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Canned Fruit and Vegetable Consumption in the United States

An Updated Report to Congress

October 2010



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Abstract

This report updates the Canned Fruit and Vegetable Consumption in the United States: Report to the United States Congress (September 2008), using more recent data through 2008, where available. Both reports were prepared and published in response to requests from Congress. We used data from the Economic Research Service's Food Availability Data System, Bureau of Labor Statistics' Consumer Expenditure Surveys, and the U.S. Department of Agriculture's food intake surveys to study U.S. consumption of and spending on canned fruits and vegetables. Data since 1970 suggest that the share of canned fruit out of total fruit consumed will continue to be fairly constant at around 6 percent in the short term, while the share of canned vegetables out of total vegetables consumed will continue to fluctuate—but mostly decline—from the 24 percent share in 2008. The analysis tracks the changes in canned fruit and vegetable expenditures since the previous report, and breaks down these expenditures by demographic characteristics of households, including age and ethnicity.

Keywords: Canned, consumption, fruit, food availability, food intake, food loss, vegetable

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Summary

This report updates *Canned Fruit and Vegetable Consumption in the United States: Report to the United States Congress* (Buzby et al., 2008) using more recent data through 2008 (versus through 2005 in previous report). If current trends prevail, the canned fruit share of total fruit will hold constant and the canned vegetable share of total vegetables will continue to fluctuate, mostly downward. However, there are offsetting forces that make it difficult to predict the future demand for canned produce.

What Is the Issue?

The Senate Report 111-039 accompanying S. 1406, the 2010 Agriculture Appropriations Bill, requested that the U.S. Department of Agriculture's (USDA) Economic Research Service (ERS) prepare and publish a report regarding consumer perceptions of canned fruits and vegetables. In the absence of consumer surveys, the report relies on consumption and spending estimates to reveal attitudes of the U.S. population toward canned produce.

What Did the Study Find?

In 2008, the average American consumed 10 pounds of canned fruit and 39 pounds of canned vegetables.

The analysis, which used per capita data from the ERS Food Availability System as a proxy for consumption, also revealed that:

- Between 1970 and 2008, the amount of fresh and processed fruit consumed rose 6 percent and the amount of fresh and processed vegetables consumed increased 17 percent. Most of these increases were for fresh fruits and vegetables.
- During 1970-2008, the canned fruit share of total fruit decreased from 11 to 6 percent and the canned vegetable share of total vegetables fell from 30 to 24 percent. There has been little change in these statistics since the 2008 Report to Congress, which estimated these shares to be 6 and 25 percent, respectively, in 2005.
- The estimated annual per capita food availability of canned fruit (adjusted for loss) fell 40 percent, from 16.7 pounds in 1970 to 10 pounds in 2008. Meanwhile, the estimated food availability of canned vegetables (adjusted for loss) fell 9 percent, from 42.5 pounds per capita in 1970 to 38.9 pounds in 2008.

We expanded the analysis in the previous report of per capita spending on canned fruits and vegetables in 2004 to include 2008 data. As before, there was considerable variation in spending on canned produce across social and demographic groups.

- Higher-income households and households headed by older persons spent significantly more per capita on canned fruits and vegetables than lower-income households and those headed by younger persons. These households also increased their spending on canned produce between 2004 and 2008.
- Whites spent the most on canned produce and Asians spent the least.
- By region, Southerners spent the most on canned vegetables and Midwesterners spent the most on canned fruit.
- Between 2004 and 2008, prices for canned produce increased more than prices for food in general: prices for canned vegetables rose 25.6 percent, prices for canned fruits rose 18.9 percent, and prices for all food-at-home rose 15 percent.

Food availability trends over the past 40 years suggest that in the very short run, the share of canned fruit out of total fruit will be fairly constant at around 6 percent, while the share of canned vegetables out of total vegetables will continue to fluctuate—mostly to decline—from the 24 percent level in 2008.

However, many economic, social, and demographic changes will occur simultaneously, and some will have offsetting effects on the demand for canned fruits and vegetables. Consequently, it is difficult to predict the future demand for canned fruits and vegetables. For example:

- The U.S. population is projected to become larger, older, wealthier, better educated, and more ethnically diverse in the long run. A wealthier and older population is likely to spend more on canned fruits and vegetables.
- Growth in the Hispanic population, which tends to spend less on canned produce than the rest of the U.S. population, may modify the per capita demand for canned fruits and vegetables.

How Was the Study Conducted?

The report is based on data from the following sources:

1. **ERS Food Availability Data System** (see www.ers.usda.gov/Data/FoodConsumption/), the only source of time-series data on the food available for human consumption in the United States. The data system provides proxies for actual consumption. The data for fruits and vegetables are

broken down by various product forms, including fresh and canned. In this report, ERS analyzes the amounts and shares of all fruits and vegetables available for consumption from 1970-2008, including the amounts of individual canned fruits and vegetables. (See Appendix A1 for further information on the Food Availability Data System.)

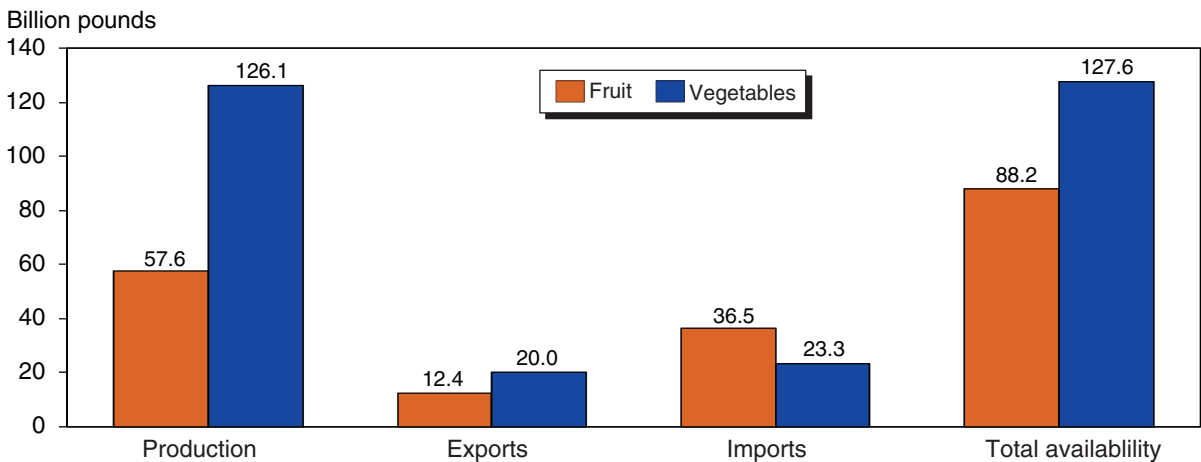
2. **U.S. Department of Labor Bureau of Labor Statistics' (BLS) Consumer Expenditure Survey (CE), conducted in 2004 and 2008** (www.bls.gov/cex). The CE's Diary Survey contains data on household food expenditures for 2 consecutive weeks. Respondents also report data on income, social, and demographic characteristics. The CE data were used to estimate annual per capita spending on various food and nonfood items by income, social, and demographic characteristics of the U.S. population. (See Appendix A2 for more information.)
3. **USDA Continuing Survey of Food Intakes by Individuals (CSFII)** (see <http://www.ars.usda.gov/Services/docs.htm?docid=14531>), conducted in 1994-1996 and 1998. ERS used these data to describe who eats selected fruits and vegetables, the amount eaten, and where fruits and vegetables are eaten. These studies were reviewed, and relevant findings on the consumption of canned fruits and vegetables are summarized here. The CSFII data are dated. But more recent data cannot be used, at this time, to estimate the amount of produce consumed because the database is not available to translate food consumption information back into commodity ingredients. A food and commodity translation database is under development to fill this research need. (See Appendix A3 for further discussion.)

General Background

This report by the USDA’s ERS is an update to *Canned Fruit and Vegetable Consumption in the United States: Report to the United States Congress* (Buzby et al., 2008, based on data through 2005). Using more recent data, this update, like the earlier report, presents results on canned fruit and vegetable consumption from three data sources: the Food Availability Data System, Consumer Expenditure Surveys, and food intake surveys. The new report includes data from the first two data sources through 2008. The update is in response to the Senate Report 111-39 accompanying S. 1406, the 2010 Agriculture Appropriations Bill, which requested that the ERS prepare and publish a report regarding consumer perceptions of canned fruits and vegetables. Consumer attitudes and perceptions regarding canned fruits and vegetables are revealed by market behavior, as indicated by consumption and spending trends over time and across demographic groups.

The United States is among the world’s top producers of fruits and vegetables. In 2008, the country produced 57.6 billion pounds of fruit and 126.1 billion pounds of vegetables. Most domestically produced fruits and vegetables are consumed in the United States, but the share that is exported is growing. Increased promotion of U.S. fruits and vegetables, directed at overseas markets through efforts such as the USDA’s Market Access Program (<http://www.fas.usda.gov/mos/programs/map.asp>), has likely helped boost foreign sales, particularly to Canada, the largest foreign buyer of U.S. fruits and vegetables. However, while growth in U.S. fruit exports has been strong, the United States remains a net fruit importer. In 2008, 88.2 billion pounds of fruit and 127.6 billion pounds of vegetables were available for consumption in the United States when accounting for domestic production, exports, imports, feed and seed use, shrinkage in storage, and beginning and ending stocks (Figure 1).

Figure 1
Domestic production, exports, imports, and availability of fruits and vegetables for consumption in 2008¹



¹Total availability = production plus imports minus exports, and where appropriate, adjustment for beginning and ending stocks.
Source: ERS, 2008. Fresh-weight equivalent. Total availability also accounts for changes in stocks, feed use, shrinkage in storage, and seed use. Melons are included in vegetables.

U.S. fruit and vegetable imports grew during the last two decades of the 1900s and into the 2000s, due in part to the growing population in the United States and the increased demand for new products, such as fruit in single-serving plastic cups. Not only have imports increased for new items, such as the less traditional types of tropical fruit, but they have expanded for commodities produced domestically, creating competition for U.S. producers. In 2006, the United States was the world's largest importer of canned fruit mixtures, accounting for 38 percent of such imports (USITC, 2007). In some cases, U.S. produce is exported in institutional-size metal cans, repackaged into plastic cups or jars in another country, and then imported back to the United States in the form of ready-to-eat products. An example is U.S.-produced peaches that are exported to Thailand in large metal cans and then repackaged for export back to the United States in individual-size plastic cups and other containers (USITC, 2007).

Fresh and processed fruits and vegetables are distributed through both retail (mainly grocery chains) and institutional channels (hospitals, hotels, prisons, schools, and other foodservice outlets). Here, "canned" refers to both traditional airtight, shelf-stable metal cans and containers and other newer and increasingly popular types of airtight containers, such as single-serving plastic cups. A large portion of canned peaches, pears, and fruit mixtures is sold to U.S. institutional buyers, typically in large containers that are lower priced per pound (USITC, 2007). On retail shelves, canned fruits and vegetables are typically sold in smaller containers, such as 4-ounce plastic cups or 8-ounce metal cans. Fruits and vegetables, both fresh and processed, are also purchased by the Government, for uses such as USDA's school nutrition programs.

