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The logo for the United States Department of Agriculture (USDA), featuring the letters "USDA" in a bold, serif font above a stylized graphic of a field and sky.

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The word "Outlook" in a stylized, italicized font, with the letter "O" being significantly larger and overlapping the "u".

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# Factors Affecting U.S. Mushroom Consumption

Gary Lucier, Jane Allshouse, and Biing-Hwan Lin<sup>1</sup>

## Abstract

U.S. mushroom consumption has been increasing over the past several decades. Basic knowledge of the distribution of mushroom consumption across different market channels, geographic regions, and population groups has been very limited in the past. Using data from USDA's 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals, this article examines the consumption distribution of fresh-market and processed mushrooms in the United States. The analysis indicates that per capita mushroom consumption is greatest in the West and Midwest. A little more than half of fresh-market mushrooms are purchased at retail and consumed at home, while three-fourths of processed mushrooms are consumed at home. Per capita mushroom use is highest among men and women aged 20-39, and lowest for children under the age of 12.

**Keywords:** Mushrooms, consumption, per capita use, distribution, regions, ethnic background, income, age.

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## Factors Affecting U.S. Mushroom Consumption

Consumption of mushrooms has been on the rise in the United States over the past several decades. Typically used as a vegetable, per capita consumption of this carefully cultivated fungus crop has quadrupled since 1965 (the first year for which reliable data are available). According to data compiled by the U.S. Department of Agriculture's (USDA) Economic Research Service (ERS), per capita use of all mushrooms (on a fresh-weight basis) totaled about 3.94 pounds in 2001, compared with about 0.69 pounds in 1965 (table 1). In 2001, U.S. consumption of all mushrooms totaled 1.13 billion pounds—21 percent greater than in 1991.

Fresh-market mushrooms account for two-thirds of domestic consumption. Fresh-market consumption has been trending higher the past few decades, reaching a record 742 million pounds in 2001/02—more than 24 times greater than in 1965/66. Although per capita use of processing mushrooms has waned in recent years as consumers have more firmly embraced fresh-market

produce, processing use in 2001/02 was still 157 percent greater than in 1965. In addition to adding taste and texture to meals in a low-fat, low-calorie manner, mushrooms have long been viewed in other countries as a functional food, whose essential amino acids, vitamins, and minerals may be beneficial to human health.

There has been continual interest in information regarding the consumption distribution of foods such as mushrooms. Although much is known about the supply side of the U.S. mushroom market, relatively little detailed information has been published concerning consumer demand, aside from such things as basic USDA disappearance data and retail sales information.

Economic theory suggests that a combination of wide-ranging factors directly influence movements in per capita mushroom consumption, including immigration trends, changing family sizes, rising disposable incomes, and shifts in America's tastes and preferences. However, due to limited consumer research, the demographics of mushroom consumption have not been quantified. Some basic questions include: what proportion of mushrooms are purchased at retail for use at home versus purchased away from home at places such as restaurants? Who consumes mushrooms? Have the increasing Asian and Hispanic populations in the United States influenced mushroom demand?

The purpose of this article is to provide basic economic information about the market distribution of mushrooms using data derived from USDA's most recent individual food consumption survey. Following a short discussion of the data used in the analyses, the report describes U.S. mushroom consumption by food source, region of the country, ethnic background, income class, gender, and age.

### Data and Methodology

USDA has conducted periodic surveys of household and individual food consumption in the United States since the 1930s. The most recent surveys, the 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals (CSFII)<sup>2</sup>, conducted by USDA's

**Table 1—U.S. mushrooms: Per capita use**

Year	Fresh market	Processing <sup>1</sup>	Total <sup>1</sup>
Pounds, fresh-equivalent			
1965	0.16	0.53	0.69
1970	0.28	0.98	1.26
1975	0.66	1.23	1.89
1980	1.20	1.53	2.73
1985	1.78	1.81	3.59
1990	1.99	1.70	3.69
1994	2.02	1.93	3.95
1995	2.02	1.74	3.76
1996	2.08	1.82	3.90
1997	2.30	1.65	3.95
1998	2.45	1.41	3.86
1999	2.48	1.58	4.06
2000	2.58	1.48	4.06
2001	2.59	1.35	3.94
2002 f	2.65	1.28	3.93
2003 f	2.67	1.25	3.92
Decade averages:			
1960s	0.24	0.79	1.03
1970s	0.64	1.3	2.02
1980s	1.70	1.65	3.35
1990s	2.13	1.70	3.83
2000s	2.60	1.38	3.98

f = ERS forecast.

<sup>1</sup> Fresh-weight basis.

Source: Economic Research Service, USDA.

