



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Fast Food Growth Boosts Frozen Potato Consumption

Biing-Hwan Lin
(202) 694-5458
blin@ers.usda.gov

Gary Lucier
(202) 694-5253
glucier@ers.usda.gov

Jane Allshouse

Linda Scott Kantor

Potatoes are the most important vegetable crop in the United States. The crop's 1999 farm receipts totaled \$2.7 billion, or 18 percent of all vegetable and melon farm cash receipts. Potatoes, rich in vitamin C, potassium, and other vital nutrients, are a staple food in the United States. The 1999 per capita consumption of vegetables was 454 pounds, fresh-weight equivalent, of which 142 pounds, or 31 percent, were potatoes. Pound for pound among U.S. crops, potatoes are topped only by wheat flour in importance in the U.S. diet. The most significant changes in potato consumption over the past several decades have been the rise of frozen potato use and the decline of fresh potato use.

In 1960, U.S. per capita consumption of fresh potatoes was 81 pounds (farm weight) per year, while per capita consumption of all processed potatoes was only 25 pounds per year. By 1971, per capita consumption of all processed potatoes, driven largely by frozen products, surpassed fresh potato consumption. While consumption of fresh potatoes has averaged about 50 pounds per person since 1975,

consumption of frozen potato products rose steadily to 63 pounds in 1999 (fig. 1). Dehydrated potatoes (14 pounds), potato chips (16 pounds), and canned potatoes (2 pounds) represented smaller segments of the market.

The growth of the fast food industry spurred the shift toward frozen potato products. USDA's 1994-96 Continuing Survey of Food Intakes by Individuals (CSFII) shows that most U.S. fresh potato consumption—as well as consumption of potato chips, dehydrated potatoes, and canned potatoes—occurs at home. Frozen french fries are sold predominately for away-from-home consumption, with fast food establishments accounting for 67 percent of the frozen french fry market, followed by a 13-percent share for restaurants.

CSFII data show distinct regional variations in the use of potato products. French fry consumption is much higher in the South and Midwest than in the Northeast and West. Consumers in the Midwestern States consume more fresh potatoes, potato chips, and dehydrated potatoes than consumers elsewhere. Rural residents tend to consume more potato products than consumers living in metropolitan cities and suburban areas.

CSFII data also show that African-Americans consume more potato chips and french fries, on a per

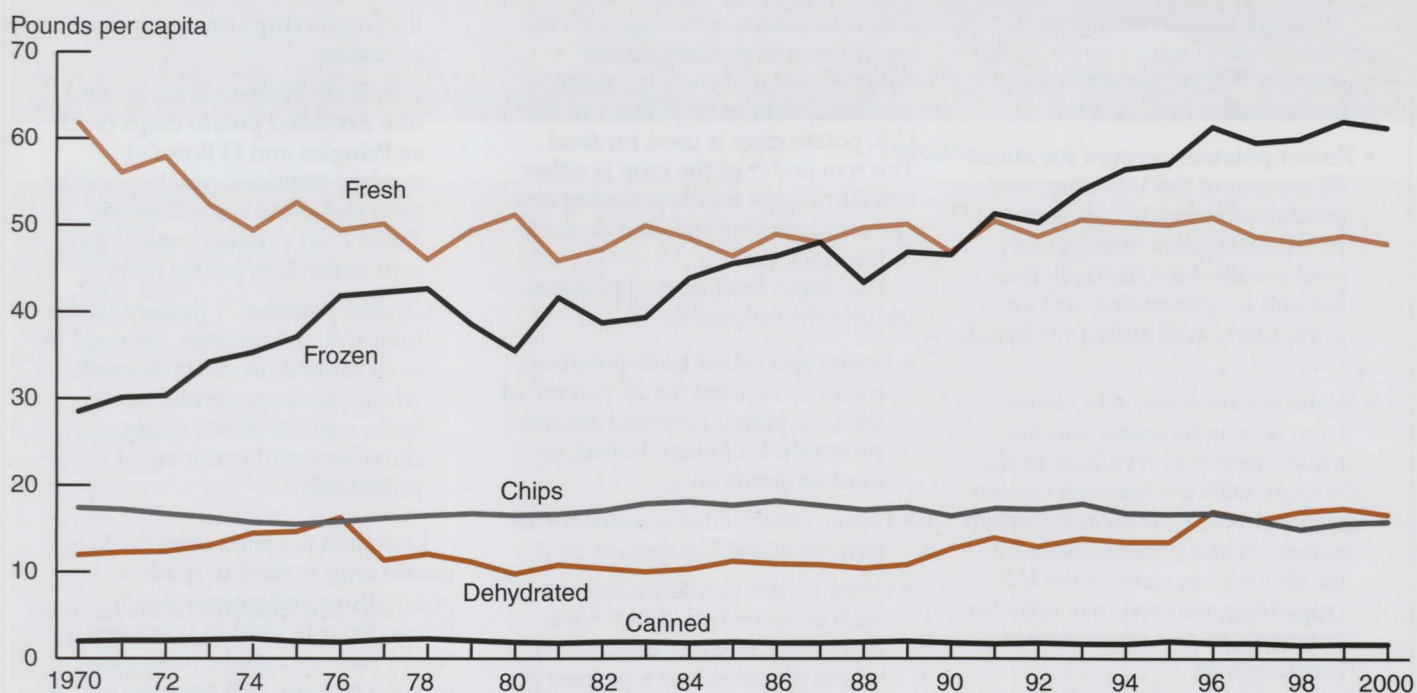
capita basis, than other Americans. Seniors favor consumption of fresh and canned potatoes, while teenagers consume more chips and french fries than other age groups.