Data on sales of fruits and vegetables to restaurants and other foodservice outlets are not available, but data do exist for retail sales. The 2008 Consumer Expenditures Study estimated total retail sales in supermarkets and mass supercenters for food categories with annual sales over \$10 million (*Progressive Grocer*, 2009).¹ In 2008, sales at these outlets were estimated at \$70.2 billion for fresh produce, \$17.2 billion for refrigerated and shelf-stable juice/drinks, \$7.1 billion for canned fruits and vegetables, \$5.4 billion for frozen fruit juice and vegetables, and \$2 billion for dried fruit (Figure 2).²

Each of these estimates was higher than in 2006. Data are unavailable on the value of fruits and vegetables used in mixed, prepared foods like frozen entrées.

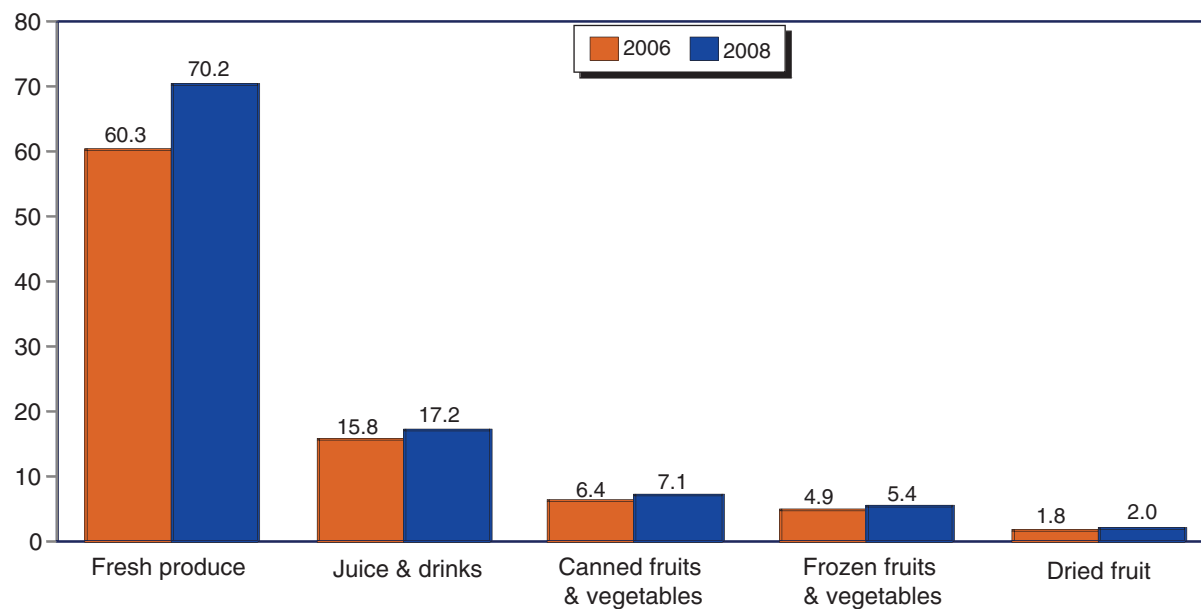
¹ "The Consumer Expenditures Study is based on data collected by The Nielsen Company for UPC-coded products, as well as sales estimates made by *Progressive Grocer's* research department for non-tracked categories in perishables and general merchandise" (*Progressive Grocer*, 2008).

² Juice/drinks were mostly fruit products, but they included a relatively small amount of vegetable juice, nonalcoholic wine, and clam juice. The data were aggregated, so ERS could not exclude these products.

Figure 2

Estimated retail sales in supermarkets and mass supercenters in 2006 and 2008

Billion dollars (nominal)



Source: Calculated by authors using data from the Consumer Expenditures Study reported by *Progressive Grocer*, 2007 and 2009.

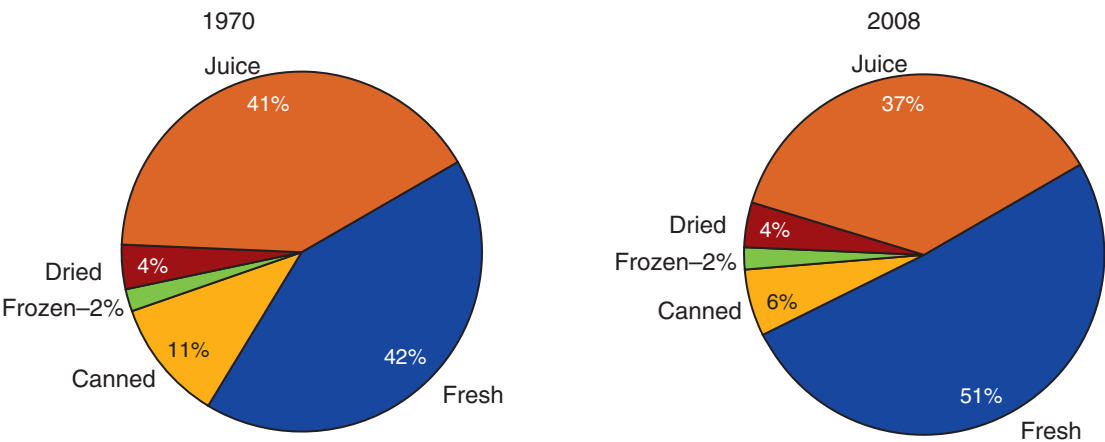
Consumption Trends for Fruits and Vegetables Through 2008

We used the estimated quantities of canned fruits and vegetables available for consumption in the United States as proxies for actual consumption (see Appendix A1 for further explanation of the data used from the ERS Food Availability Data System).

The Canned Fruit Share of Total Fruit Remained Constant Between 2005 and 2008

- The ERS Food Availability Data show that although the total amount of fruit available for consumption rose 6 percent between 1970 and 2008, the share of canned fruit out of total fruit fell from 11 percent to 6 percent (Figure 3).³ This 6 percent share of canned fruit out of total fruit is the same as the 2005 estimate in the previous report to Congress.
- Fresh fruit and juice consistently tallied higher shares than canned fruit, though canned fruit maintained a higher share than dried and frozen fruit.
- If we look only at total processed fruit, the canned share of total fruit fell from 19 percent in 1970 to 12 percent in 2008 (not shown in Figure 3). This is slightly higher than the 2005 estimate of an 11-percent share in the previous report to Congress, largely because of a recent sharp decline in orange juice, which reduced the corresponding estimate for total processed fruit.

Figure 3
Per capita fruit availability by fresh or processing form



Source: USDA, ERS Food Availability data, May 12, 2010.

³ Meanwhile, the shares for fresh fruit and frozen fruit increased between 1970 and 2008. The share of fresh fruit increased the most, from 42 to 51 percent, while the frozen fruit share increased by less than 1 percent. The juice and dried fruit shares fell during this period.

Estimated Consumption of Each Type of Canned Fruit Declined From 1970 to 2008

To estimate consumption of the different varieties of canned fruit, we used a different data series in the ERS Food Availability Data system, the Loss-Adjusted Food Availability Data. This series accounts for the amount of food lost at the market and consumer levels (e.g., plate waste and spoilage), enabling a closer approximation of what Americans, on average, consume over time. The estimated amount of canned fruit consumed per capita decreased 40 percent between 1970 and 2008 (table 1). In recent years (2005-08), canned fruit consumption fell 7 percent.

Each type of canned fruit covered in the data decreased between 1970 and 2008. One reason for these declines is that some consumers switched to fresh fruit or other types of processed fruit. Canned apples and applesauce were the most popular canned fruit in 2008, followed by pineapples and peaches. Although availability of these three fruits had decreased since 1970, they each maintained over a 20 percent share of total canned fruit. The relative ranking has not changed since the previous report to Congress. However, canned olives increased 48 percent from 1970 to 2005, as shown in the previous report, but have since fallen 38 percent (2005-2008). Part of this decline is because California had a very light olive crop in 2008.

Table 1. Estimated per capita availability of canned fruit, adjusted for loss

Fruit	1970	2005	2008	1970-08 change	2005-08 change	Share of 2008 total
	----- Pounds per capita -----			----- Percent -----		
Apples and applesauce	3.8	2.8	3.0	-22	5	29.7
Pineapples	3.5	2.4	2.2	-39	-8	21.5
Peaches	4.7	2.4	2.1	-55	-11	20.9
Pears	2.8	1.9	1.9	-31	-1	18.9
Olives	0.8	1.1	0.7	-8	-38	6.9
Cherries	0.3	0.2	0.1	-68	-25	1.1
Apricots	0.7	0.1	0.1	-87	-7	0.8
Plums	0.1	---- ¹	---- ¹	-91	-21	---- ²
Total	16.7	10.8	10.0	-40	-7	100.0

¹Less than 0.1 pounds.

²Less than 1 percent.

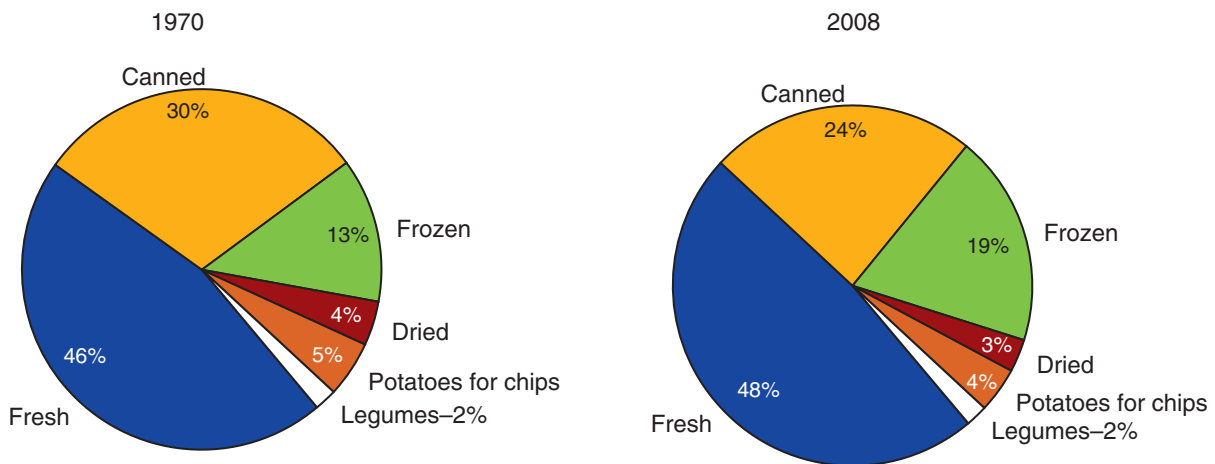
Source: USDA/ERS Loss-Adjusted Food Availability Data, 1970-2008.