<sup>2</sup> U.S. Department of Agriculture, Agricultural Research Service, 2000. 1994-96 and 1998 Continuing Survey of Food Intake by Individuals. CD-ROM. Available from National Technical Information Service, Springfield, VA.

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, and was strictly focused on children (see box 1 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 of 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 was also collected. This rich database enables researchers to estimate the market/consumption distribution of a food by numerous delineations.

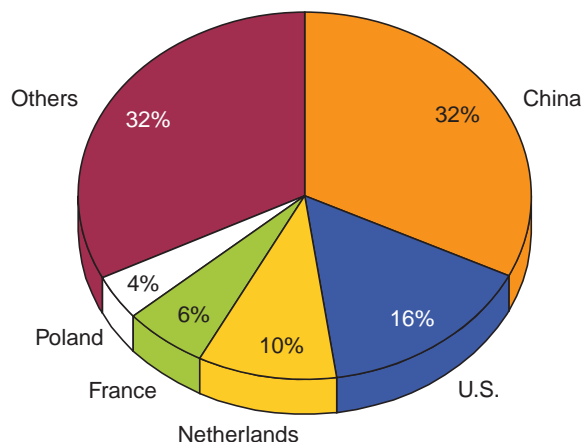
### ***Mushroom Markets and Use: United States A Top World Producer***

The United States is the world's second-largest producer of mushrooms, with 16 percent of world output, following China, which accounts for 32 percent of output (fig. 1). Mushrooms have been cultivated worldwide for thousands of years, but the U.S. commercial mushroom industry did not take hold until the early 1900s in Kennett Square, PA. Pennsylvania (53 percent of 1999-2001 U.S. output), California (15 percent), and Florida (5 percent) are the top producing States, with some 30 other States (1997 Census) reporting production. Over the 1999-2001 period, mushroom growers sold an average of 859 million pounds. Consolidation of production facilities continues within the industry. In 2001/02, mushrooms were grown on 262 farms—down 14 percent from 1999/2000 and 34 percent below 1991/92.

In terms of value of production, mushrooms are a leading U.S. specialty crop. During the 2001/02 season (July-June), the farm value of all mushroom production reached a record \$912 million, up 5 percent from a year earlier. Mushrooms were the fourth-leading

Figure 1

### **World mushroom production, 2001**



Source: Food and Agriculture Organization, United Nations.

vegetable commodity in terms of farm cash receipts—exceeded only by potatoes, tomatoes, and lettuce. Pennsylvania growers account for \$390 million or 45 percent of mushroom cash receipts, followed by California with 19 percent.

Although there are thousands of mushroom varieties in the world (not all cultivated or edible), the tried-and-true white button mushroom (*Agaricus bisporus*) continues to dominate the U.S. commercial industry. The common white button mushroom accounted for 87 percent of all domestic mushroom sales in 2001. However, over the past 20 years, an increasingly wide variety of cultivated mushrooms have become available to consumers. In recent years, sales of brown-colored variants of *Agaricus bisporus* (largely Crimini and Portabella) have surged in popularity and have been one of the fastest-growing segments of the mushroom industry. These varieties now account for 93 million pounds in sales—11 percent of all mushroom sales. Volume has nearly doubled since 1997/98 when brown *Agaricus* sales totaled 47 million pounds.

Specialty (non-*Agaricus*) varieties, led by Shiitake and Oyster, have also slowly risen in popularity over the past decade and have carved out about 2 percent of the domestic mushroom market. Although the longrun trend is rising, sales volume of specialty mushrooms (excluding brown *Agaricus*), most of which are sold in the fresh market, fell 4 percent from a year earlier to 13.3 million pounds in 2001/02. Shiitake mushrooms, which accounted for all of the decline in specialty output, accounted for 59 percent of specialty volume.

## Box 1—USDA Food Consumption Data

The United States Department of Agriculture (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 Economic Research Service (ERS), and the Continuing Survey of Food Intakes by Individuals (CSFII), 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, measure 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 ending 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 the 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 suggests 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 an estimate of the annual per capita consumption of processed mushrooms but provide

little information on consumption by product form—frozen, canned, dehydrated; where the mushrooms/products were marketed (supermarket, school, restaurant, or food manufacturer); how they were consumed (in frozen meals, on salads, or as a pizza topping); 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.

Survey data used in this paper are taken from USDA's *Continuing Survey of Food Intakes by Individuals*, 1994-96 and 1998. The 1998 CSFII is a child-oriented survey, supplemental to the 1994-96 CSFII, which is a nationally representative sample. The 1998 CSFII adds intake data for 5,559 children from birth through 9 years of age to the intake data collected in 1994-96. The CSFII, the most recent survey conducted under USDA's series of food consumption surveys dating back to the 1930s, 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 a mushroom 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 mushrooms by these characteristics.

