric mean when calculating the CPIs to better account for economic substitution behavior of consumers.⁵¹ While accounting for substitution effects suits the CPI, it does not align with the analytic framework for price-of-food adjustments to the Thrifty Food Plan. As previously discussed, the statutory and regulatory framework guiding the development of Anchorage and Honolulu price-of-food adjustments factors stipulates that the cost of the fixed Thrifty Food Plan Market Basket for the reference family of four be

adjusted for the price of food in Anchorage and Honolulu. As such, selecting an index form that is designed to more fully incorporate substitution effects did not align with the analytic framework for the price-of-food adjustments. USDA conducted a sensitivity analysis using a geometric mean to better understand how this methodological choice would influence the price-of-food adjustment factors. The adjustment factor is 3.8 percentage points lower in Anchorage and 6.3 percentage points lower in Honolulu than in the main analysis when using a geometric mean ([Table D.1.2](#)). These decreases indicate that the underlying distributions of UPC-level price ratios are right-skewed.

Geographic Definitions

Historically, Anchorage and Honolulu were used as the basis for the original price-of-food adjustments because they were the only locations in Alaska and Hawaii where BLS routinely collected food price information.¹¹ As such, the statutory and regulatory framework calls for the Thrifty Food Plan costs for Alaska and Hawaii to be based on food prices in Anchorage and Honolulu (see [Statutory and Regulatory Framework](#)). However, there is ambiguity as to whether Anchorage and Honolulu should be defined using municipal boundaries (i.e., the cities of Anchorage and Honolulu) or county boundaries (i.e., Anchorage Borough and Honolulu County). USDA defined Anchorage and Honolulu using county boundaries for this analysis to maximize the available sample sizes from which to determine food prices and because the county

boundaries cover larger populations than the municipal boundaries. In addition, it is plausible that retailers located outside of municipal boundaries still serve the population residing within the cities.

USDA tested the sensitivity of the index to different geographic boundary specifications. In Anchorage, there are only three stores located outside of the municipal boundaries, leading to a 0.1 percentage point decrease in the adjustment factor ([Table D.1.3](#)). In Honolulu, more than half of the stores are located outside of the city of Honolulu, including all of the club stores, which results in the exclusion of this store type from the analysis. The resulting price-of-food adjustment factor is 3.3 percentage points higher in Honolulu.

Uniform Unit Prices Within RMAs

Average unit prices were calculated using only sales from the 2017 IRI InfoScan that could be attributed to stores located in Anchorage or Honolulu (see [Food Prices](#)). However, some previous research using store-based scanner data has imputed store-level unit prices by assuming uniform unit prices at stores within RMAs.^{29 30} Generally, the assumption that retail chains set uniform prices over broad geographic areas is supported in the literature.³⁸ In the main analysis, sales from stores in Anchorage or Honolulu that were released to USDA as part of an RMA that also included stores outside of Anchorage or Honolulu were not included in unit price estimates for two reasons: First, using sales data from locations outside of Anchorage or Honolulu to impute unit prices in Anchorage and Honolulu conflicts with 7 CFR § 273.10(e)(4)(i) that specifies that the cost of the Thrifty Food Plan is to be adjusted for the price of food in Anchorage and Honolulu. Second, while this approach has been applied in previous research, it has not been applied in analyses of Anchorage and Honolulu, specifically. Geographic price variation between Alaska, Hawaii, and other locations that may be aggregated under the same RMAs may be systematically different than geographic price variation elsewhere in the country. One retail chain reports sales data for Alaska and Hawaii under one common RMA that combines sales data from both of these States. USDA's analyses suggest that prices in Alaska and Hawaii are substantially different from each other, making the assumption of uniform within-RMA prices untenable for sales aggregated across these States. All other retail chains present in Alaska and Hawaii that report at the RMA level

only aggregate sales from stores located within each State.

There are several club and grocery stores located in Anchorage for which sales are provided as part of an RMA that includes stores in other locations throughout Alaska. In addition to increasing the number of stores in the analysis, the assumption of uniform within-RMA prices makes it possible to include club stores as a store type in Anchorage. The inclusion of these stores decreases the adjustment factor by 4.8 percentage points ([Table D.1.3](#)). In Hawaii, there is a drug store chain that reports at the RMA-level, and more than half of its stores are located in Honolulu County. Including prices from this RMA in the analysis increases the adjustment factor by 1.3 percentage points.

The assumption of nonuniform RMA prices in the main analysis resulted in the exclusion of club stores from the price index calculation in Anchorage, since all sales at Anchorage club stores in the IRI InfoScan data acquired by USDA are provided at the RMA level and are aggregated with sales outside of Anchorage. Implicitly, this analytical choice assumes that the difference in prices between club stores in Anchorage and club stores in the mainland United States is comparable to the difference in prices between other store types. To assess how this analytical choice impacts the results, USDA conducted a sensitivity analysis that assumes uniform prices within the RMA only for this store type. The resulting impact on the price index is a decrease of 0.2 percentage points compared to the main analysis.