The Share of Canned Vegetables in Total Vegetables Continued To Decline Through 2008

- Although the total availability of vegetables increased by 17 percent between 1970 and 2008, the availability of canned vegetables fell by over 5 percent. Canned vegetables appear to have been both partially replaced by, and supplemented with, an increasing amount of fresh and frozen vegetables. As a result, the share of canned vegetables out of total vegetables fell from 30 percent to 24 percent between 1970 and 2008 (Figure 4),⁴ a continuing decline from the 25 percent share in 2005.
- The canned share of vegetables out of total processed vegetables fell from 55 percent in 1970 to 46 percent in 2008 (not shown in Figure 4).
- During 1970-2008, there was little change in the relative ranking of fresh and processed forms of vegetables. Canned vegetables remained second after fresh vegetables, despite gains in frozen vegetables during 1970-2008.
- Overall, for vegetables, the findings remained fairly consistent with those of the previous report to Congress. Some of the recent decline in fresh vegetables is likely due to consumer food safety concerns.

Figure 4

Per capita vegetable availability by fresh or processing form



The data do not break down legumes into the different product forms. Potatoes have an additional category for chips.
Source: USDA, Economic Research Service.

⁴ Between 1970 and 2008, the share of frozen vegetables rose from 13 percent to 19 percent, while the shares of the dried vegetables, legumes, and potatoes-for-chips categories remained relatively constant. Fresh vegetables rose 2 percentage points, from 46 percent to 48 percent.

Canned Vegetable Consumption Declined Between 2005 and 2008

Using the Loss-Adjusted Food Availability data to estimate consumption of the different varieties of canned vegetables, we found that estimated consumption of canned vegetables, like that of canned fruit, declined between 1970 and 2008. The previous report to Congress found that consumption of canned vegetables increased 3 percent during 1970-2005. However, recent declines during 2005-2008 reversed the trend so that total consumption of canned vegetables fell by 9 percent during 1970-2008.

All but two types of canned vegetables covered in the database decreased between 1970 and 2008: tomatoes and mushrooms. The 8-percent rise in canned tomatoes added to that vegetable's already dominant share of total canned vegetables. In 2008, the amount of canned tomatoes available for consumption was over five times higher than that of the second-ranked canned vegetable, sweet corn. Canned tomatoes include a wide range of products, such as tomato paste, diced tomatoes, and pasta sauce. The 37-percent rise in canned mushrooms was due mostly to the increased demand for pizza with processed mushrooms.

Table 2. Estimated per capita availability of canned vegetables, adjusted for loss

Vegetable	1970	2005	2008	1970-08 change	2005-08 change	Share of 2008 total
	----- Pounds per capita -----			----- Percent -----		
Tomatoes	21.5	25.6	23.3	8	-9	60
Sweet corn	8.8	5.3	4.2	-53	-21	11
Chile peppers ¹	NA	3.7	3.8	NA	2	10
Snap beans	2.4	2.0	1.7	-29	-17	4
Other canned vegetables ²	1.8	1.8	1.6	-9	-13	4
Cucumbers (pickles)	1.9	1.3	1.2	-37	-8	3
Carrots	1.4	0.7	0.6	-55	-14	2
Mushrooms	0.5	0.7	0.7	37	3	2
Green peas	1.8	0.6	0.6	-66	3	2
Potatoes	1.2	0.6	0.6	-52	2	1
Cabbage (sauerkraut)	0.9	0.5	0.4	-48	-2	1
Asparagus	0.4	0.1	0.1	-65	8	---- ³
Total	42.5	43.0	38.9	-9	-10	100

¹Data on chile peppers is not available for 1970. In 1980, the estimate was 1.88 pounds per capita per year. Includes fresh, frozen, and dried chiles. Canning is a major use in this estimate.

²Other canned vegetables include beets, pulses, pimientos, water chestnuts, bamboo shoots, juices, and other miscellaneous vegetables.

³Less than 1 percent.

Source: USDA/ERS Loss-Adjusted Food Availability Data, 1970-2008.

Economic Factors Determining Consumer Demand

Americans can now choose among a wider selection of fruits and vegetables year-round than in the past. In 1998, the typical U.S. grocery store carried 345 produce items, compared with 173 in 1987 (Calvin et al., 2001). International trade has helped overcome supply gaps that are due to seasonality.⁵ Imports also provide U.S. consumers with a larger variety of horticultural products, particularly tropical fruits that cannot be profitably grown in the States. Some of the newer items available to consumers include imported tomato varieties and exotic imports like passion fruit. In 2007, for example, the United States imported 319 different fruit products from 121 different countries, including 41 new products and 10 new source countries added since 1998 (Brooks et al., 2009).

Demand for convenience, such as for single-serving containers of fruit, has also resulted in a wider array of products for sale, many of them from foreign suppliers. In general, increased fruit and vegetable availability could increase the demand for canned produce (see Box 1, “Major Trends and Factors Potentially Affecting the Demand for Canned Fruits and Vegetables”). Processed fruits and vegetables spoil less easily and tend to have lower handling and transportation costs than fresh versions, thus expanding the geographical reach of markets (Huang, 2004). The growing demand for convenience is reflected in the share of fruit that is processed (i.e., canned, frozen, and other processed). In 1910, 12 percent of the fruit available for consumption was processed, compared with 44 percent in 1959 and 49 percent in 2008 (Morrison et al., 2010).

International trade has lowered prices for many fruits and vegetables, and this may increase the demand for these products, including canned versions. International trade has also helped smooth price fluctuations, for instance, through year-round marketing agreements between wholesalers and retailers. New produce varieties that can handle different climates, locations, and pest conditions, along with advances in production, transportation, and handling methods, have also played a role in increasing produce availability, maintaining its quality, and lowering prices.

⁵ The United States harvests many kinds of fruits and vegetables for domestic consumption and export during the growing seasons in late summer and early fall. The United States then imports many of these products from other countries during the remaining months, when they are not domestically produced. However, imports can compete with storable U.S. commodities, such as fresh apples and pears and canned fruit and vegetables.

Box 1.

Major Trends and Factors Potentially Affecting the Demand for Canned Fruits and Vegetables

<u>Trend/factor</u>	<u>Potential direction for demand</u>
↑ Availability of fruits and vegetables (variety, quality)	↑
↓ Price of fruits and vegetables	↑
↑ Increased awareness of nutritional benefits of fruits and vegetables	↑
↑ Eating away from home	↓ (except for some types like canned refried beans)
↑↓ Demographic determinants	↑↓

Source: Compiled by authors from ERS data.

The relative prices of fresh and processed fruits and vegetables undoubtedly play a role in consumers' decisions of which foods to purchase. The increase in imported canned fruits and vegetables, in new forms of these products, and in private-label supplies of traditional canned products has changed the price relationships between products and brands, often diminishing the competitiveness of U.S. canners in the domestic market (USITC, 2007). However, recent changes in the value of the dollar have increased the cost of imported produce and made U.S. produce exports more competitive, particularly for heavily traded types of produce. Exports of canned fruits and vegetables may also increase due to the weakened U.S. dollar.

Encouraging Americans to eat more fruits and vegetables has been a central theme of Federal dietary guidance for the past two decades, in part due to the growing evidence of the health benefits associated with fruit and vegetable consumption. A higher level of education, together with an increase in dietary-information campaigns, has equipped U.S. consumers with better nutritional knowledge and has promoted increased consumption of fruits and vegetables (Lin et al., 2003). It might be expected that

consumption of all forms of fruits and vegetables, including canned, would increase with greater awareness of their importance in healthy diets.⁶

A major dietary trend in the United States is the growing appetite for eating out. In 1970, 33 percent of all food expenditures was for food away from home; by 2008, that share rose to 49 percent. A number of factors have contributed to increased dining out, including the larger share of women employed outside the home (with less time for cooking and more discretionary income), more two-earner households and higher household incomes, the proliferation of more affordable and convenient fast-food outlets, increased advertising and promotion by large foodservice chains, and the smaller size of American households. Economies of scale make eating out relatively less expensive for smaller households than home cooking. These economic and demographic trends are expected to continue and to keep boosting Americans' preference for eating out. It is not expected that the growth in restaurant meals will result in any notable increases in demand for all canned fruits and vegetables, though there may be a few exceptions, such as for canned refried beans, which are already mostly consumed away from home.

Changing economic, social, and demographic characteristics also play a role in shaping consumer preferences for fruits and vegetables, including canned versions. The next section looks at a sample of these characteristics (income, race and ethnicity, region, and age) and their association with expenditures on canned fruits and vegetables.

⁶ There appears to be no published study on the effect of dietary knowledge on the consumption of canned fruits and vegetables. However, substantiated health claims appear to have helped increase consumption of some fruit and vegetable products, as well as of other foods.

Spending on Fruits and Vegetables

We estimated per capita spending on canned fruits and vegetables with data from the BLS CE (see Appendix A2 for a discussion of the survey). The 2004 CE estimates analyzed in the previous report to Congress are supplemented here with 2008 CE data. The differences between 2004 and 2008 are examined by comparing the CE data in both nominal (current) and real (inflation-adjusted) dollars. To calculate real expenditures, we adjust the 2008 dollar values back to 2004 dollars using the Consumer Price Index (CPI) published by BLS to account for inflation and allow us to compare the estimates side by side. This section examines differences in per capita spending by income and selected social and demographic factors. The analysis shows that:

- Per capita spending on canned vegetables was always greater than spending on canned fruit, regardless of the social and demographic breakdown.
- Some of the findings may be influenced by cost. Prices for canned fruit and vegetables rose more than for food in general, and prices for canned vegetables rose more than prices for canned fruit. According to the Consumer Price Index published by the BLS, prices for canned vegetables rose 25.6 percent and prices for canned fruits rose 18.9 percent between 2004 and 2008. Prices for all food-at-home over this period rose 15 percent (U.S. Department of Labor, BLS, 2010). These price increases were primarily due to the general increase in prices across all commodity markets in 2007-08.

Our analysis of consumer spending on canned produce yielded the following results.