In 2001/02, domestic consumption of all mushrooms fell 2 percent from a year earlier to 1.13 billion pounds. On a per capita basis, use of all mushrooms fell 3 percent to 3.94 pounds. For the eighth consecutive year, per capita consumption of fresh-market *Agaricus* and specialty mushrooms remained even or increased—rising slightly to a record 2.59 pounds. Use of mushrooms for processing has trended lower since peaking in 1994. Per capita use was estimated to be 1.35 pounds in 2001/02—30 percent below the 1994 peak.

Fresh-market mushroom consumption has trended higher during each of the past three decades. The latest surge in fresh use occurred during the mid-to-late 1990s when per capita use began to move from 2 pounds (where it had been sitting for the better part of a decade) to 2.5 pounds heading into the 2000s. The increase was likely the result of better marketing and promotion, the widespread adoption and appeal of newer varieties such as Portabella, and a strong national economy featuring high employment levels and rising incomes. A small part of the increase could also be due to rising public awareness of the positive impact on overall health of including more produce in the diet. According to the CSFII, on any given day, nearly 10 percent of Americans consume mushrooms in some form.

### “At-Home” Use Strongest

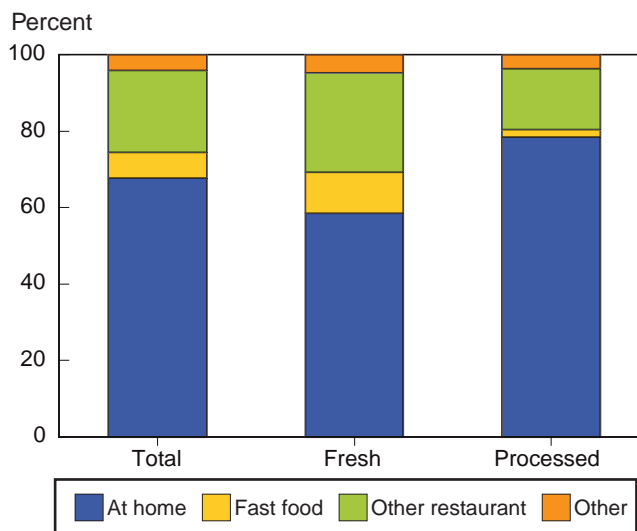
In the CSFII, the “at home” and “away from home” delineations are based on where a food was obtained or prepared, not where it was consumed. Food at home is generally obtained at a retail store such as a supermarket, grocery store, or convenience store. Food away from home is generally purchased from foodservice establishments but can also be obtained in such places as school cafeterias, community feeding programs, or child/adult care centers. Both at-home and away-from-home food can be consumed at or away from home. For example, a bagged lunch prepared at home and consumed at work is classified as at-home food. A commercially prepared pizza (with a mushroom topping) delivered and consumed at home is classified as away-from-home food. Fast food places include self-service and carryout establishments, restaurants are places that have wait staff, and school cafeterias include daycare facilities and summer camps. The category “others” is a catch-all category, including such things as community feeding centers, bar/taverns, and vending machines.

According to the CSFII, two-thirds of all mushrooms were purchased at retail stores and considered at-home

foods (table 2). About 59 percent of fresh-market mushrooms were purchased at retail stores for use at home, while 79 percent of processed mushrooms were bought for home meal preparation. The majority of processed mushrooms are canned products, with frozen and dehydrated products accounting for smaller shares of the market. About 76 percent of canned mushrooms are purchased at retail—about the same as for dehydrated products (77 percent). However, strong industrial food demand (frozen pizzas, TV dinners, etc.) and declining foodservice demand (primarily for fresh pizzas) caused the majority of frozen mushrooms to end up in various foods purchased at retail for home use.

As is frequently the case among vegetables, considerable differences in where foods were obtained were noted between the fresh and processed markets (fig. 2). About 42 percent of fresh-market mushrooms were obtained from away-from-home sources, while just 22 percent of processed mushroom consumption consisted of food away from home. Among many other factors over the past 20 years, having a presence in the expanding foodservice sector has been key in promoting market growth for several commodities (e.g. potatoes, tomatoes, onions). For mushrooms, the fresh side of the market has enjoyed relatively steady growth as shippers have been able to take advantage of several major food trends, such as salad bars, pizza, stir-fry, and a general increase in the diversity and ethnicity of foods. Indeed, the decision of most pizza delivery chains to switch from processed to fresh toppings in

Figure 2  
Annual consumption of mushrooms by food source



Source: Economic Research Service, USDA.