These findings are taken from an analysis of the 1994-96 CSFII, USDA's most recent food consumption survey. Each year of the CSFII's 3-year data set comprises a nationally representative sample of noninstitutionalized persons residing in 50 States and Washington, DC. Survey respondents were interviewed in person on 2 nonconsecutive days and asked to recall all the food and beverages they had consumed in the last 24 hours. More than 15,300 individuals provided dietary data for both days. The respondents provided a list of foods consumed as well as information on where, when, and how much of each food was eaten. The survey collected an array of economic, social, and demographic characteristics for each respondent.

USDA's Agricultural Research Service (ARS) has developed recipes that list ingredients and their quantities for over 7,300 foods. For each food, ARS has also developed the number of servings relative to USDA Food Guide Pyramid dietary recommendations. Servings data comprise the five major food groups—grain, vegetable, fruit, dairy, and meat—as well as their subgroups. For example, the

Lin, Allshouse, and Kantor are agricultural economists with the Food and Rural Economics Division, and Lucier is an agricultural economist with the Market and Trade Economics Division, Economic Research Service, USDA.

Figure 1
Frozen Potatoes Now Outweigh Fresh Potatoes in Consumer Preference

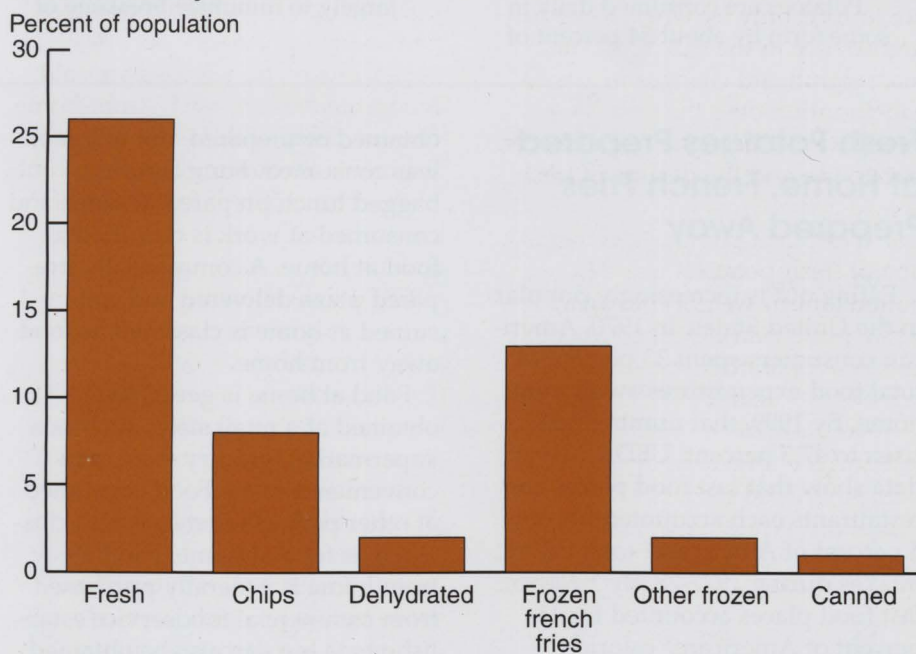


Source: USDA's Economic Research Service.

vegetable group has six subgroups, including potatoes. The ARS recipe files include 33 potato products. These 33 products are grouped into six categories: fresh potatoes, chips, dehydrated potatoes, frozen french fries (called french fries), other frozen potatoes (such as hash browns and Tater Tots), and canned potatoes (see box on potato use in the United States).