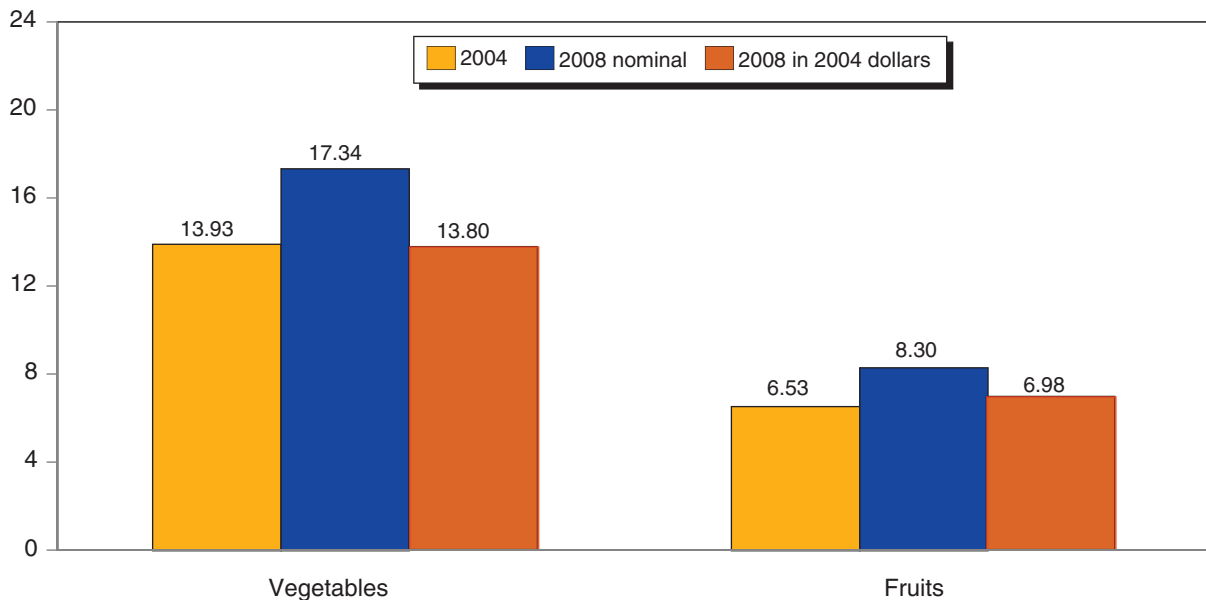
Per Capita Spending on Canned Produce in 2004 and 2008 Was Fairly Constant in Real Terms

Per capita spending on canned fruits and vegetables rose between 2004 and 2008—from \$13.93 to \$17.34 for canned vegetables and from \$6.53 to \$8.30 for canned fruits. When adjusted for inflation, per capita spending on canned vegetables declined from 2004 levels by less than 1 percent to \$13.80, while spending on canned fruits increased by almost 7 percent to \$6.98.

Figure 5

Per capita spending on canned fruit and vegetables: All households

\$ per person per year



Source: BLS Consumer Expenditure Survey, 2004 and 2008.

High-Income Households Spent the Most Per Capita on Canned Fruits and Vegetables

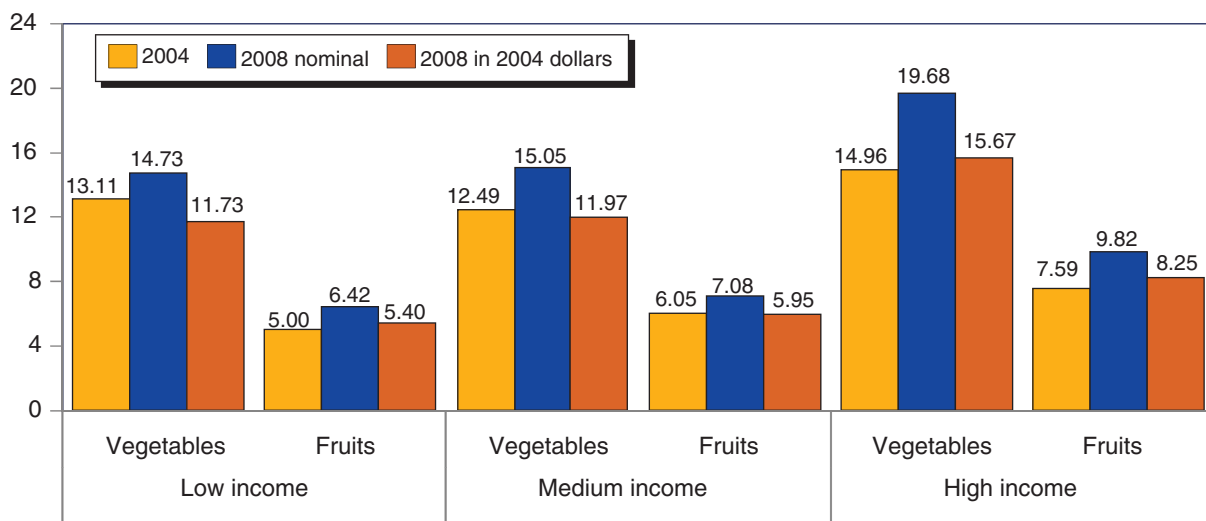
Households are classified into three income groups using the Federal poverty guidelines.⁷ In general, spending on both canned fruits and vegetables rose with income, with high-income households spending the most. In 2008 (nominal), high-income households spent 34 percent more on canned vegetables and 53 percent more on canned fruit, per capita, than low-income households. While differences between low- and middle-income households were small in both years, low-income households spent slightly more on canned vegetables than middle-income households in 2004, but the reverse was observed for 2008.

When adjusted to 2004 dollars, high-income households spent 4.7 percent more per capita on canned vegetables in 2008 than they did in 2004. Over the same time span, low-income and middle-income households spent 11 percent and 4 percent less, respectively. In real dollars, low-income households and high-income households spent more on canned fruits in 2008 than they did in 2004 (8 percent and 9 percent, respectively) while middle-income households spent less in 2008 (-2 percent).

Figure 6

Per capita spending on canned fruit and vegetables: Income class

\$ per person per year



Source: BLS Consumer Expenditure Survey, 2004 and 2008.

⁷ The low-income group has income not exceeding 185 percent of the poverty level, the high-income group has income exceeding 300 percent of the poverty level, and the middle-income group has income falling between 185 and 300 percent of the poverty level.

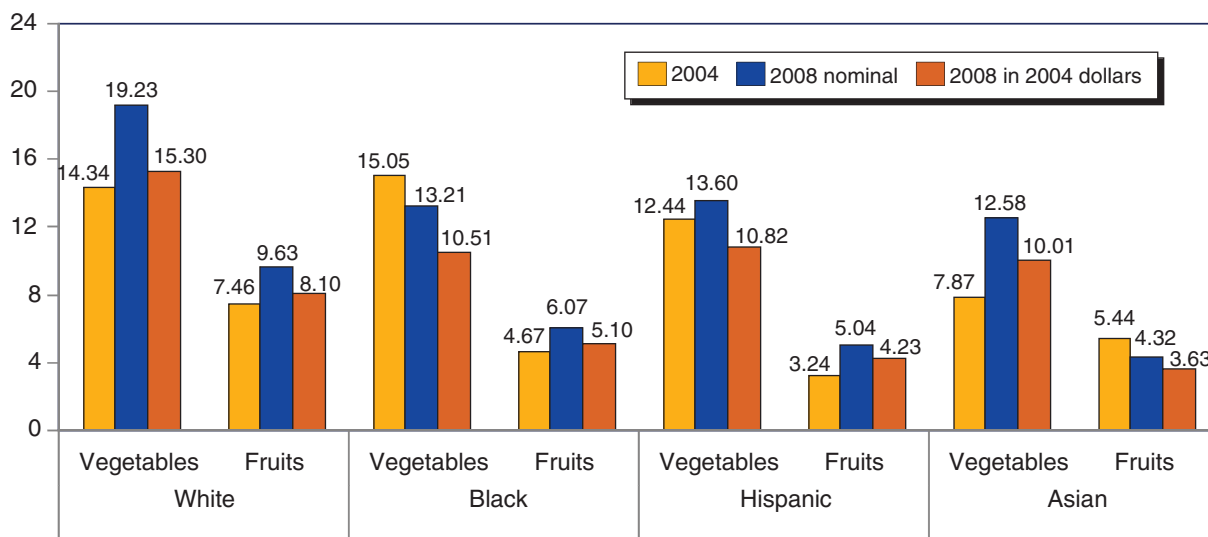
Hispanic Households Spent the Least on Canned Fruits, While White Households Spent the Most on Canned Vegetables

The U.S. population is separated into five racial and ethnic groups: non-Hispanic Whites (Whites), non-Hispanic Blacks (Blacks), Hispanics, Asians, and other races and ethnicities. Spending by “other races and ethnicities” is not discussed in this report.⁸ In general, Whites spent more on canned produce than individuals of other races and ethnicities. In 2004, Blacks spent more on canned vegetables than Whites (\$15.05 versus \$14.34, per capita). In 2008, individuals of all races and ethnicities except Blacks increased nominal spending on canned vegetables. Inflation was higher for canned produce than for all food-at-home, and thus a plausible explanation is that Blacks could be more responsive to price changes (that is, their food demand choices might be more elastic). Hispanics spent the least on canned fruits in 2004 (\$3.24), per capita, and Asians spent the least on canned fruits in 2008 (\$4.32). Asians were the only race and ethnic group that spent less on canned fruits in 2008 than in 2004.

Figure 7

Per capita spending on canned fruit and vegetables: Race and ethnicity

\$ per person per year



Source: BLS Consumer Expenditure Survey, 2004 and 2008.

⁸ We are unable to identify who these “other” households are. They may be other races or ethnicities, they may be multiracial or ethnic, or they may have simply refused to answer this question in the CE. Thus we are not able to make conclusions about their spending patterns.

Southerners Spent the Most on Canned Vegetables and Midwesterners Spent the Most on Canned Fruit

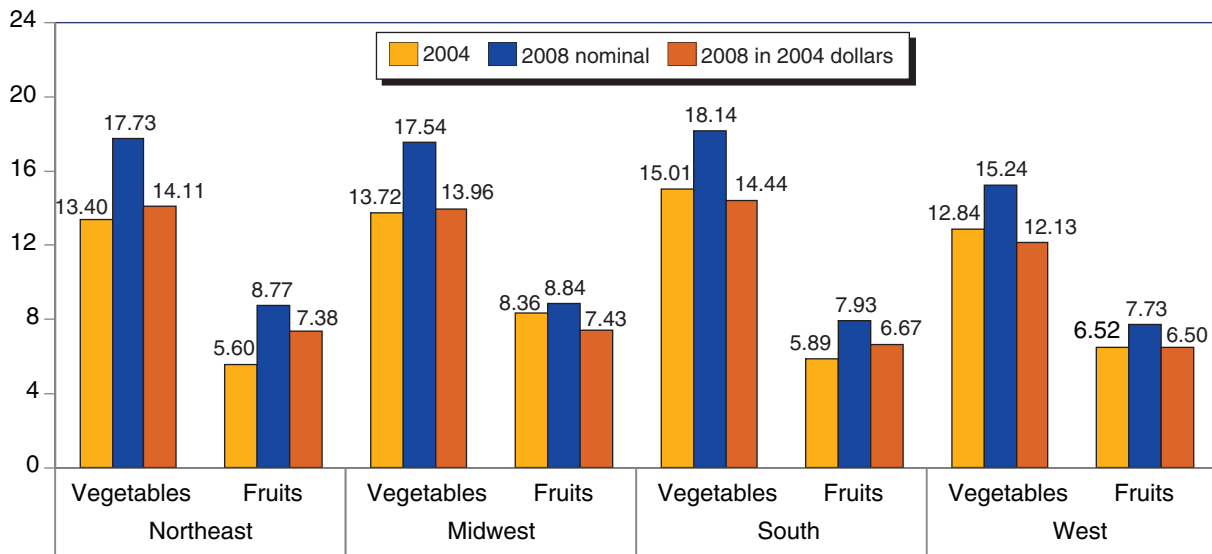
Individuals living in the West spent the least on canned vegetables, while individuals in the South spent the most in both 2004 and 2008. Real spending on canned vegetables declined between 2004 and 2008 in the South and West, but increased in the Northeast and Midwest.

