

## Demographic Profile of Apple Consumption In the United States

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**Abstract:** U.S. per capita consumption of apples has risen over the past three decades, with consumption of processed apple products exceeding consumption of fresh apples in the last 20 years. While fresh apple consumption remained fairly stable, the largest increases in processed per capita use during the 1990s were for juice, frozen, and dried products. Using data from the U.S. Department of Agriculture's (USDA) 1994-96, and 1998 Continuing Survey of Food Intakes by Individuals, this article examines the distribution of fresh and processed apple consumption in the United States. The analysis suggests that fresh apple use was most popular in the Western region of the United States, while processed apple use was strongly favored in the Northeast. Most apples are still consumed at home. Males generally consume more apples than females. Fresh apple consumption was greatest among Hispanic consumers and people of other races, while processed apple products were more popular among black, non-Hispanics. Apple juice, the largest component in the processed apple market, was most popular among children 2 to 5 years of age, especially among boys. As they got older, the importance of apple juice in their diets diminished and the popularity of the product shifted more strongly towards girls.

**Keywords:** Apple, consumption, per capita use, distribution, fresh, juice, dried, applesauce, baked products, frozen meals.

### Introduction

Apple production in the United States has come a long way since the early American settlers brought with them seeds and some grafted trees of European varieties and introduced apples to the eastern coast of North America. Through careful selection and breeding of both wild and cultivated varieties, today's apples are quite different from those that were first introduced. Produced commercially in nearly all of the United States, apple production averaged 20 percent higher during the 1990s compared with the previous decade. USDA's apple production data date back to 1889, when approximately 6.0 billion pounds were produced. Production was generally on a declining trend beginning in the 1910s, with average production bottoming out during the 1940s and 1950s at over 4.0 billion pounds. By the end of the 20<sup>th</sup> century, production had grown to over 10.0 billion pounds. Data on production for farm household use was first reported in 1909. During the 1910s, about one-fourth of production reported as having value was consumed on farm households. This share has declined

over the years to about less than 1 percent during the early-to-mid 1960s when it was last reported.

According to per capita disappearance data compiled by the USDA's Economic Research Service (ERS), apple demand in the United States has risen since the 1970s, reversing the downward trend experienced during the first half of the 20<sup>th</sup> century (fig. A-1). During the 1990s, domestic per capita disappearance of apples for all uses averaged much higher than the previous six decades, approaching peak disappearance levels achieved during the first 10 years of the 20<sup>th</sup> century. A combination of factors has likely contributed to increased per capita apple use in the United States, including production expansion, rising incomes, a growing and more diverse population, new varieties and products that better meet changing consumer lifestyles and preferences, and more recently, increased awareness of the importance of fruit in a healthy diet. However, due to lack of consumer research in this area, little is known about the demographics of fresh and processed apple consumption. Who consumes apples? What proportion of fresh and processed apples are purchased for at-home versus away-from-home meals? Has the increasing Hispanic population influenced fresh apple demand?

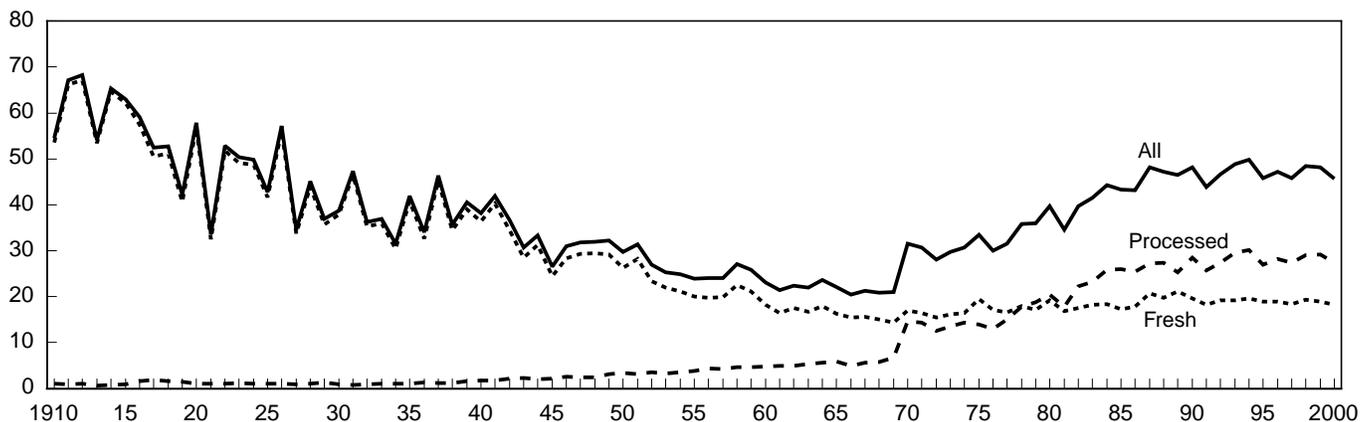
This article utilizes USDA's most recent individual food consumption survey to describe the distribution of fresh and

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Figure A-1

## Apple consumption in the United States

Pounds per person, fresh-weight basis



Source: Economic Research Service, USDA.

processed apple consumption in the United States. Apple consumption was analyzed based on the following socioeconomic and demographic characteristics: food source, region of the country, urbanization, racial or ethnic make-up, income class, age, and gender. The information derived from this article attempts to fill some of the information gaps in the area of consumer research for apples.