Our analysis of the CSFII data shows that fresh potatoes and french fries are the two most frequently consumed potato products in the United States. On a given day, more than a quarter of consumers (26 percent) ate fresh potatoes and 13 percent ate french fries (fig. 2). French fries accounted for about 95 percent of the total servings of all frozen potatoes. About 1 in every 12 consumers (8 percent) ate potato chips on a given day. Other potato products, including dehydrated, other frozen potatoes, and canned potatoes, were consumed less frequently.

Figure 2
Fresh Potatoes and French Fries Are Most Likely To Be Consumed on a Given Day



Source: USDA's CSFII 1994-96, 2-day dietary recall data.

Potato Use in the United States

Although there are numerous potato varieties, most can be grouped into three general categories: russet, white, and red.

- Russet potatoes account for about 70 percent of the U.S. crop, with production heavily concentrated in Western States. Russet varieties are used for the fresh market and for processing and are particularly well suited for french fries.
- White potatoes range in shape from oblong to round and are grown nearly everywhere in the Nation, with the heaviest concentration in the Central and Eastern States. White potatoes account for about 25 percent of the U.S. crop. They are used primarily for potato chips and fresh-market consumption.
- Red potatoes, named for their skin color, are marketed largely in the fresh market. Red potatoes account for about 5 percent of the U.S. crop, with production concentrated in the upper Midwest.

Potatoes are consumed daily in some form by about 54 percent of

U.S. consumers, reflecting both the importance of potatoes in the national diet and their incredible versatility. About 85 percent of the U.S. potato crop is used for food. The remainder of the crop is either lost (shrinkage and loss during storage and handling) or used as seed or livestock feed.

The major food uses of potatoes include the following:

- Fresh (also called table potatoes) potatoes account for 27 percent of the U.S. potato crop and are used primarily for baked, boiled, or mashed potatoes.
- Frozen french fries account for 29 percent of the U.S. potato crop.
- Other frozen potato products, such as Tater Tots, spiral fries, homefries, wedges, and frozen whole potatoes, use 6 percent of U.S. potatoes.
- Potato chips (including canned shoestring potatoes) use 10 percent of the U.S. potato crop. The Nation's 116 chip manufacturing plants are located regionally, largely to minimize breakage of

the fragile chips during transportation.

- Dehydrated potatoes are made into extruded potato chips (such as Pringles and O'Boise's), mashed potatoes, potato pancake mix, and some canned stews. These food products use 11 percent of the U.S. potato crop.
- Canned potatoes, 1 percent of the total U.S. potato crop, are used in such canned products as small whole potatoes, corned beef hash, various stews, soups, chowders, and commercial potato salad.

Less than 0.3 percent of the U.S. potato crop is used in foods as potato flour and potato starch. Potato flour is used in processed foods, such as breads, rolls, cake mixes, crackers, and pastries, and as a thickener for soup bases and sauces. Potato starch is used in baked goods, such as specialty breads, rolls, and crackers, instant pudding mixes, and molding confections, such as gum drops, jelly beans, and chewing gum.

Fresh Potatoes Prepared at Home, French Fries Prepared Away

Eating out is increasingly popular in the United States. In 1970, American consumers spent 33 percent of total food expenditures away from home. By 1999, that number had risen to 47.5 percent. USDA survey data show that fast food places and restaurants each accounted for only 3 percent of Americans' total caloric intakes during 1977-78. By 1994-96, fast food places accounted for 11 percent of Americans' caloric intakes, and restaurants accounted for 8 percent.

This study classifies foods as "at home" and "away from home" based on where the food was

obtained or prepared, not where it was consumed. For example, a bagged lunch prepared at home and consumed at work is classified as food at home. A commercially prepared pizza delivered and consumed at home is classified as food away from home.