In 2004, individuals living in the Northeast spent the least on canned fruits, while individuals in the Midwest spent the most. In 2008, Midwesterners continued spending the most on canned fruits (although real spending declined), and Northeasterners increased their spending on canned fruits and spent more for these products than individuals living in the South and West.

Figure 8

Per capita spending on canned fruit and vegetables by region

\$ per person per year



Source: BLS Consumer Expenditure Survey, 2004 and 2008.

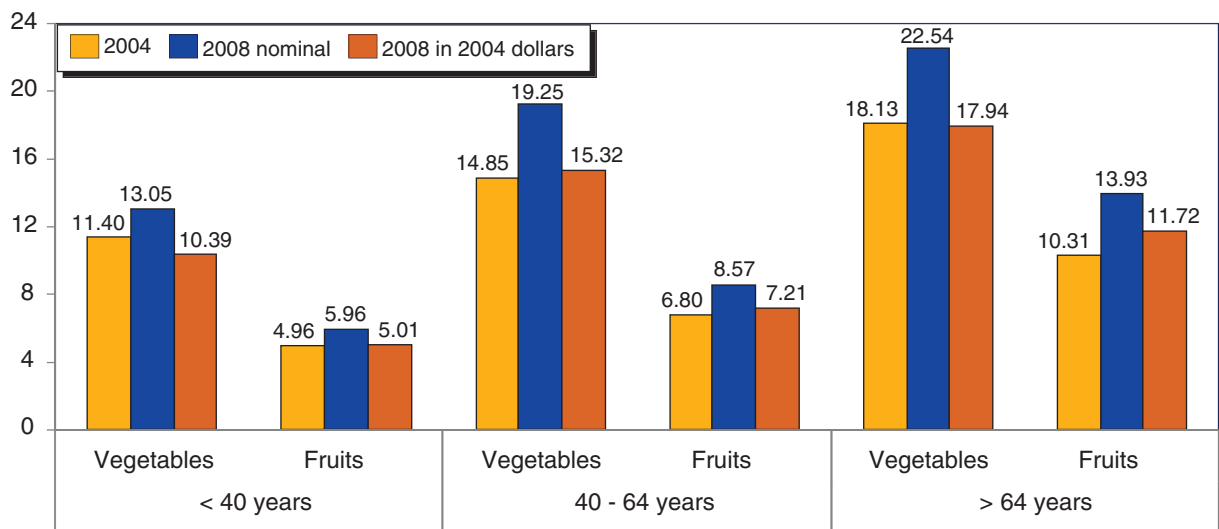
Spending on Canned Produce Rose With the Age of Household Head and With the Presence of Seniors, but Declined With the Presence of Children

Canned fruit and vegetable consumption increased with age in the United States. For example, in 2008, households headed by a person 65 or older spent 17 percent more per capita (nominal) on canned vegetables and 63 percent more on canned fruit than households whose head was aged 40 to 64. And households headed by a person 65 or older spent 73 percent more per capita on canned vegetables and 134 percent more on canned fruit than households whose head was younger than 40.

Figure 9

Per capita spending on canned fruit and vegetables: Age of household head

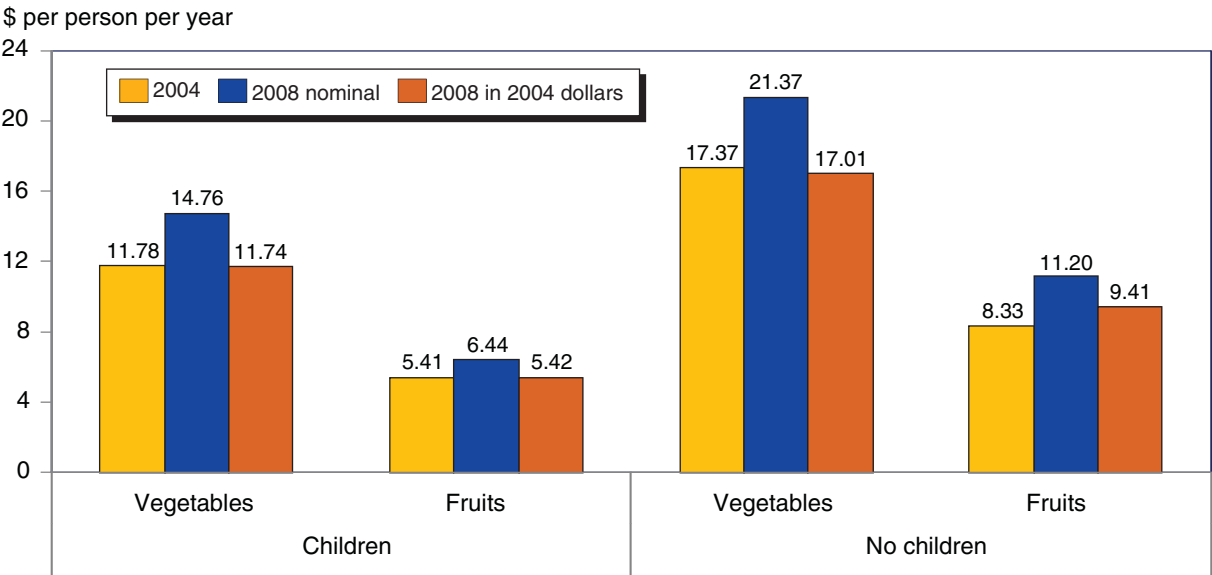
\$ per person per year



Source: BLS Consumer Expenditure Survey, 2004 and 2008.

Consistent with the results for age of household head, households with children (age 18 or younger) spent less per capita on canned produce. In 2008, individuals living in households without children spent 45 percent more on canned vegetables and 74 percent more on canned fruits, per capita, than individuals living with children (in both nominal and real dollars).

Figure 10
Per capita spending on canned fruit and vegetables: Households with children



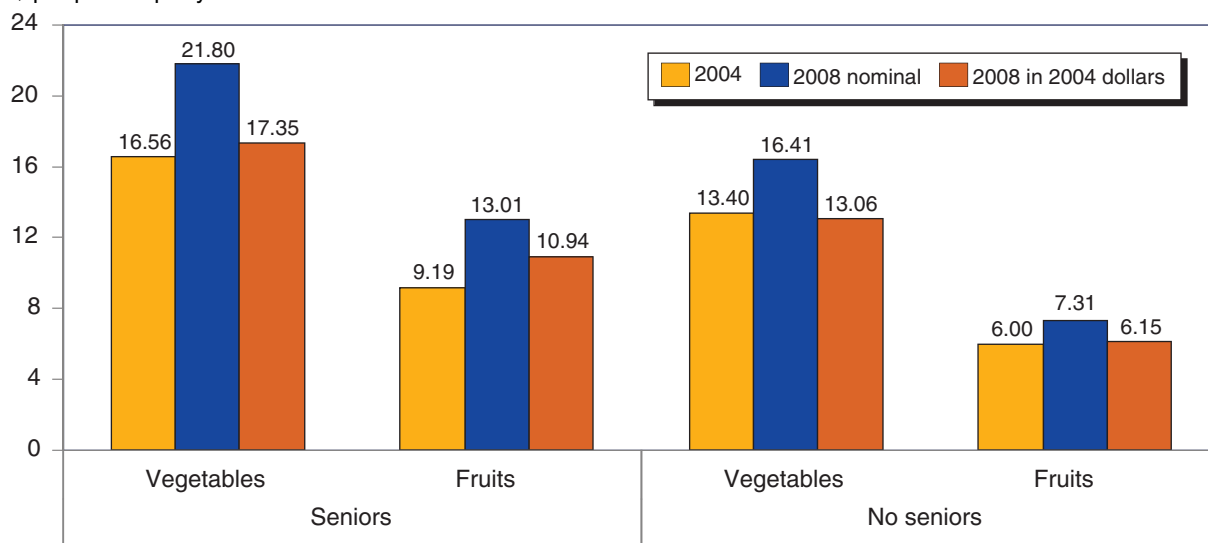
Source: BLS Consumer Expenditure Survey, 2004 and 2008.

Because spending on canned produce rose with age of household head, it is not surprising that households with seniors present (adults aged 65 or over, not necessarily the household head) spent more on canned produce in 2008: 33 percent more on canned vegetables and 78 percent more on canned fruits, per capita, than households without seniors (in both nominal and real dollars). In addition, between 2004 and 2008, households with seniors increased spending on canned fruits by 5 percent and canned vegetables by 19 percent (in real dollars).

Figure 11

Per capita spending on canned fruit and vegetables: Households with seniors

\$ per person per year



Source: BLS Consumer Expenditure Survey, 2004 and 2008.

Demographic Characteristics: Who Eats What, When, and Where

The previous section used BLS Consumer Expenditure Survey data to analyze the spending patterns for canned produce by economic, social, and demographic characteristics. However, prices of canned produce vary greatly by the type of produce as well as by product attributes, such as packaging. Thus, spending more on canned produce does not necessarily mean that a greater quantity of canned produce was purchased. Data from the Food Availability Data System was used to provide an overview of the total quantities of canned fruits and vegetables consumed since 1970, but the data are not appropriate for determining the linkages between individual quantities of canned fruit and vegetables consumed and demographic characteristics. Therefore, this section uses other data sources to analyze how quantities of individual canned fruits and vegetables are linked to who eats what, when, and where.

Data from USDA's food consumption surveys can be used to estimate the amount of canned produce consumed by Americans in different social and demographic groups (USDA, 2000). Since 2000, ERS researchers have conducted a series of studies combining survey data with availability data to describe who eats produce, how much, and where. These studies were based on 1994-96 and 1998 data. Even though more recent food consumption data have been collected, the recent data cannot be used to estimate the amount of produce consumed (see Appendix A-3 for an explanation and description of the data).

This section highlights findings from 20 ERS-published studies pertaining to specific canned fruits and vegetables. Although these findings do not give us a comprehensive story for all types of produce, they provide anecdotal evidence about individual fruits and vegetables. The findings show the choices made in the marketplace, and this information reveals consumer preferences, which vary by the type of produce and product form. The preferences show that purchase decisions for individual commodities are based on income, age, and other demographic factors. However, purchase decisions can also be based on relative prices, availability, and convenience of the different forms (e.g., baby carrots versus canned carrots). Detailed tables and publications are available upon request from Biing-Hwan Lin of ERS (blin@ers.usda.gov).