### Data and Methodology

USDA has conducted periodic surveys of household and individual food consumption in the United States since the 1930s (see box). The most recent surveys, the 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals (CSFII)<sup>2</sup>, conducted by USDA's Agricultural Research Service (ARS), provided the basis for this article. Each year of the 1994-96 data set comprises a nationally representative sample of non-institutionalized persons residing in 50 States and Washington, D.C. The 1998 CSFII was a supplemental survey to the 1994-96 CSFII. The supplemental survey was strictly focused on children (see the box for more details).

In the CSFII, two nonconsecutive days of dietary data for individuals of all ages were collected 3 to 10 days apart through in-person interviews using 24-hour recalls. The 1994-96 CSFII data set includes information on the food and nutrient intakes of 15,303 individuals, while the 1998 CSFII data set includes 5,559 children who were up to 9 years of age.

The respondents provided a list of foods consumed as well as information on where, when, and how much each food was

eaten. Standardized probes were used to collect details on food descriptions and amount of food eaten. The location where the food was purchased was coded into several categories. For each respondent, an array of economic, social, and demographic characteristics were also collected. This rich database enables researchers to estimate the market/consumption distribution of a food by numerous delineations.

### Domestic Apple Demand Rising

Apples are the third most valuable fruit crop in the United States, next to grapes and oranges, with 2000 farm cash receipts of \$1.5 billion, 11 percent of all fruit and nut farm cash receipts. Considered by Americans as a traditional fruit crop, nearly 100 varieties are now commercially produced in the United States, with 15 of the most popular varieties accounting for over 90 percent of production. Next to oranges, apples (frequently alternating with grapes) are the Nation's second most popular consumed fruit (fresh and processed uses combined). According to ERS disappearance estimates, per capita fruit consumption in the United States was 284.3 pounds, fresh-weight equivalent, in 1999, of which 48.1 pounds were apples. Consumption is estimated to decline to 45.6 pounds of apples per person in 2000 as a result of reduced utilized production in the fall of last year.

U.S. apple consumption (fresh and processed combined) generally trended upward over the past three decades. While U.S. fresh fruit and vegetable consumption experienced significant growth since the 1970s, per capita fresh-market apple use has remained relatively flat. The fresh-market apple sector lagged behind other fresh produce product sectors in meeting the growing demand for fresh-cut products, especially during the past decade.

Another factor that may have contributed to the leveling of fresh-market apple consumption in the United States is

<sup>2</sup> U.S. Department of Agriculture, Agricultural Research Service, 1998. 1994-96 Continuing Survey of Food Intake by Individuals and 1994-96 Diet and Health Knowledge Survey. CD-ROM. Available from National Technical Information Service, Springfield, VA.

increased competition from imports of other fruits. Increased fruit imports such as grapes, peaches, nectarines, and plums from Chile (mostly during November through March) beginning in the mid-1980s has expanded out-of-season fruit supplies domestically. While perhaps contributing to boost consumption of many U.S. summer fruits (by extending the season), the increase in choices of fruit for consumers during the winter months, besides the traditional apples, pears, and oranges, may have shifted some consumption away from these commodities.

Also, supermarkets across the United States now offer more variety of items in their produce department in response to consumers' demands for added convenience, healthy diets, and gourmet and ethnic items (Kaufman, et. al.). The number of stockkeeping units (SKU's) sold in the produce department increased from 173 in 1987 to 225 in 1997 (Litwak, 1988 and 1998). For example, the growing demand for non-traditional fruit products such as tropical fruit, reflecting in part the growing immigrant population in the United States and increased interest among Americans to try new products, has led to increased imports of these products and the greater presence of these products in supermarket produce departments. Growth in average per capita consumption for fresh mangoes, pineapples, and papayas during the 1990s relative to the 1980s was substantial and has surpassed those for most domestically-produced fruit.

Processed apple demand has trended higher, exceeding fresh apple demand in the last 20 years. During the most recent 3 years (1998-2000), average fresh use increased 4 percent over the 1978-80 period (to 18.8 pounds per person annually), while average processing use has risen 50 percent, to 28.6 pounds. ERS estimates suggest the largest processed use of apples is for juice (74 percent), followed by canned (17 percent), dried (4 percent), frozen (3 percent), and other (2 percent). Per capita consumption for all these processed products averaged higher during the 1990s compared with the previous decade, with the largest increases in juice, frozen, and dried products (fig. A-2).