Food at home is generally obtained at a retail store, such as a supermarket, grocery store, or a convenience store. Food consumed at other people's homes is also classified as food at home. Food away from home is generally purchased from commercial foodservice establishments but can also be obtained in such places as school cafeterias, community feeding programs, or child/adult care centers. In this study, fast food places are foodservice establishments where food is

ordered and picked up at a counter, restaurants are places that have wait staff, and school cafeterias include daycare facilities and summer camps. The category "other" is a catchall category that includes community feeding centers, bars/taverns, vending machines, and other sources of foods.

CSFII data show that about 2 percent of consumers did not eat any at-home food on a given day (table 1). More than half of consumers (55 percent) ate at least one away-from-home food on a given day. The most-frequented foodservice outlets were fast food establishments, with 31 percent of consumers purchasing at least one food item from these places, followed by restaurants, with 17 percent of consumers purchasing at least one food item there.

Table 1
Potato Consumption Varies With Income, Gender, Region, and Other Demographics

Item	Potatoes						
	Population ¹	Fresh	Chips	Dehydrated	Frozen french fries	Other frozen	Canned
<i>Percent</i>							
Food sources:							
At home	98	79	79	89	12	53	80
Away from home	55	21	21	11	88	48	20
Fast food	31	6	7	4	67	23	5
Restaurant	17	12	1	1	13	9	15
School	7	1	3	2	6	12	0
Other ²	13	2	9	2	2	3	1
Census region:							
Northeast	20	18	20	16	16	13	20
Midwest	24	28	29	34	26	22	24
South	35	35	34	35	42	37	37
West	22	20	17	15	19	28	18
Metropolitan Statistical Area status:							
Metropolitan	32	27	31	33	31	33	30
Suburban	47	47	44	47	46	41	31
Rural	21	26	25	20	23	26	39
Race/ethnic origin:							
White, non-Hispanic	73	80	73	78	70	77	72
Black, non-Hispanic	13	8	17	13	16	12	4
Hispanic	11	9	7	7	9	9	8
Others	4	3	3	3	4	3	16
Household income as a percentage of poverty:							
0 - 130 percent	19	17	18	22	19	19	16
131 - 350 percent	42	45	42	41	42	53	41
351 percent and above	39	39	40	38	39	28	43
Gender and age:							
Male:							
All	49	57	62	53	62	63	60
2 - 5 years	5	2	3	3	3	4	2
6 - 11 years	5	3	6	4	5	10	3
12 - 19 years	6	6	10	9	12	10	5
20 - 59 years	27	36	40	31	39	35	38
60 years and older	7	10	3	7	3	4	13
Female:							
All	51	43	39	47	38	38	40
2 - 5 years	5	2	3	3	3	4	3
6 - 11 years	4	2	5	4	5	6	2
12 - 19 years	6	4	6	5	9	4	3
20 - 59 years	28	25	22	29	20	20	22
60 years and older	9	10	2	6	2	4	10

¹ The "population" column indicates the share of the U.S. population that ate at least one food item on any given day.

² Six percent of chips came from vending machines, which are included in the category "other."

Source: CSFII, 1994-96, 2-day dietary recall data.

Seven percent of consumers obtained at least one food item from a school cafeteria on any given day, and 13 percent of consumers obtained at least one food item from other sources.

During 1994-96, the bulk of fresh potatoes, potato chips, dehydrated potatoes, and canned potatoes were purchased at retail stores for home consumption (fig. 3). In 1994-96, 21 percent of fresh potatoes were prepared away from home, mostly by restaurants. Like fresh potatoes, 21 percent of potato chips were obtained from away-from-home sources, with other sources accounting for 9 percent of the market. Vending machines, included in other sources, had a 6-percent share of the chips market. Eleven percent of dehydrated potatoes were obtained away from home, with 4 percent from fast food places. Away-from-home sources accounted for 20 percent of the total canned potato

consumption, with a 15-percent share for restaurants and a 5-percent share for fast food places.