Findings from ERS studies on consumption patterns for individual fruits and vegetables are as follows:

Apples (Perez et al., 2001)

- Children under the age of 5 eat more applesauce than older children and adults.
- By a substantial margin, Whites consume more applesauce than other individuals.
- Applesauce consumption has risen with income.

Tomatoes (Lucier et al., 2000)

Most processed tomatoes are consumed at home, except for ketchup.

- Fast food restaurants account for 34 percent of ketchup use, and restaurants with waiter service account for 15 percent.
- Individuals living in the western region eat more tomato sauce and less tomato paste than individuals living in other parts of the United States. The western region accounts for 22 percent of the U.S. population and consumes 25.6 percent of tomato sauce and 20.9 percent of tomato paste.
- Relative to other Americans, Blacks have a preference for ketchup but do not favor tomato juice. Blacks account for 12.6 percent of the U.S. population and consume 14.6 percent of ketchup and 5.8 percent of tomato juice.⁹

Sweet corn (Lucier and Lin, 2001)

- Canned sweet corn consumption, on a fresh-equivalent basis, is smaller than fresh and frozen sweet corn consumption.
- The foodservice sector uses a larger percentage of frozen and canned sweet corn than fresh sweet corn. The use of prepared frozen and canned corn products is heavily favored in the foodservice industry to reduce labor costs.

Snap beans (Lucier and Lin, 2002)

- Consumption of canned snap beans (i.e., green or long beans) is greatest among older Americans (age 60 and above) and weakest among teenagers.

Cucumbers (Lucier and Lin, 2000)

- The preference for fresh and pickled cucumbers varies by age.
- Men aged 20 to 59 are the largest consumers of pickles, accounting for 27 percent of the U.S. population but consuming 39 percent of pickled cucumbers.
- Seniors consume less than the average amount of pickles, likely reflecting their desire to reduce sodium intake.

⁹ The population estimate for Blacks in the 1994-96 survey is from the 1990 Census.

Potatoes (Lin et al., 2001)

- Canned potatoes make up a very small share of total potato use (about 2 pounds fresh weight, compared with 63 pounds for frozen potatoes in 1999).
- Canned potato consumption rises with income and is higher among individuals living in rural areas than among those living in nonrural areas.

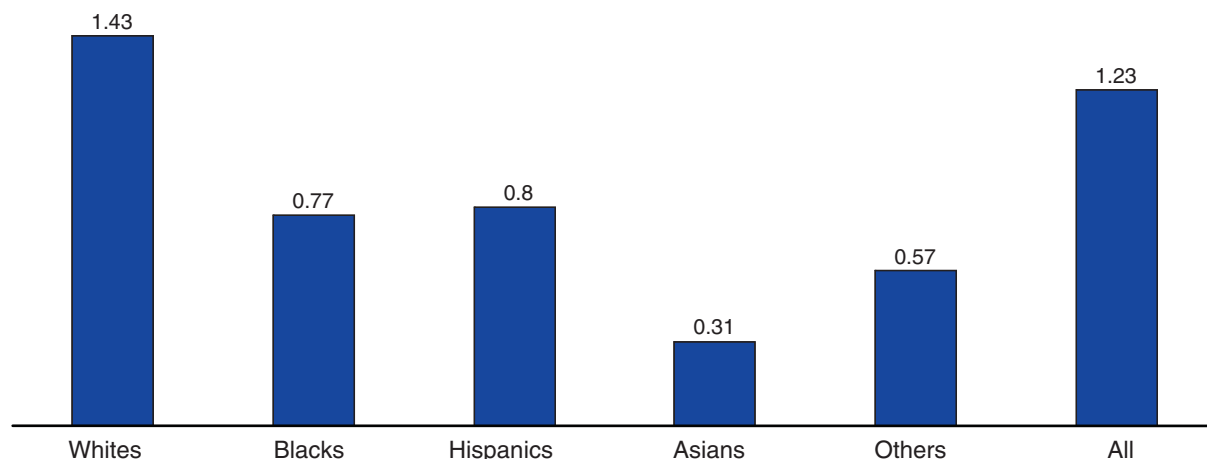
Carrots (Lucier and Lin, 2007)

- Most processed carrots are consumed at home,
- An estimated 1.55 pounds of fresh equivalent canned carrots were consumed per capita in 2006, with 86 percent of this amount eaten at home.
- Restaurants with waiter service account for 7 percent of canned carrot use, followed by 3 percent at school cafeterias.
- At home, individuals living in the southern region consume more canned carrots per capita than individuals in other regions.
- Per capita consumption of canned carrots declines with income and education.
- In 2005, Whites ate more canned carrots at home by a substantial margin than Hispanics, Blacks, and Asians (Figure 12).

Figure 12

Annual per capita consumption of canned carrots by race

Pounds per person per year, fresh-equivalent weight



Source: Consumption patterns depicted in 1994-96 and 1998 are used with 2005 Food Availability data to show 2005 consumption by race.

Onions (Lucier et al., 2001)

- At-home consumption accounts for 80 percent of canned onion use.
- Restaurants with waiter service lead the away-from-home market with 12 percent of total canned onion use.

Spinach (Lucier et al., 2004)

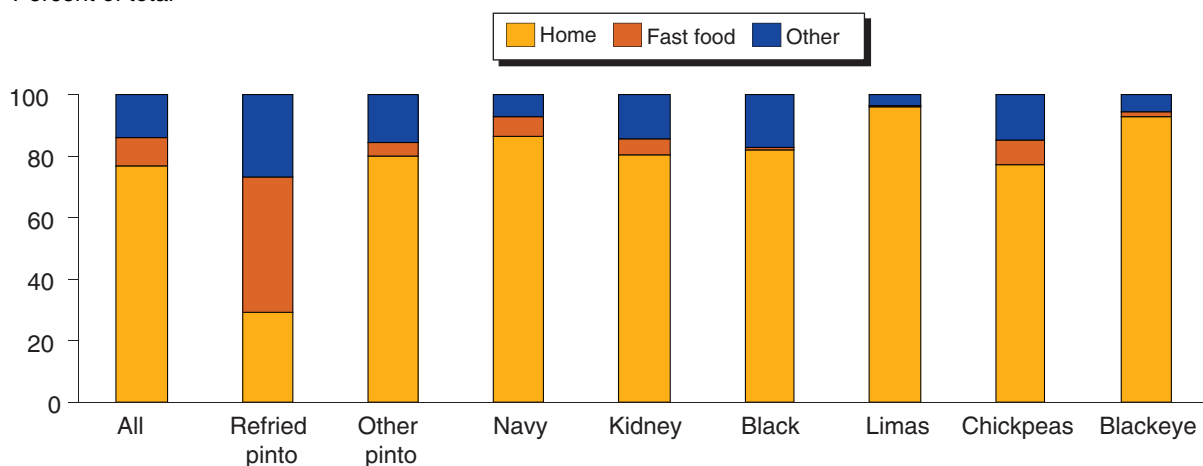
- At-home consumption accounts for 90 percent of canned spinach use.
- Canned spinach is favored by older people, those living in the South and West, and those living in rural areas.

Dry beans (Lucier et al., 2000)

- Canned refried pinto beans differ distinctly from other dry beans in terms of where they are consumed. About 77 percent of all dry beans are consumed at home, whereas 71 percent of canned refried pinto beans are consumed away from home, mostly at fast food outlets (Figure 13).
- Refried pinto bean consumption rises with age and then drops sharply among seniors, reflecting the fact that older Americans are less likely to eat out.
- Canned refried pinto beans are favored by Hispanics, especially Mexican Americans.

Figure 13

Share of select dried beans consumed at home and away from home
Percent of total



Source: USDA's Continuing Survey of Food Intakes by Individuals, 1994-96.

Future Trends

How Demographic Shifts May Influence Future Food Choices

The U.S. population is expected to continue to increase, with changes occurring in the number of people in different economic, social, and demographic groups. The population is expected to become wealthier, older, better educated, and more ethnically diverse in the long run. In particular, the racial and ethnic landscape of the U.S. population is undergoing dramatic changes.¹⁰ Two growing groups, Hispanics and Asians, spent the least on canned produce in 2004, whereas Whites spent relatively more on canned produce. If these spending patterns continue into the future, the changing demographic landscape suggests a decline in spending on canned produce on a per capita basis. However, with a larger population, the total spending on canned produce in the United States may still increase, despite decreased per capita spending. An in-depth analysis is needed to gauge the effects of changing race and ethnic makeup on the future consumption of canned produce.

Americans are getting older, and that aging trend is expected to boost spending on canned produce. Americans are also getting wealthier in the long run, and it has been well documented that as household income rises, food spending will rise as well.¹¹ BLS data indicate that spending on both canned fruits and canned vegetables rises with income. Therefore, we would expect per capita consumption of canned fruits and vegetables to increase with rising income and the graying of the U.S. population in the long run.

The American appetite for eating out is also expected to continue growing. Consequently, we expect these changes to affect per capita consumption of fruits and vegetables, by type and processed form. For example, the current demand for canned refried pinto beans, ketchup, and canned sweet corn in the foodservice industry may increase if this trend prevails.

ERS studies of canned produce consumption have not used the more recent survey data because a technical database, along with programming to convert the amount of foods to their equivalent commodity components, has not yet been developed. ERS is currently working with USDA's Agricultural Research Service (ARS) to fill this data void in order to continue estimating the type and amount of food commodities Americans eat and where they are eaten.