Different Weights for UPCs

In the main analysis, the weight for each UPC within an EC-form combination was determined by its sales share in the 2015–16 IRI InfoScan data for all of the United States for consistency with the 2021 Thrifty Food Plan reevaluation. To assess the impact of this analytical choice, USDA performed two sensitivity analyses: (1) weighting UPCs by their sales shares in the mainland United States in 2017 (i.e., a Laspeyres approach), and (2) weighting UPCs for the index calculation for Anchorage and Honolulu by their respective sales shares in each location (i.e., a Paasche approach). This second sensitivity analysis would better reflect purchasing patterns specific to each location. The weight of each specific food and beverage in the index calculation would still be derived from their cost share in the Thrifty Food Plan, 2021. For example, there are 72 unique

UPCs associated with the EC-form combination for canned tuna ("fish, tuna, light, canned in oil, drained solids") in the Thrifty Food Plan, 2021. Of these, 15 are available in the main analysis for Honolulu. These sensitivity analyses vary the relative contribution of each of these 15 UPCs; all other weights are held constant to isolate the effect of this methodological choice.

Weighting by 2017 sales in the mainland United States increases the adjustment factor by 0.4 percentage points in Anchorage and decreases it by 1.6 percentage points in Honolulu ([Table D.1.3](#)). Weighting by location-specific sales, the adjustment factors are 1.7 percentage points lower in Anchorage and 3.6 percentage points lower in Honolulu compared to the main analysis.

Table D.1.1. Results of the sensitivity analyses

	Main analysis	June prices only	Heterogeneity within store types: Mass merchandisers	Heterogeneity within store types: All store types	Not applying IRI store weights in the mainland: Same set of stores	Not applying IRI store weights in the mainland: Expanded set of stores
Anchorage						
Price-of-food adjustment factor ^a	1.361	1.358	1.350	1.278	1.338	1.335
Number of stores in Anchorage	20	20	20	20	20	21
Number of stores in the mainland United States	39,929	39,574	34,250	11,844	39,929	40,435
Number of UPCs in index ^b	10,545	8,985	10,545	10,439	10,545	12,905
Number of foods and beverages represented ^c	951 (70.9%)	905 (67.4%)	951 (70.9%)	947 (70.6%)	951 (70.9%)	1020 (76%)
Thrifty Food Plan cost represented by foods and beverages ^d	\$182.40 (94.6%)	\$181.90 (94.3%)	\$182.40 (94.6%)	\$182.40 (94.6%)	\$182.40 (94.6%)	\$183.20 (95%)
Honolulu						
Price-of-food adjustment factor ^a	1.524	1.547	1.511	1.451	1.512	1.506
Number of stores in Honolulu	32	31	32	32	32	57
Number of stores in the mainland United States	40,789	40,434	35,110	12,489	40,789	41,296
Number of UPCs in index ^b	11,593	9,676	11,582	11,523	11,593	14,249
Number of foods and beverages represented ^c	956 (71.2%)	911 (67.9%)	955 (71.2%)	955 (71.2%)	956 (71.2%)	1036 (77.2%)
Thrifty Food Plan cost represented by foods and beverages ^d	\$188.10 (97.5%)	\$186.60 (96.8%)	\$188.10 (97.5%)	\$188.10 (97.5%)	\$188.10 (97.5%)	\$190.20 (98.7%)

Notes: IRI = Information Resources, Inc.; UPC = Universal Product Code.

^a All index values are rounded to the third decimal.

^b Number of UPCs that are available in both the location and the mainland United States.

^c Number of foods and beverages represented by combinations of Ensemble Codes (ECs) and form (e.g., raw, refrigerated, shelf-stable, etc.). The percentages in parentheses report the percent of the 1,342 EC-form combinations underlying the Thrifty Food Plan, 2021.

^d Total weekly cost of the Thrifty Food Plan, 2021 for the reference family of four represented by foods and beverages (EC-form combinations) in the index calculation rounded to the nearest \$0.10. The percentage in parentheses report the percent of the total weekly cost (\$192.84) represented by the EC-form combinations. To convert weekly TFP costs to monthly costs, multiply the weekly cost by 4.333.