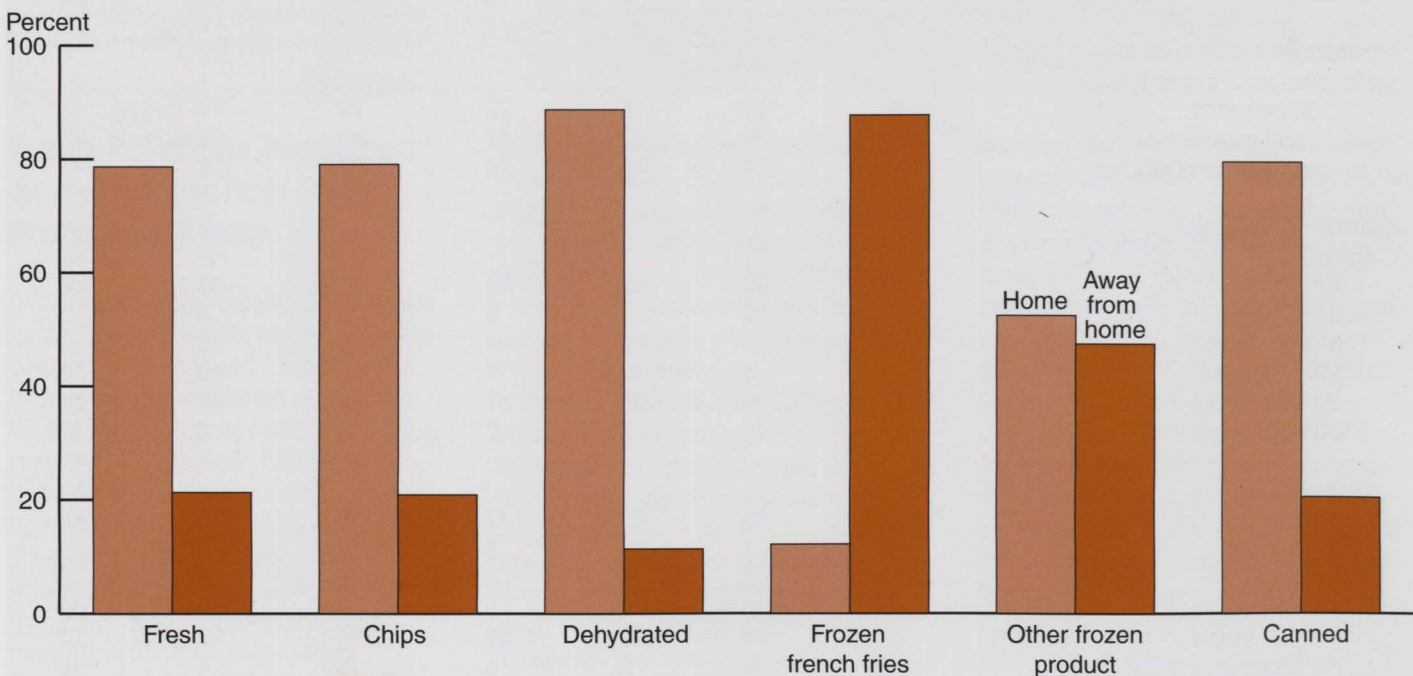
Away-from-home sources dominated the consumption of french fries with an 88-percent market share during 1994-96. Fast food places accounted for 67 percent of french fries, and the amount of french fries obtained at restaurants, 13 percent, was more than the amount purchased at retail stores, 11 percent. School cafeterias accounted for 6 percent of french fry consumption.

Slightly more than half of other frozen potatoes were purchased for home consumption. Other frozen potatoes include such products as Tater Tots, homefries, and potato patties. Fast food places had a 23-percent share of the market for other frozen potatoes, followed by schools with a 12-percent share and restaurants with a 9-percent share.

Potato Dishes Vary by Region and Urbanization...

CSFII data show distinct patterns in the consumption of potato products among the four Census regions—Northeast (20 percent of population), Midwest (24 percent), South (35 percent), and West (22 percent). With a 24-percent share of the U.S. population, the Midwestern States accounted for 26 percent of french fry consumption, 28 percent of fresh potato consumption, 29 percent of chips consumption, and 34 percent of dehydrated potato consumption (table 1). By dividing the consumption share by the population share, we can compare relative consumption, as shown in table 2. For example, table 2 shows that Midwestern States had the highest relative consumption of fresh potatoes, chips, and dehydrated potatoes.

Figure 3
Most Potatoes Are Consumed at Home



Source: USDA's CSFII 1994-96, 2-day dietary recall data.