**Table 2—U.S. mushrooms: Consumption distribution by fresh and processed product<sup>1</sup>**

Item	Population	All mushrooms	Fresh-market	Processed <sup>2</sup>
		Percent		
<b>Food sources:</b>				
Home	97.6 <sup>3</sup>	67.7	58.5	78.5
Away from home	56.2 <sup>3</sup>	32.3	41.5	21.5
Fast food	26.6 <sup>3</sup>	6.7	10.7	1.9
Other restaurant	17.3 <sup>3</sup>	21.5	26.1	16.0
School	6.8 <sup>3</sup>	0.3	0.3	.4
Others	21.4 <sup>3</sup>	3.8	4.4	3.2
<b>Census region:</b>				
Northeast	19.6	19.8	21.9	17.4
Midwest	23.5	26.5	26.5	26.4
South	34.9	28.5	25.6	32.0
West	22.0	25.2	26.1	24.2
<b>MSA status: <sup>4</sup></b>				
Metropolitan	32.0	30.4	31.4	29.3
Suburban	46.9	51.1	53.2	48.7
Rural	21.1	18.4	15.4	22.0
<b>Race/ethnic origin:</b>				
White, non-Hispanic	72.5	81.9	82.6	81.1
Black, non-Hispanic	12.6	3.7	2.9	4.6
Hispanic	10.6	6.1	5.3	7.0
Mexican	4.9	2.7	3.0	2.3
Puerto Rican	1.1	0.3	0.1	0.4
Cuban	.3	0.1	0.2	0.1
Other Hispanic	4.3	3.1	2.0	4.3
Asian	2.9	6.5	6.8	6.0
Others	1.5	1.9	2.4	1.3
<b>Household income as a percentage of poverty:</b>				
Under 130 percent	19.2	11.6	11.7	11.4
131-350 percent	41.8	39.4	38.1	40.9
Over 350 percent	39.0	49.1	50.2	47.7
<b>Gender and age:</b>				
Male, all	49.0	49.0	47.1	51.2
Male, 2-11	9.0	2.7	1.8	3.7
Male, 12-19	5.9	4.1	4.1	4.2
Male, 20-39	16.0	22.0	20.3	23.9
Male, 40-59	11.6	12.3	12.9	11.6
Male, 60 and over	6.7	7.9	8.0	7.8
Female, all	51.0	51.0	53.0	48.8
Female, 2-11	8.5	2.8	1.8	3.9
Female, 12-19	5.7	3.9	2.6	5.5
Female, 20-39	15.9	21.1	23.3	18.7
Female, 40-59	12.1	14.0	15.1	12.6
Female, 60 and over	8.6	9.3	10.2	8.2

<sup>1</sup> Components may not sum vertically due to rounding. <sup>2</sup> Processed consists largely of canning but also includes frozen and dehydrated.

<sup>3</sup> Percent of population consuming at least one food at the specific location. <sup>4</sup> MSA = Metropolitan Statistical Area.

Source: U.S. Department of Agriculture, Agricultural Research Service, 2000. 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals.

CD-ROM. Available from National Technical Information Service, Springfield, VA.

## Box 2—Calculating Per Capita Shares

One way to describe the various consumption shares is by converting the survey shares into information already familiar to those in the agricultural industry—per capita disappearance. The per capita use data presented in the tables for 2001 were calculated by distributing the 2001 ERS food disappearance data for mushrooms using the CSFII survey data as distribution factors and then dividing by the 2001 population. This presents the share of consumption described in the survey in terms of mushroom consumption per person. One potential shortcoming of this methodology is the difference in time periods represented by each data

set. While the disappearance data is for the 2001/02 season (the latest available), the distribution factors applied to this data (also the latest available) are from survey data collected during the period 1994-96 and 1998. It is conceivable that there have been changes in the market distribution factors since the time the survey data were collected. Although the various levels of consumption may or may not be the same as if 2001/02 CSFII data were available and used, the shares illustrated by the distributed data in the tables are a fair representation of the shares found in the 1994-96 and 1998 CSFII.

the 1990s boosted fresh mushroom consumption, while consumption of processed mushrooms slumped.

According to the CSFII, nearly 11 percent of fresh mushroom consumption was courtesy of fast-food (quick-service) establishments and likely consisted of pizza, salads/salad bars, and ethnic take-out food. Of even greater significance, 26 percent of fresh mushrooms were reported to be consumed in meals purchased at standard restaurants (those with table service)—a reflection of the wide variety of menu items containing mushrooms. As is the case with vegetables such as broccoli or artichokes, mushrooms, in any form, rarely (less than 1 percent of use) appear in school cafeterias.