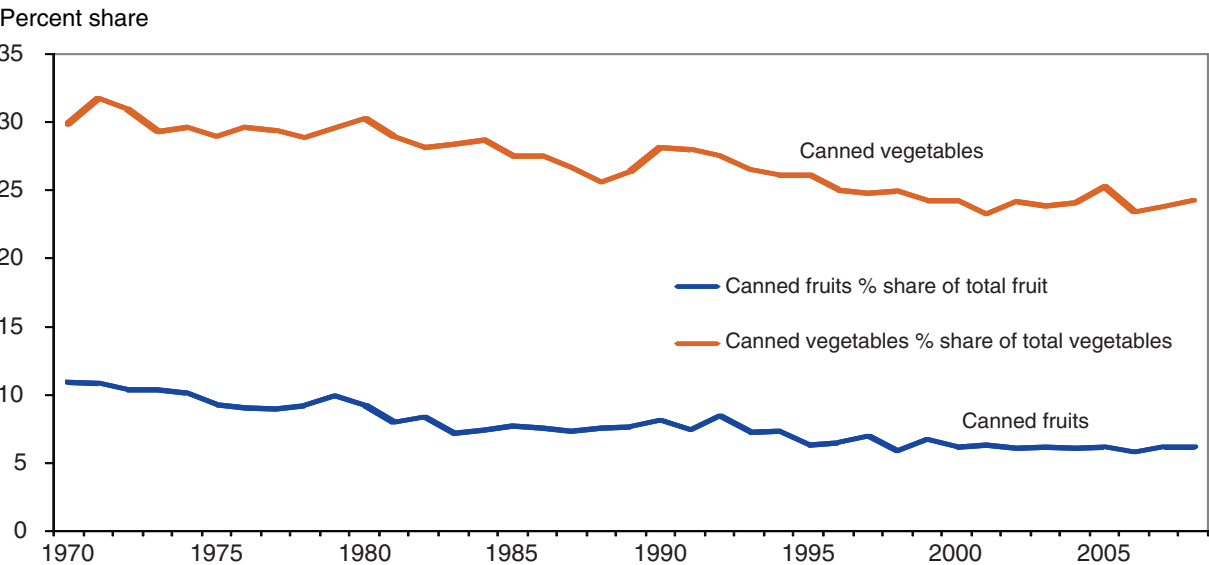
¹⁰ According to the population projections by the U.S. Census Bureau (U.S. Dept. of Commerce, 2008), the White population will decline to 72 percent by 2050, Blacks will increase to 14.6 percent, Asians will more than double to 8 percent, and "all other races" will be 5.3 percent. Hispanics (of any race) will almost double to 24.4 percent.

¹¹ Given current economic events, such as declining housing prices and rising energy costs, households may not be considered as becoming wealthier in the short term. Our analysis takes the long-run approach, in which households have generally become wealthier over time.

Where Will Markets Head in the Future?

Many economic, social, and demographic changes will occur simultaneously, with offsetting effects on the demand for canned fruits and vegetables, making it difficult to predict the future demand for these products. However, if the trends over the past 40 years shown in the food availability data prevail in the future, total per capita consumption of fruits and vegetables will continue to increase, the canned share of total fruits will hold constant at around 6 percent in the very short run, and the canned share of total vegetables will continue to fluctuate—but mostly to decline—from its 24-percent level in 2008 (Figure 14). That is, any future increase in total fruits and vegetables will likely be due to increases in noncanned produce.

Figure 14
Share of canned fruit and vegetables, 1970-2008



Source: ERS Food Availability (per capita) Data System.

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Appendix A: Sources of Data

A.1. The Food Availability Data System

The Food Availability data represent the food supply, or the disappearance of food into the food marketing system. In the Food Availability Data System, food available for domestic consumption is calculated as a residual. That is, for a given year, the total supply is the sum of production, imports, and beginning inventories; from this amount, exports, farm and industrial uses, and ending stocks are subtracted, leaving domestic consumption as the remainder. Different agencies within the U.S. Government collect these data directly from producers, distributors, and others, using techniques that vary by commodity. These data provide an alternative to using consumer surveys to examine food consumption trends.¹² Per capita estimates are calculated by dividing the total annual availability for a commodity by the U.S. population for that year. The data measure the food supply of over 200 food commodities, including meats, fruits and vegetables, and dairy products.

ERS manages and disseminates both the Food Availability data and the Loss-Adjusted Food Availability data within the Food Availability Data System posted on the ERS website. ERS is the only official source of time series data on the food available for human consumption in the country. Accordingly, the data play a key role in monitoring the potential of the food supply to meet the nutritional needs of Americans and in examining historical consumption trends. Although the Food Availability data series does not directly measure actual quantities ingested, it provides an indication of whether Americans, on average, are consuming more or less of various foods over time. In this report, we use this data series to compare the amount and share of fruits and vegetables that are available fresh or in the different processed forms (e.g., canned, frozen, juice, and dried) and to assess how these estimates have changed between 1970 and 2008.¹³

In terms of pounds, the total availability of fruit (farm weight) rose 6 percent from 237.7 pounds per capita in 1970 to 250.9 pounds in 2008 (table A1).¹⁴ Of this amount, the total availability of fruit for canning fell from 25.9 pounds per capita in 1970 to 15.3 pounds in 2008 (a 41-percent decrease).

In terms of pounds, the annual per capita availability of vegetables increased 17 percent from 336.8 pounds per capita in 1970 to 392.7 pounds in 2008 (table A2). Increases in fresh and frozen vegetables were the main drivers of the increase in total vegetables.

¹² Because of the way the data are constructed, the data are available at the national level only and not at the State, county, or regional level. Additionally, the data cannot be broken up by other demographic categories.

¹³ Canned fruits and vegetables include those sold in metal cans, glass containers, plastic cups, or other packaging that permits the product to be maintained without refrigeration (i.e., to be shelf-stable). Canned fruits and vegetables in this report do not include boxed juice, dried fruits or vegetables (e.g., dried lentils), or potato chips.

¹⁴ These estimates are in terms of *farm weight*, which is the weight of a commodity as measured on the farm before further conditioning and processing. The farm weight is essentially the same as the *fresh-weight equivalent*, which is the weight of processed fruits and vegetables converted to an equivalent weight of the fresh produce.

Table A1. Fruit by type of processing (farm weight): Per capita availability, 1970-2008

Table A1. Fruit by type or processing (fruit weight). Per capita availability, 1970-2008							
Year	Fresh ¹	Processing				Total processed fruit ⁶	Total fruit ⁷
		Canning ²	Freezing ³	Dried ⁴	Juice ⁵		
Pounds							
1970	100.8	25.9	3.9	9.9	96.6	136.9	237.7
1971	100.8	26.3	4.0	9.9	101.0	141.8	242.6
1972	94.4	24.0	4.0	7.2	101.2	137.0	231.4
1973	96.7	24.3	4.1	10.1	99.6	138.7	235.4
1974	96.1	23.9	3.3	9.6	101.4	139.1	235.2
1975	101.3	23.3	3.6	10.2	113.0	150.6	251.8
1976	102.0	23.2	3.4	13.4	115.3	155.7	257.7
1977	99.6	24.2	3.3	9.9	132.6	170.5	270.1
1978	103.4	23.9	3.7	8.6	118.8	155.8	259.2
1979	99.7	24.8	3.1	10.0	112.0	150.4	250.1
1980	106.2	24.4	3.3	11.2	119.0	158.7	264.9
1981	103.2	20.8	3.0	9.6	124.1	157.9	261.1
1982	107.8	21.9	3.3	12.0	117.3	155.0	262.8
1983	110.5	20.0	3.3	11.7	133.6	168.9	279.4
1984	112.4	19.6	3.4	12.7	117.7	153.8	266.3
1985	110.5	20.7	3.5	12.8	121.9	159.2	269.8
1986	118.4	21.0	4.1	11.5	122.6	159.5	278.0
1987	121.0	20.8	4.1	12.1	126.9	164.2	285.2
1988	121.2	20.6	4.1	14.9	112.1	152.0	273.2
1989	122.7	21.4	4.6	13.2	117.3	156.8	279.6
1990	116.5	20.8	4.3	12.1	102.7	140.3	256.8
1991	112.6	19.6	4.3	12.2	117.2	153.7	266.3
1992	123.9	22.6	4.1	10.7	105.8	143.8	267.8
1993	123.0	20.4	3.8	12.5	122.3	159.4	282.4
1994	125.0	20.6	3.9	12.7	118.7	156.4	281.4
1995	123.1	17.2	4.3	12.7	116.2	150.7	273.7
1996	126.3	18.4	4.1	11.1	126.6	160.4	286.8
1997	129.9	19.9	3.8	10.6	123.5	158.5	288.4
1998	129.1	16.9	4.3	12.1	128.6	162.3	291.4
1999	130.2	19.2	3.9	10.2	123.4	157.0	287.2
2000	128.5	17.5	4.6	10.4	124.6	157.5	286.0
2001	125.8	17.6	4.9	9.8	121.7	154.2	280.0
2002	126.8	16.7	4.1	10.4	116.7	148.0	274.9
2003	128.1	17.2	5.1	9.9	119.0	151.5	279.6
2004	127.7	16.9	4.3	9.3	119.7	150.6	278.3
2005	125.3	16.5	5.2	10.1	112.4	144.7	270.1
2006	127.9	15.4	5.0	10.4	109.3	140.8	268.8
2007	123.6	16.0	5.3	10.0	106.4	138.1	261.7
2008	126.8	15.3	4.9	10.1	93.0	124.1	250.9

¹Includes apples, apricots, avocados, bananas, cherries, cantaloup, cranberries, grapes, grapefruit, honeydew, kiwifruit, lemons, limes, mangoes, nectarines, oranges, papayas, peaches, pears, pineapples, plums, prunes, strawberries, tangelos, tangerines, temples, and watermelon. ²Includes apples, applesauce, apricots, cherries, olives, peaches, pears, pineapples, plums, and prunes. ³Includes apples, apricots, blackberries, blueberries, boysenberries, cherries, loganberries, peaches, plums, prunes, raspberries, strawberries, and other miscellaneous fruit and berries. ⁴Includes apples, apricots, dates, figs, peaches, pears, prunes, and raisins. ⁵Includes apple, cranberry, grape, grapefruit, lemon, lime, orange, pineapple, and prune juice. ⁶Includes apples used for vinegar, wine, and fresh slices for pie making. ⁷Computed from unrounded data.

Source: USDA/Economic Research Service, Food Availability data. Data last updated February 1, 2010.