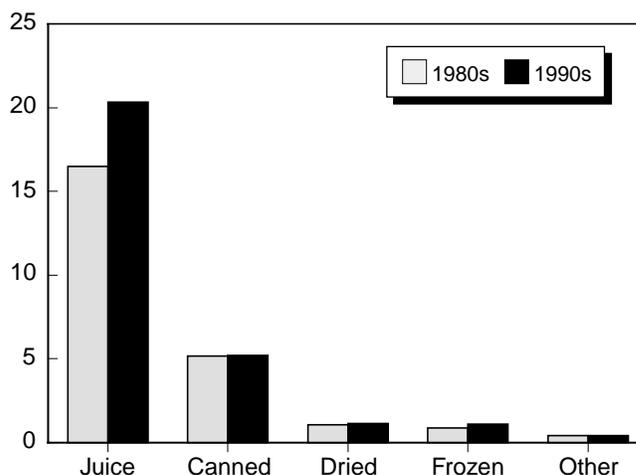
### **“At Home” Consumption Still Dominates**

Despite the growing trend in dining out among U.S. households over the last two decades, Americans still consume the vast majority of apple and apple products at home (fig. A-3). Approximately 94 percent of fresh apples were consumed at home, including fresh apples that were packed or prepared at home, but eaten elsewhere. In this study, the “at home” and “away from home” delineation is based on where a food was obtained or prepared, not where it was consumed. Food consumed at home is generally purchased at a retail store such as a supermarket, grocery store, or convenience store. Food consumed away from home is generally purchased from foodservice establishments, but can also be obtained in

Figure A-2

### **U.S. apple consumption by processed product categories**

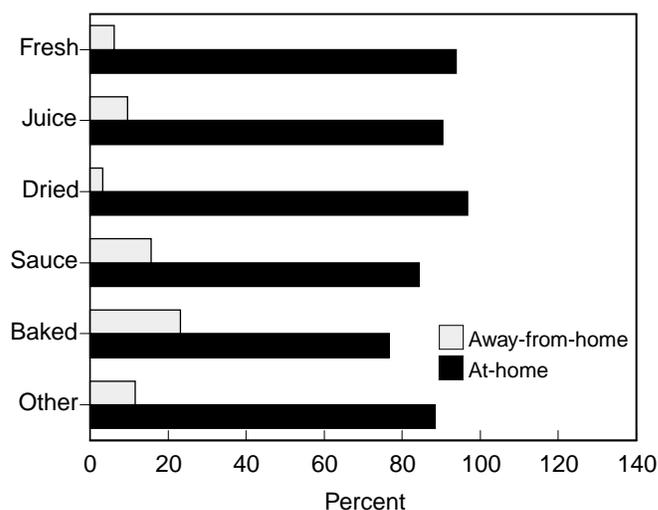
Pounds per person, fresh-weight basis



Source: Economic Research Service, USDA.

Figure A-3

### **Consumption of apples by location**



Source: Economic Research Service, USDA.

such places as cafeterias, community feeding programs, or child/adult care centers. Among the various food products that contain apples as an important ingredient, dried apples, which also includes apples in cereal products, were most frequently consumed (97 percent) at home while baked apple products such as dessert items were the least frequently consumed at home (77 percent). On average, about 89 percent of all processed apple products were consumed at home.

## Western Region Led in Per Capita Fresh Apple Consumption, Northeastern Region Topped Processed Apple Product Use

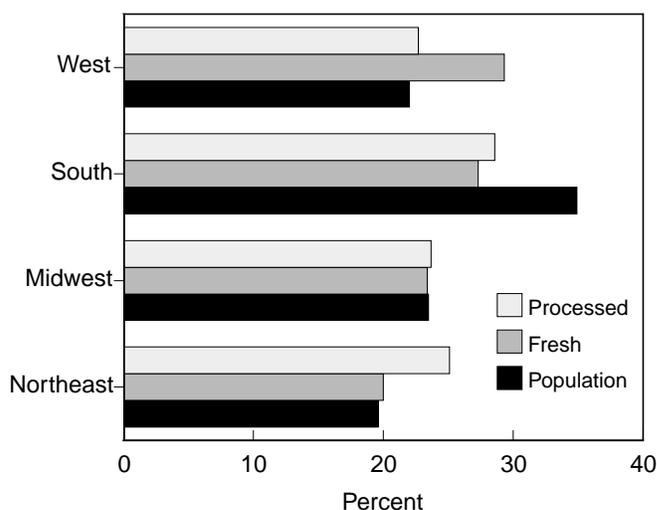
The CSFII data present distinct regional patterns in the consumption of apple products. Among the four-Census defined regions, the Southern region had the largest representation of consumers (35 percent of the population), followed by the Midwest (24 percent), West (22 percent), and Northeast (20 percent) regions (table A-1). Consumption of fresh apples was favored more in the West and less in the South, perhaps partly due to the geographic concentration of production.

The West is a major production region for apples, particularly for the fresh market, whereas the South is the smallest producing region. Higher transportation costs may be required to bring apples into the Southern region where local production for the fresh market is relatively low, and the resulting higher retail prices may be discouraging consumption. With a 22-percent share of the U.S. population, the Western States accounted for 29 percent of fresh apple consumption (table A-1). By dividing the consumption share by the population share, we can compare relative consumption as shown in table A-2. For example, figures in table A-2 show that relative to the national average, per capita fresh apple consumption in the Western States is 33 percent higher, while in the South per capita consumption is 22 percent lower. Table A-2 also indicates that Westerners consume 71 percent more fresh apples than Southerners.