Using the 1994-96 CSFII data as distributors, ERS per capita disappearance data can be broken down by the various food sources (table 3). An important caveat is that this estimation procedure assumes that market shares today remain similar to those discovered by the survey during 1994-96. The results indicate that about 1.1 pounds of the 2.6 pounds of fresh mushrooms consumed in 2001 were obtained away from home, with 0.3 pounds of the 1.4 pounds of processed mushrooms (fresh-weight basis) purchased away from home.

### ***Mushroom Consumption Strongest in the West***

The CSFII data are broken down by four Census-defined regions—Northeast (20 percent of the population), Midwest (24 percent), South (35 percent), and West (22 percent). The regional data show that during the 1994-96 survey period, the Northeast, Midwest, and West each consumed proportionately more mushrooms than their share of the national population (fig.

3). The South was the only region to consume proportionately fewer mushrooms than its share of the population. As the 2001 per capita regional market distribution estimates shown in table 4 indicate, mushrooms appear to have their greatest following in the West, where per capita use of all mushrooms is nearly 4.6 pounds, followed closely by the Midwest (4.4 pounds). While the Northeast was just above the national average consumption rate of 3.9 pounds, those in the South consumed 3.1 pounds of all (fresh and processing) mushrooms—21 percent below the national average.

In the fresh market, the same pattern holds with the frequently “trend-setting” Western consumers eating the most mushrooms (3.1 pounds per capita) and those in the South eating the fewest (1.9 pounds per capita). For processed products, the consumption range narrows, with the Midwest leading at 1.5 pounds per per-

**Table 3—Mushrooms: Per capita use by food source, 2001**

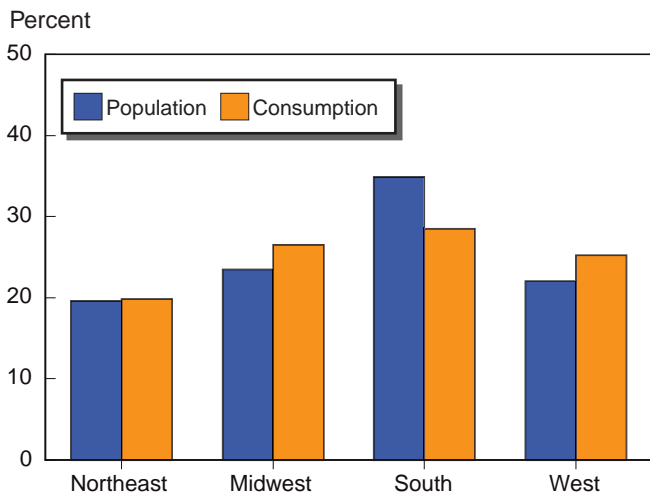
Category	Total <sup>1</sup>	Fresh	Processed
Pounds per person			
At home	2.58	1.52	1.06
Away from home	1.36	1.07	0.29
Fast food	0.30	0.28	0.03
Other restaurant	0.89	0.68	0.22
School	0.01	0.01	0.01
All others	0.16	0.11	0.04
All sources	3.94	2.59	1.35

<sup>1</sup> Components may not sum due to rounding. See text box 2 for an explanation of methodology.

Source: Derived by ERS using data from the 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals, U.S. Dept. of Agriculture, Agricultural Research Service.

Figure 3

**U.S. population and mushroom consumption, by region**



Source: Economic Research Service, USDA.

**Table 4—Mushrooms: Estimated regional per capita use, 2001**

Region	Total <sup>1</sup>	Fresh	Processed
		Pounds	
Northeast	4.09	2.89	1.20
Midwest	4.44	2.92	1.52
South	3.13	1.89	1.24
West	4.56	3.07	1.49
Total	3.94	2.59	1.35

<sup>1</sup> Components may not sum due to rounding. See text box 2 for an explanation of methodology.

Source: Derived by ERS using data from the 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals, U.S. Dept. of Agriculture, Agricultural Research Service.

son and consumers in the Northeast reporting the lowest consumption at 1.2 pounds.

About 47 percent of American consumers reside in suburban areas, 32 percent live in metropolitan cities, and 21 percent live in rural areas. Mushroom consumption was strongest in suburban areas (4.3 pounds per capita), followed by metropolitan sections of the country (3.8 pounds), and rural (3.3 pounds). For fresh-market mushrooms, suburbanites reported consuming about 1 pound more per capita than those in rural areas (table 5). On the processing side of the market, rural and suburban consumers each reported eating the fresh equivalent of 1.4 pounds per capita—just above the national average and 14 percent higher than metropolitan consumers.