Table A2. Vegetables by type of processing (farm weight): Per capita availability, 1970-2008

Year	Fresh ¹	Processing					Total processed vegetables ⁶	Total vegetables ⁶
		Canning ²	Freezing ³	Dried ⁴	Potatoes	Legumes ⁵		
					for chips			
<i>Pounds</i>								
1970	154.3	100.6	43.8	13.2	17.4	7.5	182.5	336.8
1971	148.0	107.8	45.4	13.8	17.2	7.5	191.6	339.6
1972	151.3	104.5	45.4	13.3	16.7	6.8	186.7	338.0
1973	148.0	98.2	50.6	14.2	16.3	7.9	187.2	335.2
1974	145.9	99.3	51.3	16.1	15.7	6.2	188.6	334.5
1975	148.8	98.0	52.8	16.7	15.5	7.2	190.1	338.9
1976	148.1	103.4	57.8	17.1	15.8	6.9	201.0	349.1
1977	148.6	101.6	59.4	12.7	16.2	6.8	196.8	345.3
1978	143.4	96.6	58.9	13.4	16.5	5.8	191.1	334.5
1979	148.6	100.6	55.5	13.1	16.7	5.8	191.6	340.2
1980	151.6	102.5	51.5	10.5	16.5	5.9	187.0	338.6
1981	145.3	96.9	58.2	11.7	16.6	5.9	189.4	334.6
1982	151.2	95.1	54.4	12.4	17.0	7.7	186.5	337.7
1983	151.5	96.4	55.8	11.6	17.8	6.7	188.4	339.9
1984	156.9	102.6	62.7	11.8	18.0	5.8	200.8	357.7
1985	158.9	99.2	64.5	12.8	17.6	7.4	201.4	360.3
1986	159.0	99.5	64.4	12.8	18.1	7.1	202.0	360.9
1987	168.6	98.9	67.0	12.3	17.6	6.0	201.7	370.3
1988	174.4	94.6	64.2	12.1	17.1	7.4	195.4	369.9
1989	180.7	101.6	67.4	12.4	17.4	6.0	204.9	385.6
1990	176.4	110.3	66.8	14.6	16.4	7.2	215.2	391.6
1991	176.3	112.4	72.4	15.4	17.3	7.9	225.3	401.6
1992	179.8	110.0	70.5	14.3	17.1	8.4	220.3	400.1
1993	187.8	109.8	75.3	15.7	17.7	7.7	226.2	414.0
1994	193.3	109.6	77.5	14.2	16.5	8.1	226.0	419.3
1995	188.1	108.2	78.8	14.5	16.4	8.4	226.4	414.5
1996	193.2	106.4	83.3	17.5	16.4	8.1	231.8	424.9
1997	199.0	105.5	80.0	16.4	15.5	8.3	225.6	424.6
1998	195.5	105.3	80.3	17.6	14.7	8.1	226.0	421.6
1999	201.3	102.9	80.8	14.6	15.9	8.4	222.6	423.9
2000	200.7	103.2	79.3	17.3	15.9	8.5	224.1	424.9
2001	198.1	96.5	79.4	15.8	17.6	7.7	217.0	415.1
2002	197.5	100.4	76.9	15.8	16.5	7.5	217.1	414.6
2003	201.0	100.9	78.9	17.3	17.3	7.3	221.6	422.6
2004	204.8	102.6	78.9	15.3	16.6	6.7	220.0	424.8
2005	196.8	105.0	76.6	13.9	16.2	6.9	218.6	415.4
2006	194.1	94.5	74.6	14.2	18.8	7.5	209.6	403.7
2007	194.7	97.2	76.2	14.1	18.7	7.6	213.8	408.4
2008	187.7	95.2	73.1	13.9	15.9	7.0	205.0	392.7

¹Includes artichokes, asparagus, snap beans, broccoli, cabbage, carrots, cauliflower, celery, sweet corn, cucumbers, eggplant, endive, escarole, garlic, head, romaine, and leaf lettuce, mushrooms, onions, bell peppers, potatoes, radishes, spinach, sweetpotatoes, and tomatoes. ²Includes asparagus, lima beans, snap beans, beets, cabbage, carrots, sweet corn, cucumbers, mushrooms, green peas, chile peppers, potatoes, spinach, tomatoes, and other miscellaneous vegetables. ³Includes asparagus, lima beans, snap beans, broccoli, carrots, cauliflower, sweet corn, green peas, potatoes, spinach, and other miscellaneous vegetables. ⁴Includes potatoes and onions. ⁵At this time dry field peas and lentils are not available and therefore are not included in the total legumes. ⁶Computed from unrounded data.

Source: USDA/Economic Research Service, Food Availability data. Data last updated February 1, 2010.

The Food Availability data overstate the amount of food actually ingested by capturing substantial quantities of food lost to human use through waste and spoilage beyond the farm gate, in the marketing system, and at home. In order to obtain a closer approximation of what Americans, on average, consume over time on an annual and daily basis, a second data series, the Loss-Adjusted Food Availability Data, adjusts the Food Availability data for:

1. Loss from primary (i.e., farm) to retail weight.
2. Loss from retail/institutional level to the consumer level (e.g., in supermarkets, megastores like Walmart, and other retail outlets).
3. Loss at the consumer level. This includes losses for food consumed at home and away from home (e.g., in restaurants, fast food outlets, etc.) and has two components:
 - (a) “Nonedible share” of a food (e.g., asparagus stalk, apple core). Data on the nonedible share is from the National Nutrient Database for Standard Reference compiled by USDA’s ARS
 - (b) “Cooking loss and uneaten food such as plate waste” from the edible share.

The goal of accounting for these three general types of losses is to more closely approximate actual food intake. In addition to estimates of per capita consumption, the data are presented in two forms:

1. The number of calories available per capita per day, and
 2. The number of MyPyramid equivalents available per capita per day, which can be used for comparison with dietary recommendations for the U.S. population (e.g., Wells and Buzby, 2008).
- Figure A1 illustrates the multistage process that takes the per capita annual estimates for canned sweet corn from the farm to the table.

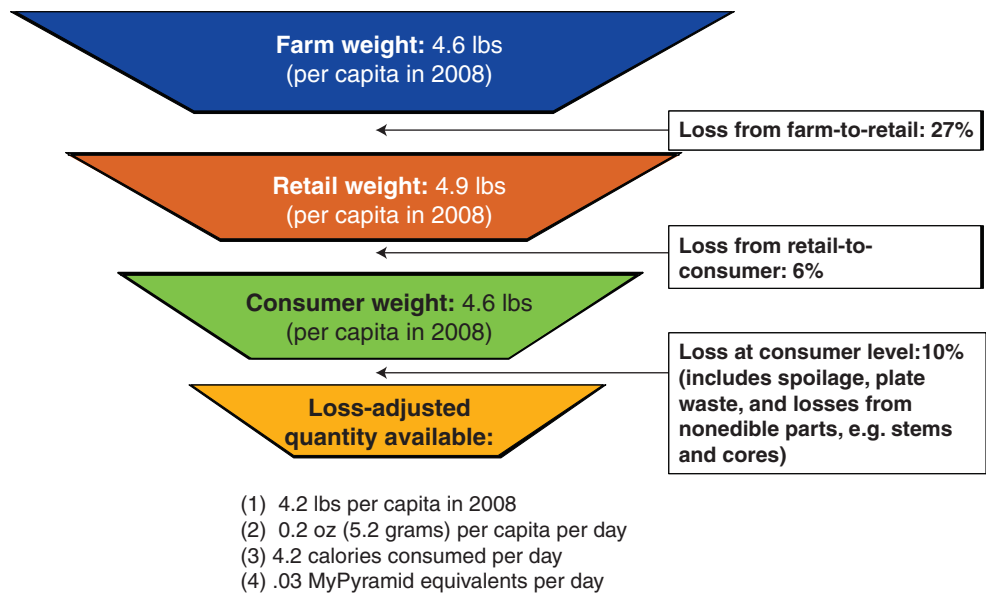
Each commodity in the Loss-Adjusted Food Availability data has a spreadsheet posted on the ERS website that provides the loss assumptions currently used by ERS (see <http://www.ers.usda.gov/Data/FoodConsumption/FoodGuideIndex.htm>). Additionally, each fruit and vegetable has a separate spreadsheet for each product form. For example, apples have spreadsheets for fresh, frozen, dehydrated/dried, and canned apples, as well as for apples processed into juice. Vegetables do not have tables for juice, but have tables for legumes and potatoes processed into chips. The Loss-Adjusted Food Availability data for canned fruits and vegetables are provided in tables 1 and 2 of this report.

It is important to note that like the core Food Availability data, this data series is based on the food that is available for consumption and does not represent data from consumer surveys.¹⁵ Traditionally, ERS

¹⁵ Most consumer surveys of dietary intake cover from 1 year to several years of consumption, and most are not nationally representative of the U.S. population. Moreover, time series data on actual consumption by Americans are lacking.

uses the Loss-Adjusted Food Availability Data series to track the dietary status of Americans as compared with Federal dietary recommendations. In this report, however, ERS uses the data to estimate how much of the different kinds of canned fruits and vegetables Americans are consuming over time.

Figure A1
Loss-adjusted food availability data for canned sweet corn, U.S. per capita, in 2008



A2. Consumer Expenditure Survey

The Bureau of Labor Statistics conducts the Consumer Expenditure Survey (CE). A major objective of the survey is to collect information necessary to construct the Consumer Price Indices. The CE features two components, each with its own questionnaire and sample:

1. A quarterly interview panel survey in which each of approximately 11,000 households is surveyed every 3 months over a 1-year period.
2. A weekly diary survey of approximately 7,800 households that keep an expenditure record for two consecutive 1-week periods. The diary data from 2004 and 2008 are analyzed in this report.

The diary survey obtains data on small, frequently purchased items that are normally difficult for people to recall, including food and beverages, tobacco, housekeeping supplies, nonprescription drugs, personal care products and services, fuels, and utilities. The survey excludes expenditures incurred while respondents are away from home for one night or longer. In addition to reporting expenditures, respondents also report data on income, social, and demographic characteristics. Therefore, CE data are useful for estimating per capita spending on various food and nonfood items by income, social, and demographic characteristics of the U.S. population.

A3. The Food Intake Data

Since 2000, ERS researchers have developed and used a methodology to analyze food intake survey data to examine the influences of income and demographic factors on the consumption of produce and animal products. Over 20 analyses have been conducted to study the consumption of specific fruits and vegetables (e.g., apples, carrots, and potatoes).¹⁶ These studies were mostly based on food intake data collected by USDA. USDA has conducted periodic surveys of household and individual food consumption in the United States since the 1930s. During 1994-96 and 1998, the Continuing Survey of Food Intakes by Individuals (CSFII, 1994-96 and 1998) was the last food consumption survey conducted by ARS to collect data on the type and amount of foods eaten by Americans (USDA/ARS, 2000). In addition to food intake data, ARS developed the Food Commodity Intake Database (FCID) (EPA, 2000), providing data on the edible amount of agricultural food commodities contained in each food reported eaten in CSFII.

Besides food intake, CSFII also collects demographic information, such as household size, income, race, age, and gender, and information on where a food was purchased, how it was prepared, and where it was eaten. The data are particularly valuable for measuring the effect of social, economic, and demographic characteristics on food consumption.

The 1994-96 and 1998 CSFII was the last food consumption survey conducted exclusively by USDA. The data have become dated. Currently, USDA is working with the Centers for Disease Control and Prevention (CDC) to collect food consumption data as part of the National Health and Nutrition Examination Survey (NHANES) conducted by U.S. Department of Health and Human Services (CDC is part of DHHS). Work is underway to develop a Food Commodity Economic Database (a modified FCID database) to continue studying food and commodity consumption using survey data that has been collected since 1999.

¹⁶ Whether or not canned products were included in these studies depended on the type of produce. The depth of each analysis depended on the type of publication ERS researchers used to disseminate findings. For example, Commodity Spotlight articles in *Agricultural Outlook* (this publication was later replaced by *Amber Waves*) were short and hence only highlighted selected findings. There were also a number of studies published as ERS Outlook Report articles, which provided more detailed description of produce consumption. These ERS publications are listed in the references of this report and are available on the ERS website—under “Who eats what and where” in <http://www.ers.usda.gov/Briefing/DietQuality/who eats.htm>. In addition, some of the research findings were published in journals. Interested readers should contact Biing-Hwan Lin of ERS (blin@ers.usda.gov) for more information.