Per capita consumption of processed apple products was strongest in the Northeast region and weakest in the South (table A-1 and fig. A-4). Important apple-producing States in the Northeast, such as New York and Pennsylvania, produce a high percentage of processing apples. Per capita processed apple consumption in the Northeast was 28 percent higher than the national average, while in the South, per capita consumption was 18 percent below (table A-2). While consumers from the Western States indicated a much stronger preference for fresh apples than processed, consumers in the Midwest demonstrated an equal preference for fresh and processed apple products. Per capita processed apple consumption in both regions, however, were about equal to the national average.

Among the processed apple products, Northeasterners showed preference towards apple juice, dessert or baked apple products, dried apples, and apple sauce (table A-1). In particular, consumers in the Northeast had the highest per capita consumption of apple juice and dessert or baked apple products (table A-2). Consumers in the Western States also indicated preference for apple juice but the relative per capita consumption of apple juice in the Northeast was 25 percent higher (table A-2). Similarly, consumers in the Midwest also indicated a preference for dessert or baked apple products, but the relative per capita consumption of these products in

Figure A-4  
U.S. population and apple consumption by region



Source: Economic Research Service, USDA.

the Northeast was 24 percent higher. The Western States tied with the Midwest as having the highest relative per capita consumption of dried apples (14 percent above the national average). The Midwest also had the highest relative per capita consumption of applesauce (31 percent above the national average) and “other” processed apple products such as jams and jellies. Meanwhile, per capita consumption of all these processed products, except “other”, lagged behind the national average in the Southern States.

## Suburban Residents Consume More Fresh Apples, Metropolitan Residents More Processed Apples

About 47 percent of the U.S. population reside in suburban areas, 32 percent in metropolitan cities, and 21 percent in rural areas (table A-1). Daily per capita use of fresh apples was slightly higher in suburban areas, reflecting in part the higher concentration of supermarkets in these areas and the larger percentage of the middle-income and high-income population residing in these areas. Metropolitan area consumers had a slightly stronger preference for processed apple products, particularly for products such as apple juice and dried apples. Consumption of processed apples such as in applesauce and baked products, meanwhile, were consumed in larger proportions by suburban consumers (table A-2). Although ahead in total processed apple per capita use, consumption of applesauce and baked apple products in metropolitan areas were below the national average. Meanwhile, per capita use of fresh and most processed apples fell below the national average in rural areas, where a large proportion of low-income populations reside and where there are smaller and fewer food stores.

### Non-Hispanic, White Consumers Dominate the Market for Apples, But Preference for Fresh Apples Lean Towards Hispanics and People of Other Races

Apple consumption patterns for the top three racial groups (white, black, Hispanic) and all others (two-thirds of which are Asian) are presented in tables A-1 and A-2. Non-Hispanic, white consumers represented 72 percent of the diverse racial and ethnic makeup of the U.S. population in the 1990 Census. On a per capita basis (market share divided by population), whites indicated preference for all apple products except apple juice (table A-2). While fresh-market apples were found to be important in their diets (fig. A-5), whites indicated stronger preference for dried apples, applesauce, baked apple products, and “other” processed forms. While accounting for a smaller proportion of the U.S. population, fresh apple consumption was 27 percent higher among Hispanics than non-Hispanic, whites (table A-2). Consumption of fresh apples, however, was highest among people of other races (Asians, Pacific Islanders, American Indian, etc.).

Non-Hispanic, black consumers indicated no preference for fresh apples in favor of apple juice, baked apple products, and “other” (table A-1). This ethnic group made up 13 percent of the U.S. population but consumed only about 7 percent of the fresh apples. However, they consumed 15 percent, 13 percent, and 14 percent of the apple juice, baked apple products, and “other” processed products, respectively. These findings were reinforced in table A-2. Fresh apple consumption by non-Hispanic, blacks was 46 percent below the national average. These consumers, however, had the highest consumption of processed apple products, in

general. They rank second in apple juice and baked apple product consumption and had the highest relative consumption of “other” processed products. Leading in apple juice consumption, consumers from “other” backgrounds were found to consume 3 percent more apple juice than non-Hispanic, blacks.

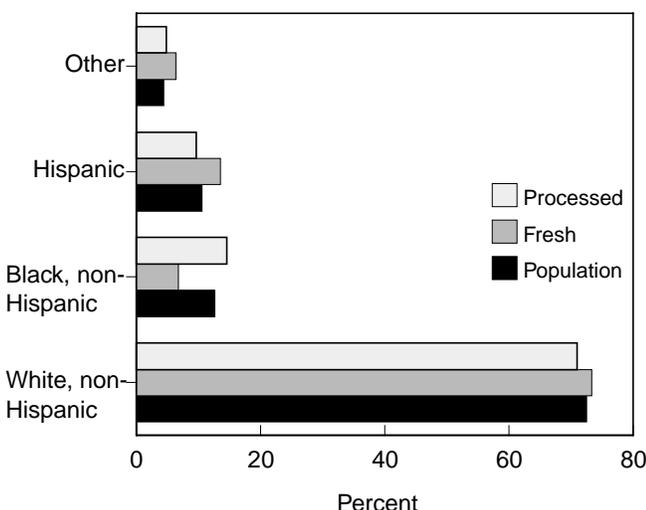
### Per Capita Apple Use Rises With Income

Survey results indicated that per capita consumption of fresh apples increases with income. Households were grouped into three income brackets utilizing the Federal poverty guidelines developed by the Department of Health and Human Services for the implementation of Federal food programs. Households with income falling below 130 percent of the poverty level (eligible for receiving food stamps) were regarded as low-income; those with income between 130 and 350 percent of the poverty level were middle-income; and those with income greater than 350 percent of the poverty level were high-income. About 19 percent of the households in this study were in the low-income bracket, 42 percent were middle income, and 39 percent were high-income (table A-1).