Table D.1.2. Results of the sensitivity analyses

	Main analysis	Minimum sales thresholds: Sales value ≥ \$10	Minimum sales thresholds: Sales value ≥ \$100	Minimum sales thresholds: Sales value ≥ \$1,000	Only including grocery stores and mass merchandisers	Geometric mean
Anchorage						
Price-of-food adjustment factor ^a	1.361	1.359	1.360	1.372	1.362	1.322
Number of stores in Anchorage	20	20	20	20	12	20
Number of stores in the mainland United States	39,929	39,929	39,929	39,929	19,822	39,929
Number of UPCs in index ^b	10,545	10,384	9,751	7,107	10,230	10,545
Number of foods and beverages represented ^c	951 (70.9%)	949 (70.7%)	932 (69.4%)	851 (63.4%)	949 (70.7%)	951 (70.9%)
Thrifty Food Plan cost represented by foods and beverages ^d	\$182.40 (94.6%)	\$182.40 (94.6%)	\$182.10 (94.5%)	\$180.90 (93.8%)	\$182.40 (94.6%)	\$182.40 (94.6%)
Honolulu						
Price-of-food adjustment factor ^a	1.524	1.524	1.526	1.525	1.554	1.461
Number of stores in Honolulu	32	32	32	32	18	32
Number of stores in the mainland United States	40,789	40,789	40,789	40,789	19,822	40,789
Number of UPCs in index ^b	11,593	11,404	10,795	8,878	10,495	11,593
Number of foods and beverages represented ^c	956 (71.2%)	953 (71%)	939 (70%)	892 (66.5%)	942 (70.2%)	956 (71.2%)
Thrifty Food Plan cost represented by foods and beverages ^d	\$188.10 (97.5%)	\$187.90 (97.5%)	\$187.40 (97.2%)	\$186.60 (96.8%)	\$181.30 (94%)	\$188.10 (97.5%)

Note: UPC = Universal Product Code.

^a All index values are rounded to the third decimal.

^b Number of UPCs that are available in both the location and the mainland United States.

^c Number of foods and beverages represented by combinations of Ensemble Codes (ECs) and form (e.g., raw, refrigerated, shelf-stable, etc.). The percentages in parentheses report the percent of the 1,342 EC-form combinations underlying the Thrifty Food Plan, 2021.

^d Total weekly cost of the Thrifty Food Plan, 2021 for the reference family of four represented by foods and beverages (EC-form combinations) in the index calculation rounded to the nearest \$0.10. The percentage in parentheses report the percent of the total weekly cost (\$192.84) represented by the EC-form combinations. To convert weekly TFP costs to monthly costs, multiply the weekly cost by 4.333.

Table D.1.3. Results of the sensitivity analyses

	Main analysis	Geographic definition as city	Uniform unit prices within RMAs: All store types	Uniform unit prices within RMAs: Club stores	Different UPC weights derived from sales shares: Weights based on sales in mainland United States 2017	Different UPC weights derived from sales shares: Weights based on sales in Anchorage/Honolulu 2017
Anchorage						
Price-of-food adjustment factor ^a	1.361	1.360	1.312	1.358	1.365	1.344
Number of stores in Anchorage	20	17	27	22	20	20
Number of stores in the mainland United States	39,929	39,929	40,813	40,790	39,929	39,929
Number of UPCs in index ^b	10,545	10,509	16,208	11,407	10,567	10,567
Number of foods and beverages represented ^c	951 (70.9%)	950 (70.8%)	1031 (76.8%)	958 (71.4%)	952 (70.9%)	952 (70.9%)
Thrifty Food Plan cost represented by foods and beverages ^d	\$182.40 (94.6%)	\$182.40 (94.6%)	\$189.70 (98.4%)	\$189.00 (98%)	\$182.40 (94.6%)	\$182.40 (94.6%)
Honolulu						
Price-of-food adjustment factor ^a	1.524	1.557	1.537	1.524	1.508	1.488
Number of stores in Honolulu	32	15	65	32	32	32
Number of stores in the mainland United States	40,789	39,929	40,813	40,790	40,789	40,789
Number of UPCs in index ^b	11,593	10,507	11,967	11,593	11,664	11,664
Number of foods and beverages represented ^c	956 (71.2%)	936 (69.7%)	960 (71.5%)	956 (71.2%)	957 (71.3%)	957 (71.3%)
Thrifty Food Plan cost represented by foods and beverages ^d	\$188.10 (97.5%)	\$180.90 (93.8%)	\$188.10 (97.6%)	\$188.10 (97.5%)	\$188.10 (97.5%)	\$188.10 (97.5%)

Notes: RMA = retailer marketing area; UPC = Universal Product Code.

^a All index values are rounded to the third decimal.

^b Number of UPCs that are available in both the location and the mainland United States.

^c Number of foods and beverages represented by combinations of Ensemble Codes (ECs) and form (e.g., raw, refrigerated, shelf-stable, etc.). The percentages in parentheses report the percent of the 1,342 EC-form combinations underlying the Thrifty Food Plan, 2021.

^d Total weekly cost of the Thrifty Food Plan, 2021 for the reference family of four represented by foods and beverages (EC-form combinations) in the index calculation rounded to the nearest \$0.10. The percentage in parentheses report the percent of the total weekly cost (\$192.84) represented by the EC-form combinations. To convert weekly TFP costs to monthly costs, multiply the weekly cost by 4.333.