**Asians and Non-Hispanic Whites Are Dominant Mushroom Consumers**

Non-Hispanic White consumers represent 73 percent of the U.S. population but consume 82 percent of all mushrooms (table 2). On a per capita basis, white consumers used nearly 4.5 pounds of all mushrooms, of which nearly 3 pounds consisted of fresh-market products (table 6). Curiously, one factor partly responsible for the pattern of slow growth in U.S. mushroom use may be the concentration of the market among white consumers. Between 1990 and 2000, the U.S. non-Hispanic White population expanded by just 4 percent, while growth in the Hispanic population was much more rapid. The White population segment is only expected to increase by 7 percent by 2030, while the population as a whole jumps 28 percent—indicating Whites will continue to account for a declining share of the U.S. population (table 7).

**Table 5—Mushrooms: Estimated per capita use by metro status, 2001**

Metro status	Total <sup>1</sup>	Fresh	Processed
		Pounds	
Metropolitan	3.78	2.54	1.24
Suburban	4.34	2.94	1.41
Rural	3.30	1.89	1.41
Total	3.94	2.59	1.35

<sup>1</sup> Components may not sum due to rounding. See text box 2 for an explanation of methodology.

Source: Derived by ERS using data from the 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals, U.S. Dept. of Agriculture, Agricultural Research Service.

**Table 6—Mushrooms: Per capita use by race/ethnicity, 2001**

Category	Total <sup>1</sup>	Fresh	Processed
		Pounds per person	
White	4.47	2.95	1.52
Black	1.09	0.60	0.50
Hispanic	2.20	1.31	0.90
Mexican	2.22	1.59	0.63
Puerto Rican	0.83	0.34	0.49
Cuban	1.69	1.44	0.25
Other Hispanic	2.55	1.20	1.34
Asian	8.90	6.08	2.82
Others	5.18	4.06	1.12
Population average	3.94	2.59	1.35

<sup>1</sup> Components may not sum due to rounding. See text box 2 for an explanation of methodology.

Source: Derived by ERS using data from the 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals, U.S. Dept. of Agriculture, Agricultural Research Service.

**Table 7—U.S. population trends, April<sup>1</sup>**

Race/ethnicity	1980	1990	2000	Census Bureau Projections		
				2010	2020	2030
Millions						
White, non-Hispanic	180.906	188.315	196.659	201.986	207.145	210.984
Black, non-Hispanic	26.142	29.304	33.476	37.483	41.549	45.567
Hispanic <sup>2</sup>	14.609	22.379	32.440	43.688	55.156	68.168
Asian/Pacific Islander	3.563	6.996	10.504	14.436	18.527	23.564
Amer. Indian, Eskimo, Aleut	1.326	1.797	2.051	2.269	2.550	2.787
Population total	226.546	248.791	275.130	299.862	324.927	351.070
Percent of total						
White, non-Hispanic	79.9	75.7	71.5	67.4	63.8	60.1
Black, non-Hispanic	11.5	11.8	12.2	12.5	12.8	13.0
Hispanic <sup>2</sup>	6.4	9.0	11.8	14.6	17.0	19.4
Asian/Pacific Islander	1.6	2.8	3.8	4.8	5.7	6.7
Amer. Indian, Eskimo, Aleut	0.6	0.7	0.7	0.8	0.8	0.8
Population total <sup>3</sup>	100.0	100.0	100.0	100.0	100.0	100.0

<sup>1</sup> Resident population estimates consistent with 1980 and 1990 decennial enumerations and do not reflect the results of the 2000 Census.

<sup>2</sup> Persons of Hispanic heritage may be of any race.

<sup>3</sup> Totals summed from unrounded numbers.

Source: Bureau of the Census, USDC.

Black consumers represent nearly 13 percent of the U.S. population yet accounted for less than 4 percent of mushroom consumption during the 1994-96 survey period (table 2). This can largely be explained by a paucity of mushrooms in cooking traditions for many areas of the South. Annual per capita mushroom use by Black consumers was estimated to total about 1.1 pounds, with fresh use slightly greater than processed.

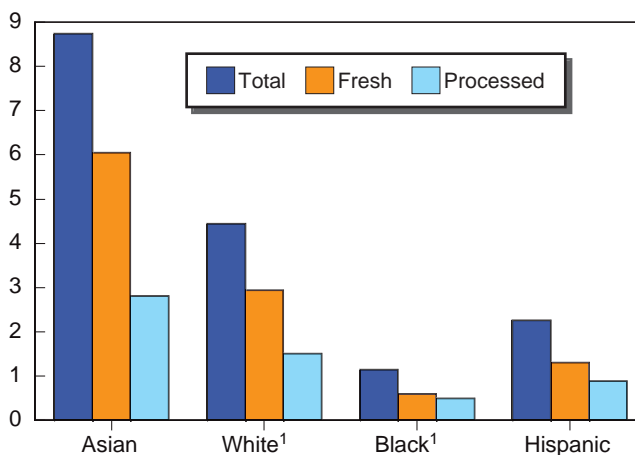
Similarly, the CSFII indicated that mushrooms also play a limited role in the diets of many Hispanic consumers. During the survey period, people of Hispanic descent accounted for nearly 11 percent of the population, yet reported consuming just 6 percent of all mushrooms. This is an important point since Hispanics have now likely surpassed Blacks as the second-largest racial/ethnic group and are also the second-fastest-growing population segment in the United States. The good news for the industry is that mushrooms are already a small part of the diets of Mexicans (who account for nearly half of the Hispanics in the United States) and most other Hispanics. This implies that future consumption may respond to increases in disposable incomes and targeted industry promotions.