Partly reflecting the high value associated with fresh produce, fresh apple consumption was favored by high-income households who represented 39 percent of the population and consumed 45 percent of all fresh apples (table A-1). Fruit intended for the fresh market are typically more costly to produce as they require more careful management to help meet consumer preferences on size, shape, taste, and other physical qualities. The average daily per capita use of fresh apples of high-income households was 16 percent higher than the national average (table A-2). Households in the low-income bracket indicated the least preference for fresh apples as their average daily per capita use were about 20 percent below average, much lower than the already below-average consumption by middle-income households. This pattern in consumption is consistent with findings of a recent ERS study whereby low-income regions exhibited above-average grocery store expenditures on calorie-dense food items and below-average expenditures on many of the vegetable items—the opposite pattern exhibited by high-income markets (Jekanowski and Binkley).

For processed apples, per capita use increased with income for dried apples, applesauce, and dessert or baked apple products. High-income households consumed most of these three products, while daily per capita use of low-income households were far below the average, as they may regard these products as luxury or discretionary items in the preparation of a basic nutritious meal (table A-2). Dried apples are an expensive snack item which low-income households may replace with cheaper, more affordable alternatives. Applesauce is usually used as a complement for meat menus that require more expensive cuts of meat such as pork chops and roasts, and baked apple products are often eaten as a

Figure A-5  
**U.S. population and apple consumption by racial/ethnic background**



Source: Economic Research Service, USDA.

Table A-1--U.S. apples: Consumption distribution by fresh and processed product

	Population 1/	All apples	Fresh	Processed					
				All products	Juice	Dried	Sauce	Dessert or baked	Other
Percent									
Census region									
Northeast	19.6	23.5	20.0	25.1	25.9	20.4	20.8	26.6	16.0
Midwest	23.5	23.6	23.4	23.7	22.2	27.4	30.8	25.7	30.0
South	34.9	28.2	27.3	28.6	28.4	26.2	26.9	30.2	39.1
West	22.0	24.7	29.3	22.7	23.4	26.0	21.5	17.5	14.9
MSA status									
Metropolitan	31.8	34.5	29.1	36.8	38.6	38.3	29.3	28.7	31.7
Suburban	47.0	48.7	51.9	47.2	46.3	47.4	52.1	51.4	44.8
Rural	21.2	16.9	19.0	16.0	15.1	14.3	18.6	19.9	23.5
Race/ethnic origin									
White, non-Hispanic	72.5	71.7	73.3	71.0	68.5	88.2	81.0	81.0	78.2
Black, non-Hispanic	12.6	12.3	6.8	14.6	15.3	6.0	11.7	12.7	14.2
Hispanic	10.6	10.8	13.5	9.6	10.7	2.3	5.4	5.0	5.4
Others	4.4	5.3	6.4	4.8	5.5	3.6	1.9	1.3	2.3
Household income as a percentage of poverty									
0-130%	19.2	18.3	15.4	19.5	20.7	12.4	15.9	10.2	19.9
131-350%	41.8	40.5	39.5	41.0	40.8	33.4	40.9	45.7	42.4
351% and above	39.0	41.2	45.1	39.5	38.6	54.2	43.2	44.2	39.7
Gender and age									
Male:									
All	48.9	51.6	51.4	51.6	52.4	49.2	45.1	53.6	55.0
< 2	1.6	3.9	0.7	5.3	5.5	0.6	6.8	0.2	2.4
2-5	3.2	9.2	5.1	10.9	12.4	3.6	6.9	1.5	5.8
6-11	4.6	6.0	6.1	5.9	5.6	7.0	9.2	2.7	7.6
12-19	5.8	5.3	4.4	5.7	6.2	7.4	2.4	6.6	5.9
20-59	27.0	21.0	25.8	18.9	19.4	24.9	10.2	27.8	25.8
60 and older	6.8	6.2	9.3	4.9	3.4	5.8	9.6	14.8	7.5
Female:									
All	51.1	48.4	48.6	48.4	47.6	50.8	54.9	46.4	45.0
< 2	1.5	3.2	0.5	4.3	4.5	0.3	6.1	0.1	1.7
2-5	3.1	7.5	4.0	9.0	10.1	2.9	6.3	0.8	4.3
6-11	4.4	6.4	5.4	6.8	7.1	4.4	7.5	2.1	6.1
12-19	5.6	6.0	4.2	6.7	7.4	3.1	4.0	3.1	4.9
20-59	27.7	18.6	25.2	15.7	14.6	29.6	15.0	29.0	20.0
60 and older	8.9	6.9	9.2	5.9	3.9	10.5	15.9	11.4	8.1

Totals may not sum due to rounding. 1/ Percent of the U.S. population in each of the categories.