Southern consumers ate more french fries than consumers in each of the other three regions. The Southern States represent 35 percent of the overall U.S. population and accounted for 42 percent of french fry consumption, 37 percent of other frozen potato consumption, and 37 percent of canned potato consumption. Consumption of french fries

and other frozen potatoes was lowest in the Northeast.

About 47 percent of the U.S. population resides in suburban areas, 32 percent live in metropolitan areas, and 21 percent live in rural areas (table 1). Rural area residents ate more potato products, except for dehydrated products, than suburban or metro residents (table 2). On

a per capita basis, rural area consumers ate 2.7 times as many canned potatoes as suburban consumers. Consumption of fresh potatoes in rural areas was about 24 percent more than in suburban areas and almost 50 percent more than in metropolitan areas.

Table 2
Relative Shares Highlight Differences in Potato Consumption

Demographic profile	Potatoes					
	Fresh	Chips	Dehydrated	Frozen french fries	Other frozen	Canned
	Percent					
Census region:						
Northeast	91	101	83	71	68	105
Midwest	118	125	145	108	93	101
South	99	97	101	120	105	107
West	90	77	66	86	127	84
Metropolitan Statistical Area status:						
Metropolitan	85	98	102	98	103	95
Suburban	100	94	100	98	87	67
Rural	124	117	96	107	125	183
Race/ethnic origin:						
White, non-Hispanic	110	101	107	97	106	99
Black, non-Hispanic	64	133	100	131	94	33
Hispanic	90	68	65	89	85	77
Others	69	64	65	95	59	363
Household income as a percentage of poverty:						
0 - 130 percent	87	96	113	99	99	85
131 - 350 percent	107	101	97	101	126	98
351 percent and above	98	101	96	99	72	110
Gender and age:						
Male:						
All	117	126	109	127	128	123
2 - 5 years	44	62	67	65	81	32
6 - 11 years	59	127	76	111	216	62
12 - 19 years	110	178	154	213	169	94
20 - 59 years	132	147	116	144	131	141
60 years and older	153	39	96	36	53	185
Female:						
All	84	75	91	75	73	78
2 - 5 years	40	69	62	60	77	57
6 - 11 years	50	112	91	107	142	54
12 - 19 years	70	114	96	152	76	53
20 - 59 years	90	80	103	73	72	77
60 years and older	114	20	64	21	39	114

Source: CSFII, 1994-96, 2-day dietary recall data.

...and by Race and Ethnicity

According to the 1994-96 CSFII, non-Hispanic Whites represented 73 percent of the U.S. population and, compared with other racial/ethnic groups, favored potatoes in fresh, dehydrated, and other frozen potatoes. Relative to their proportion of the population, non-Hispanic Whites tended to consume slightly fewer french fries and canned potatoes (fig. 4). Non-Hispanic Blacks represented about 13 percent of the U.S. population. Compared with other racial/ethnic groups, this group reported the highest consumption of potato chips and french fries but the lowest consumption of fresh and canned potatoes.

Hispanics tended to eat fewer potatoes than other racial/ethnic groups. Hispanics represented about 11 percent of the U.S. population and do not appear to have strong preferences or dislikes for any par-

ticular potato product. Hispanics accounted for between 7 and 9 percent of the various potato products consumed in the United States.