Although per capita consumption by Whites is above the national average, per capita use is actually strongest among Asians (fig. 4). Total per capita mushroom use by Asians was estimated at 8.9 pounds—

more than twice the national average and the highest among all identified groups. This is potentially important to the mushroom industry as Asians (a category which includes Pacific Islanders) are the fastest-growing segment of the U.S. population and now account for about 4 percent of the total. Between 1990 and

Figure 4  
**Annual U.S. per capita mushroom consumption by racial/ethnic makeup, 2001**

Pounds, fresh weight



<sup>1</sup> Non-Hispanic.

Source: Economic Research Service, USDA.

2000, the U.S. Asian population expanded by 50 percent, compared with 45 percent for Hispanics, 14 percent for non-Hispanic Blacks, and 4 percent for non-Hispanic Whites. By 2030, Census population projections suggest that Hispanics and Asians will together comprise 25 percent of the U.S. population—up from 16 percent in 2000.

### **Per Capita Use Rises With Income**

According to the CSFII, income appears to be an important determinant of mushroom consumption. Households were classified into three income brackets using Federal poverty guidelines. The poverty guidelines were developed by the U.S. Department of Health and Human Services for the implementation of Federal food programs. Some Federal food programs, such as the Food Stamp Program, have used 130 percent of the poverty level to determine eligibility for participation. It is used in this study as the top end of the low-income category. About 39 percent of households had income exceeding 350 percent of the poverty level (called high-income households); 42 percent of households had income falling between 131 and 350 percent of the poverty level (middle-income group); and 19 percent of households had income below 131 percent of the poverty level (low-income) (table 2).

The CSFII results suggest a strong positive correlation between income and fresh and processed mushroom consumption. Consumers in the survey's top income bracket reported the highest per capita consumption (an estimated 5 pounds in 2001) while those in the lowest bracket reported the lowest consumption (2.4 pounds) (table 8). Consumption of middle-income consumers ranged between the upper and lower groups at 3.7 pounds per person. Although their per capita consumption was 55 percent greater than the lowest

income group, the middle-income responders reported eating proportionately fewer fresh mushrooms (38 percent of the total) than their respective population share (42 percent). This was also the case with the lower income group (table 2).

Fully half of all fresh-market mushrooms are consumed by 39 percent of the population—those whose incomes exceed 350 percent of the poverty level. Given their increased affluence, consumers in this income group are likely less price-sensitive at the supermarket and take a greater percentage of their meals away from home. Thus, their exposure to mushrooms may be greater than the other two income classes, given that full-service restaurants account for 22 percent of mushrooms sold (26 percent for the fresh market).

### **Mushrooms Appeal to Both Genders, But Use Varies With Age**

The CSFII data indicated few major differences between men and women in terms of mushroom consumption. In fact, for all mushrooms, men and women consume mushrooms in exactly the same proportion as their shares of the population (table 2). Men account for 49 percent of the population and reported consuming 49 percent of all mushrooms, while women account for 51 percent of the population and reported consuming 51 percent of all mushrooms. Thus, total per capita mushroom consumption was similar to the national average for each gender, although differences were noted in both fresh and processed markets (table 9). For fresh mushrooms, women report consuming about 8 percent more than men at 2.7 pounds per capita, versus 2.5 pounds for men. For processed mushrooms, the situation was reversed, with men consuming an estimated 1.4 pounds (fresh-weight basis) per capita and women consuming 1.3 pounds per person.