Source: U.S. Department of Agriculture, Agricultural Research Service, 1998. 1994-96 Continuing Survey of Food Intake by Individuals.

Table A-2--Relative per capita consumption of apple products: Subgroup population divided by U.S. population

	All apples	Fresh	Processed					Other
			All products	Juice	Dried	Sauce	Dessert or baked	
Percent								
Census region								
Northeast	120	102	128	132	104	106	136	81
Midwest	100	100	101	95	114	131	109	130
South	81	78	82	82	75	77	87	113
West	112	133	103	106	114	97	80	65
MSA status								
Metropolitan	108	91	116	121	121	92	90	101
Suburban	104	110	101	99	100	111	109	95
Rural	80	90	75	71	64	88	94	112
Race/ethnic origin								
White, non-Hispanic	99	101	98	95	121	112	112	108
Black, non-Hispanic	98	54	116	122	46	92	101	114
Hispanic	102	128	91	101	21	51	48	52
Others	120	145	109	126	82	44	29	51
Household income as a percentage of poverty								
0-130%	95	80	102	108	61	83	53	105
131-350%	97	94	98	97	79	98	109	101
351% and above	106	116	101	99	114	110	113	98
Gender and age								
Male:								
All	106	105	106	107	100	92	109	112
< 2	249	42	339	318	36	439	15	43
2-5	285	159	340	385	111	215	48	187
6-11	131	134	130	122	154	200	59	172
12-19	92	77	99	107	129	41	114	105
20-59	78	96	70	72	89	38	103	99
60 and older	92	138	72	51	86	142	219	114
Female:								
All	95	95	95	93	96	107	91	89
< 2	210	32	287	295	18	405	6	41
2-5	245	131	294	331	93	208	25	145
6-11	147	125	156	162	100	173	48	143
12-19	107	76	120	133	57	72	56	92
20-59	67	91	57	53	107	54	105	75
60 and older	77	103	66	44	118	178	127	94

Source: CSFII, 1994-96 and 1998, two-day dietary recall data.

dessert or snack for which low-income households may decide to do away with in order to economize.

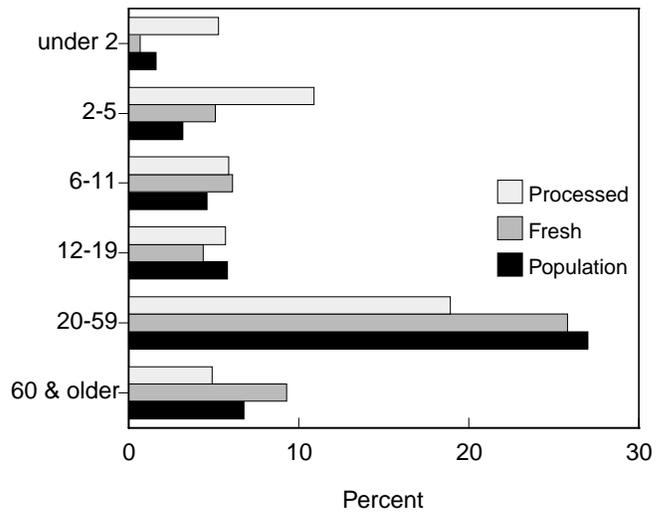
Products that were favored more by households in the low-income bracket were apple juice and items such as jams and jellies which are often offered at lower prices in grocery stores under a private label brand. Also helping to boost consumption of these products among the low-income households is perhaps their participation in Federal food programs such as the National School Lunch Program and other food assistance programs such as the Food Stamp program and the Supplemental Women, Infant, and Children (WIC) program where these apple products are included. Low-income consumers represented 19 percent of the population and consumed 21 percent of apple juice products and 20 percent of other products (jams and jellies) (table A-1). Based on table A-2, per capita daily use of these products by low-income households was found to be 8 percent and 5 percent above the national average.

### **Apples Are Preferred More By Males, Consumption Patterns Vary Distinctly by Age**

Male consumers have a stronger preference for fresh and processed apple products than female consumers do. This may be attributed in part to the fact that food intake of males generally tend to be higher. Survey results indicated that although males represented a slightly smaller segment of the population, they, relative to females, accounted for a larger share of the fresh apples and processed apple products consumed, with the exception of dried apples and applesauce (table A-1). The daily per capita use of apples (all) among males was 6 percent higher than the national average while those for females was 5 percent lower (table A-2). Relative to females, apple consumption by males was also found to be 11 percent higher for the fresh-market product and 12 percent higher for all processed products. Between fresh and processed, male consumers in general had a slightly higher preference for processed apple products. Female consumers, meanwhile, were more indifferent in their preference, with the consumption of both fresh and processed apple products lagging the national average.