Consumption of Chips and Fries Independent of Income

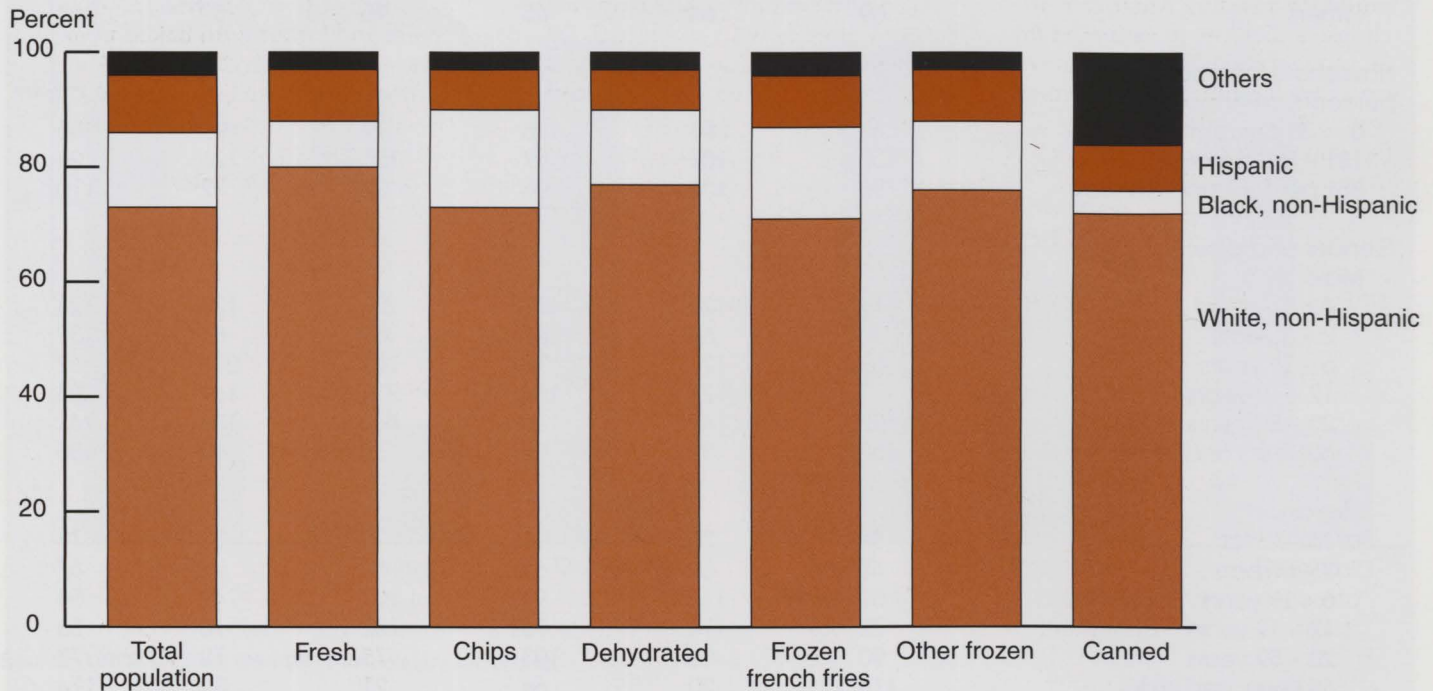
Food consumption is determined by several factors, including income. Based on consumers' responses to an increase in income, foods can be classified as inferior goods (consumption declines when income increases), normal goods (consumption rises by a proportion smaller than the rise in income), or luxury goods (consumption rises at a proportion larger than the rise in income). Consumption of staple foods, such as cereals and potatoes, usually rises with income, but the rise is smaller than the increase in income. Within a food, there exist products of different qualities that

may respond differently to a rise in household income. For example, consumers having more to spend on food may decide to consume more steaks and less ground beef. Similarly, households of different income levels may consume different amounts of potato products.

We classified households into three income groups. About 40 percent of households had high incomes—that is, incomes exceeding 350 percent of the Federal poverty level. (The Federal poverty level was \$15,141 for a family of four in 1995.) Forty-two percent of households had incomes falling between 131 and 350 percent of poverty level. Nineteen percent of households fell into the low-income group, with incomes no more than 130 percent of the poverty level.

CSFII data show that consumption of chips and french fries did not vary much with income. Low-income households consumed, per person, the least amount of fresh

Figure 4
Non-Hispanic Whites' Potato Consumption Is Higher Than That of Other Groups



Source: USDA, CSFII 1994-96, 2-day dietary recall data.

potatoes, chips, and canned potatoes (table 2). Households with incomes between 131 and 350 percent of the poverty level had the highest per capita consumption of fresh and frozen potato products. High-income households consumed more canned potatoes, per person, than other income groups.

Gender and Age Affect Potato Consumption

Males, perhaps because of their larger caloric intake, ate more of all six potato products than did females. This statistic may also reflect a long-held perception by some diet-conscious females that potatoes are a high-calorie, diet-unfriendly food. Males ate about 70 percent more chips, french fries, and other frozen potatoes than females (table 2).

Relative consumption of fresh and canned potatoes increased with age,

with seniors age 60 and older reporting the highest consumption for these two products. Consumption of chips and french fries initially rose with age, peaking, not surprisingly, in the teenage years, and then declined, with seniors consuming fewer chips than even toddlers.