The CSFII also provided consumption breakdowns by selected age groups. The survey showed that consumption was relatively light for children between the ages of 2 and 11—averaging an estimated 1.1 pounds per capita. This population segment accounts for about 18 percent of the population but consumed less than 6 percent of all mushrooms. As children entered their teen years (loosely defined as ages 12-19), mushroom consumption began to increase. Teens accounted for 12 percent of the population but consumed just 8 percent of all mushrooms. Estimated teen per capita use of all mushrooms was more than double the 2-11 year-old group. Teen consumption was split evenly between fresh and processed products for females but males

**Table 8—Mushrooms: Estimated per capita use by income class, 2001**

Percent of poverty level	Total <sup>1</sup>	Fresh	Processed
	Pounds		
Under 130 percent	2.38	1.58	0.80
131 to 350 percent	3.69	2.36	1.32
Over 350 percent	4.99	3.33	1.66
All households	3.94	2.59	1.35

<sup>1</sup> Components may not sum due to rounding. See text box 2 for an explanation of methodology.

Source: Derived by ERS using data from the 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals, U.S. Dept. of Agriculture, Agricultural Research Service.

**Table 9—Mushrooms: Estimated per capita use by age/gender, 2001**

Age/gender	Total <sup>1</sup>	Fresh	Processed
		Pounds	
Male, all	3.90	2.49	1.41
Male, 2-11	1.09	0.53	0.56
Male, 12-19	2.77	1.79	0.98
Male, 20-39	5.32	3.29	2.03
Male, 40-59	4.24	2.89	1.36
Male, 60 and over	4.68	3.10	1.58
Female, all	3.98	2.69	1.30
Female, 2-11	1.15	0.54	0.61
Female, 12-19	2.46	1.16	1.30
Female, 20-39	5.36	3.78	1.58
Female, 40-59	4.63	3.23	1.41
Female, 60 and over	4.34	3.06	1.28
Total	3.94	2.59	1.35
Total, 2-11	1.12	0.54	0.59
Total, 12-19	2.62	1.48	1.14
Total, 20-39	5.34	3.53	1.81
Total, 40-59	4.44	3.06	1.38
Total, 60 and over	4.49	3.07	1.41

<sup>1</sup> Components may not sum due to rounding. See text box 2 for an explanation of methodology.

Source: Derived by ERS using data from the 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals, U.S. Dept. of Agriculture, Agricultural Research Service.

favored fresh mushrooms. Thus, consumers under the age of 20 accounted for 30 percent of the population, but consumed less than 14 percent of all mushrooms.

According to the survey, fresh and processed mushroom consumption peaks for both men and women between the ages of 20 and 39. People in this age cohort accounted for 32 percent of the population but reported consuming 43 percent of all mushrooms. Differences in total per capita use were minor within this age group, with women at 5.4 pounds and men at 5.3 pounds. Although women in their twenties and thirties were found to be the leading consumers of fresh mushrooms (3.8 pounds per person), men in this cohort were the top consumers of processed (largely canned) mushrooms at 2 pounds per person (fresh-weight basis).

The CSFII data indicated that mushroom consumption dropped off by 0.9 pounds per person during the middle-age years (40-59). Men in this group were estimated to consume 4.2 pounds per capita—a somewhat steeper drop off than for women (from 5.4 down to 4.6 pounds). However, consumption for both men and women continued to exceed the national average for all ages, especially for fresh-market products. Consumption of processed

mushrooms during middle-age years was similar to the national average (1.4 pounds, fresh-weight basis).

Survey respondents over the age of 59 remained steady mushroom consumers, with per capita use for all mushrooms slightly higher than that of the middle-age cohort (4.5 pounds per person). This group represents about 15 percent of the population and consumes about 17 percent of all mushrooms (18 percent of fresh and 16 percent of processed). Curiously, fresh-market use by men of this age group recovered much of the decline experienced during middle-age—rising from 2.9 to 3.1 pounds per capita. Thus, the survey indicated that once people become adults, consumption of mushrooms remains a life-long affair.

## Conclusion

Although a great deal is known about the supply side of the U.S. mushroom market, the knowledge base is not as large for the consumer side of the market. Using data from USDA's CSFII survey, we show where and how much fresh and processed mushrooms are consumed and link this consumption to consumer's economic, social, and demographic characteristics. The important findings in this article include:

- The bulk of mushrooms were purchased at retail stores and considered at-home foods. The standard full-service restaurant market was the strongest among the various away-from-home markets.
- Mushrooms were favored in the West and Midwest and consumed about in proportion to population share in the Northeast. Per capita use was weakest in the South.
- Asian and non-Hispanic White consumers were the strongest consumers of mushrooms. Compared with other consumers, mushrooms were discovered to be less important in the diets of Hispanic and non-Hispanic Black consumers.
- Per capita mushroom consumption is positively correlated with income, with consumption among upper income consumers more than twice that of the lower income group and one-third greater than middle-income consumers.
- Per capita consumption of all mushrooms is about the same for women and men. Men and women between the ages of 20 and 39 are the strongest mushroom consumers, representing about 32 percent of the population, yet consuming 43 percent of all mushrooms.