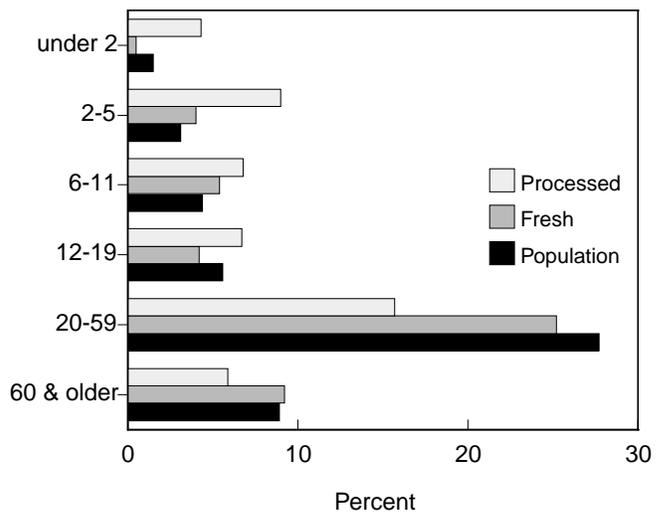
There are distinct fresh apple consumption patterns by age (figs. A-6 and A-7). Children who were 2 years in age through 11 years have the highest consumption of fresh apples. In addition to its nutritional content, this may partly reflect the popularity of this fruit as part of a packed meal, especially among school children. Fresh apple consumption was well below average for children below 2 years old, reflecting the bulk of their apple consumption in the form of baby food, including apple juice. Aside from the infant years, children begin to consume fewer fresh apples once they reach the teen years (defined here as ages 12-19), especially among boys. This consumption pattern continues until adulthood, with consumers between the ages 20 and 59, espe-

Figure A-6  
**U.S. population and apple consumption by male age group**



Source: Economic Research Service, USDA.

Figure A-7  
**U.S. population and apple consumption by female age group**



Source: Economic Research Service, USDA.

cially women, having the lowest preference for fresh apples. Perhaps partly due to stronger health concerns, consumption picks up again as consumers reach the age of 60 years and older, with men eating more fresh apples than females. Publicity surrounding recent research findings helped increase public awareness of the many health benefits obtained from apple consumption. Aside from being a delicious source of dietary fiber, apples contain numerous vitamins, minerals, and nutrients that help sustain good health by lowering cholesterol, reducing hypertension, promoting bone and lung health, managing diabetes, and reducing the risk of heart attacks, strokes, and certain types of cancer. Some of

these recent research findings are summarized in the U.S. Apple Association's website [www.usapple.org](http://www.usapple.org).

Distinct patterns also exist in processed apple consumption by different age groups. Processed consumption was higher among younger children (both genders) and teenage girls. Children 2 to 5 years in age had the highest consumption. Children in this age bracket, including those younger than 2 years, had at least more than twice as many servings of processed apple products as fresh. However, as children grew older, their choices of food also expanded and since they take over more of the food decision-making responsibility, they opt for other foods when it becomes their choice. This may partly explain why, like the pattern in fresh apple consumption, the importance of processed apples in the diets of young children faded as they approached teenage years and adulthood. Among adults, those 20 to 59 years of age, had the least preference for processed apple products.

Apple juice—the most dominant of all processed apple products—was the most popular apple product among young children and teenagers (table A-2). Per capita consumption was highest among children between 2 and 5 years of age, with consumption by boys exceeding that of girls by as much as 16 percent. Girls started to have more preference for apple juice than boys after 5 years of age. The early introduction of apple juice into the diets of young children, particularly among infants and toddlers, may have earned its early acceptability to consumers in this age group. Children's preference for apple juice, however, diminished as they grew older, with per capita use falling well below average as they reached adulthood. From among the adults, those 20 to 59 years old were found to have the least preference for apple juice.

Applesauce was the second most popular apple product among younger children (less than 2 to 11 years of age). Boys had a slightly stronger preference for applesauce than girls. Teenagers, and more so adults who were in the 20 to 59 year age bracket, did not indicate any strong preference for the product and their daily per capita use were well below average. Among the processed apple categories, teenage boys favored dried apples (which includes cereal products) the most while teenage girls placed a stronger preference for apple juice. Although differing slightly in order of preference, both male and female adults 20 to 59 years old showed strong preference for dessert or baked apple products. Females in this age bracket, however, had a much stronger preference for dried apples. Meanwhile, the two most popular processed products among adult consumers 60 years and older were dessert or baked apple products and applesauce.

## **Conclusion**

Apples are traditionally among the major mix of fruit grown in the United States. Serving both the fresh and processed

markets, apples remain a popular fruit item for many American consumers. The Economic Research Service's U.S. disappearance estimates for apple and apple products indicate a general rising trend overall. Still, little is known about the market distribution of fresh and processed apples in the United States. Utilizing data from USDA's CSFII survey, this article arrives at some understanding of the market distribution of fresh and processed apple consumption. The following highlights the findings of this article:

- While away-from-home eating has become a clear trend in the United States in the last several years, at-home use still dominates both the fresh and processed apple markets. This means most apples and apple products are purchased at retail stores and eaten as home foods. Baked apple products, although also mostly consumed at home, had the largest share of away-from-home consumption.
- Fresh apple consumption was favored more in the Western States and less in the Southern States. Meanwhile, consumption of processed apple products in general was strongest in the Northeastern States and weakest in the Southern States.
- Fresh apple consumption was slightly higher in suburban areas, while processed apple consumption was greatest in metropolitan areas. In rural areas, the daily per capita apple use was generally below average.
- People of "other" races were the strongest consumers of fresh-market apples followed by Hispanics. Non-Hispanic white consumers also favored fresh-market apples, but their preference towards processed apples was stronger. African-Americans, on the other hand, indicated the strongest preference for processed apples, particularly apple juice, but their consumption of fresh-market apples was the lowest.
- Per capita consumption of fresh apples increases as income rise. Fresh-market apples were favored the most by high-income households and were favored the least by low-income households. From among the processed apple products, dried apples, applesauce, and dessert or baked apple products were popular among wealthier households. The low-income households, on the other hand, favored apple juice and other miscellaneous processed products such as jams and jellies.
- Male consumers have a stronger preference for apples in general than females. The daily per capita apple use by males was slightly above average while consumption by females was slightly below average. Moreover, there are distinct patterns in consumption by age. Children 2 to 5 years of age have the highest consumption of fresh and processed apples, while adults 20 to 59 years of age have the lowest preference for these products. The two most dominant processed products—apple juice and applesauce—were popular among young children, but these products' appeal to consumers diminished with age.

## USDA Food Consumption Data

USDA collects and compiles two major data sets on food consumption in the United States, the Supply and Utilization or food disappearance data, compiled by USDA's ERS, and the Continuing Survey of Food Intakes by Individuals, compiled by USDA's Agricultural Research Service. Both data sets are key components of ongoing Federal efforts to monitor the nutritional health and dietary status of U.S. consumers. They were mandated by Congress under the National Nutrition Monitoring and Related Research Act of 1990. When used together, they provide a comprehensive picture of the Nation's eating habits.

**Food Supply and Utilization Data**, also known as food disappearance data, measures the flow of raw and semi-processed food commodities through the U.S. marketing system. They are neither a direct measure of actual consumption, nor of the quantity of food actually ingested. The total amount available for domestic consumption is estimated as the residual after exports, industrial uses, seed and feed use, and year-end inventories are subtracted from the sum of production, beginning inventories, and imports. The use of conversion factors allows for some subsequent processing, trimming, spoilage, and shrinkage in the distribution system. However, the estimates also include residual uses for which data are not available (such as miscellaneous non-food uses, and changes in retail and consumer stocks).

With data back to 1909 for most commodities, the food disappearance data are useful as indicators of trends over time. The data are most commonly used to measure the average level of food consumption in the country, to show year-to-year changes in consumption of major foods, to calculate the approximate nutrient content of the food supply, to establish long-term consumption trends, and to permit statistical analyses of effects of prices and income on food consumption. Because they include spoilage and waste accumulated through the marketing system and in the home, the data typically overstate actual consumption. A 1997 ERS study suggested that such losses may exceed 25 percent of the edible food supply.

Food disappearance data reflect the amount of major food commodities entering the market, regardless of their final use. Final product forms and consumption locations are not usually known, and little or no data exist on supplies of further-processed products. In short, relatively good information exists for many food ingredients, but not for foods as actually eaten. For example, the food disappearance data provide a good estimate of the annual per capita con-

sumption of apples but provide no information on products consumed—fresh, juice, frozen, canned, dried; where the apples/products were marketed—supermarket, hospital, school, restaurant, or food manufacturer; how they were consumed—in frozen meals, baked products, or on salads; how they were prepared—cooked from scratch or reheated from a canned or frozen product; or the socioeconomic characteristics of the consumer that ultimately ate the food.

Data used in this paper are taken from USDA's **Continuing Survey of Food Intakes by Individuals (CSFII)**, 1994-96 and 1998. The 1998 CSFII is a supplemental children survey to the 1994-96 CSFII, which is a nationally representative sample. The 1998 CSFII adds intake data from 5,559 children from birth through age 9 years to the intake data collected in 1994-96. The CSFII measures foods actually eaten by individuals. The survey records food intake over a specific period of time (two non-consecutive days in 1994-96 using 24-hour dietary recalls). The survey collects demographic information, such as household size, income, race, age, and sex, and information on where a food was purchased, how it was prepared, and where it was eaten, in addition to food-intake data. The CSFII provides information for use in policy formation, regulation, program planning and evaluation, education, and research. For example, data from recent surveys have been used to evaluate the impact of food fortification on nutrient intakes, to estimate exposure to pesticide residues and other contaminants from foods, and to target nutrition assistance and education programs to those who need them most. The data are particularly valuable for measuring the effect of socioeconomic and demographic characteristics on food consumption.

In this study, we make use of the Food Commodity Intake Database (FCID) from the Environmental Protection Agency. FCID contains human food consumption data expressed in terms of agricultural food commodities on 5,831 different foods and beverages people of different ages reported eating in 1994-96 and 1998. FCID provides the edible amount of agricultural food commodities contained in each food reported eaten in CSFII.

The 1994-96 CSFII data include a sample weight for each respondent, indicating the number of people the sample represents. The share of an apple product by location can be estimated by calculating the weighted-sum of the product consumed in each location. Similarly, the socioeconomic and demographic characteristics of the respondents can be used to estimate the consumption share of apples by these characteristics.

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