Consumption of other frozen potatoes peaked at the 6-to-11-year-old age group (children in elementary school) and then declined with age. Such products as Tater Tots tend to be popular in school lunches and breakfasts. Seniors ate fewer other frozen potatoes than toddlers. Consumption of dehydrated potato products peaked for males during the teenage years. This statistic is likely an extension of the popularity of potato chips and reflects the consumption of extruded chip products and those made from potato flakes.

Outlook for Potato Consumption

Over the last few decades, dining out has grown in popularity for Americans. Close to half of consumer food expenditures are now spent on eating out. A number of factors contribute to this trend: a growing number of women employed outside the home, more two-earner households, higher incomes, more affordable and convenient fast food outlets, increased advertising and promotion by large foodservice chains, and smaller American households. These factors are expected to continue to boost eating out. As the bulk of fresh potatoes are consumed at home, and a large proportion of frozen french fries is consumed away from home, increased eating out will favor consumption of french fries at the expense of fresh potatoes (see box on nutrient comparisons).

Nutritional Content of Potato Chips, French Fries, and Baked Potatoes

The shift from fresh potatoes to french fries conflicts with dietary guidance advising Americans to choose a diet low in saturated fat and moderate in total fat. Cutting up a low-fat, nutritious potato and frying it in oil adds calories and fat (see table). One hundred grams of baked potato (with the peel) has 108 calories and almost no fat or saturated fat, while 100 grams of french

fries has 309 calories and 16 grams of fat, 5 of which are saturated fat. The numbers for potato chips are even more striking, with each 100 grams packing 536 calories and 35 grams of fat, 11 of which are saturated fat. On the positive side, french fries and potato chips have more dietary fiber than baked potatoes, and higher levels of potassium and folate.

Certain foods are commonly consumed with potato products, such as catsup with french fries, sour cream and butter with baked potatoes, and dip with chips. USDA's Nutrient Database lists nutrient profiles of these foods. The database can be accessed at www.nal.usda.gov/fnic/foodcomp.

Chips and Fries Are Higher in Fat and Calories Than Baked Potatoes

Nutrient	Unit	Baked potatoes without peel	Baked potatoes with peel	Chips	Frozen french fries
Food energy	Calories	92.4	108.4	536.0	309.1
Protein	Grams	2.0	2.3	7.0	4.0
Carbohydrate	Grams	21.4	25.1	52.9	38.6
Total fat	Grams	.1	.1	34.6	16.1
Saturated fat	Grams	.03	.03	11.0	5.0
Dietary fiber	Grams	1.5	2.4	4.5	3.2
Potassium	Milligrams	388.7	415.6	1,275.0	712.0
Vitamin C	Milligrams	12.7	12.82	31.1	5.3
Folate	Micrograms	9.0	10.9	45.0	33.0
Vitamin A	International unit	0	0	0	29.0

Source: Nutrient Data Laboratory, Agricultural Research Service, USDA.



Food companies market frozen french fries for home consumption, but close to 90 percent of french fries are obtained from fast food places, restaurants, and other away-from-home sources.

Credit: PhotoDisc.

Other factors should be considered, however. Elderly people had the highest consumption of fresh and canned potatoes and the lowest consumption of potato chips, french fries, and other frozen potato products. On one hand, with the aging of the Nation's population, consumption patterns could begin to favor fresh potatoes. On the other hand, consumption patterns acquired during young ages may change little as consumers age. Today's teenagers could continue heavy consumption of french fries as they age. The future, therefore, is unclear with respect to the consumption growth of fresh potatoes and french fries.

References

- Lin, B.H., J. Guthrie, and E. Frazao. *Away-From-Home Foods Increasingly Important to Quality of American Diet*, Agricultural Information Bulletin No. 749. U.S. Department of Agriculture, Economic Research Service, 1999.
- Plummer, C. "U.S. Potato Briefing Room." U.S. Department of Agriculture, Economic Research Service, <http://www.ers.usda.gov/briefing/potatoes/>
- Putnam, J., and J. Allshouse. *Food Consumption, Prices, and Expenditures, 1970-99*. U.S. Department of Agriculture, Economic Research Service, forthcoming.
- Talbur, W.F. (ed) *Potato Processing*, 4th Edition. New York: Van Nostrand Reinhold Co., 1987.
- U.S. Department of Agriculture, Agricultural Research Service. *1994-96 Continuing Survey of Food Intakes by Individuals and 1994-96 Diet and Health Knowledge Survey*. 1998. ■