

Factors Affecting Watermelon Consumption In the United States

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Abstract: U.S. watermelon consumption has fluctuated over the past decade. Basic knowledge of the distribution of watermelon consumption across different marketing sectors, geographic regions, or population groups has been limited in the past. Using data from the United States Department of Agriculture's 1994-96 Continuing Survey of Food Intakes by Individuals, this article examines the consumption distribution of fresh-market watermelon in the United States. The analysis indicates that per capita watermelon consumption is greatest in the Western areas of the country. The majority of watermelon is consumed at home, with middle-aged women accounting for the greatest share.

Keywords: Watermelon, consumption, per capita use, distribution, regions, income, age.

Watermelon is consumed frequently as a dessert, snack, fruit salad, breakfast food, picnic food, edible plate garnish, in drinks, and is used in many other creative ways. Up until two decades ago, watermelon was largely a seasonal fruit that appeared in the market for a few months and then disappeared as late summer and fall fruit crops were harvested. Today, imports during the winter and early spring help satisfy consumer demand for year-round supplies of watermelon. In 2000, U.S. consumption of watermelon totaled 3.9 billion pounds—59 percent greater than the 1980 level.

There has been continuing interest in information regarding the consumption distribution of foods such as watermelon. Although much is known about the supply side of the U.S. watermelon market, relatively little has been published about consumer demand. According to per capita disappearance data compiled by the U.S. Department of Agriculture's (USDA) Economic Research Service (ERS), total watermelon consumption reached a recent peak of 16.8 pounds per person in 1996 but has averaged about 15.1 pounds per person since.

A combination of factors, including immigration trends, changing family sizes, and shifts in America's tastes and preferences has likely contributed to movements in per capita watermelon use. However, due to a dearth of consumer research in this area, the demographics of watermelon consumption have not been quantified. Some basic questions include; what proportion of watermelon are purchased at retail for use at-home versus purchased away-

from-home? Who consumes watermelon? Has the increasing Asian and Hispanic population in the United States influenced watermelon demand?

The purpose of this article is to provide unique basic information about the market distribution of watermelon using data derived from USDA's most recent individual food consumption survey. Following a short discussion of the data used in the analyses, the next sections will describe the distribution of watermelon consumption by food source, region of the country, ethnic background, income class, and age and gender.

Data and Methodology

The USDA has conducted periodic surveys of household and individual food consumption in the United States since the 1930s (see box). The most recent survey, the 1994-96 Continuing Survey of Food Intakes by Individuals (CSFII)², conducted by USDA's Agricultural Research Service (ARS), provided the basis for this article. Each year of this 3-year data set comprises a nationally representative sample of non-institutionalized persons residing in 50 States and Washington, D.C.

In the 1994-96 CSFII, 2 nonconsecutive days of dietary data for individuals of all ages were collected 3 to 10 days apart through in-person interviews, between January 1994 and January 1997, using 24-hour recalls. The 3-year CSFII data

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² 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.

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 of 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 exists 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 consump-

tion of watermelon but provide no information on where watermelon was marketed—supermarket, hospital, school, or restaurant—or what were the socioeconomic characteristics of the consumers that ultimately ate the food.

The **Continuing Survey of Food Intakes by Individuals (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 addition to intake data, the Agricultural Research Service also provides technical support documents, including recipes and number of servings relative to USDA Food Guide Pyramid (Pyramid) dietary recommendations. For each food, its recipe lists all ingredients and their weights in grams. For a product largely consumed fresh ("as is") like watermelon, this is less important. For more complex products like tomatoes, the description of the ingredients can be used to distinguish among food products (e.g., stewed tomatoes vs. spaghetti sauce). The Pyramid serving data show, for each food consumed, the number of servings from 30 food groups.

The recipe files and Pyramid serving data together show the number of servings of a product (e.g., fresh watermelon) provided by a food (e.g., a particular meal package offered at a restaurant). The intake data show where and how much of the food was consumed. The 1994-96 CSFII data include a sample weight for each respondent, indicating the number of people the sample represents. The share of watermelon consumed 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 watermelon by these characteristics.

set includes information on food and nutrient intakes by 15,303 individuals who provided dietary data for both days.

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 amounts 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.

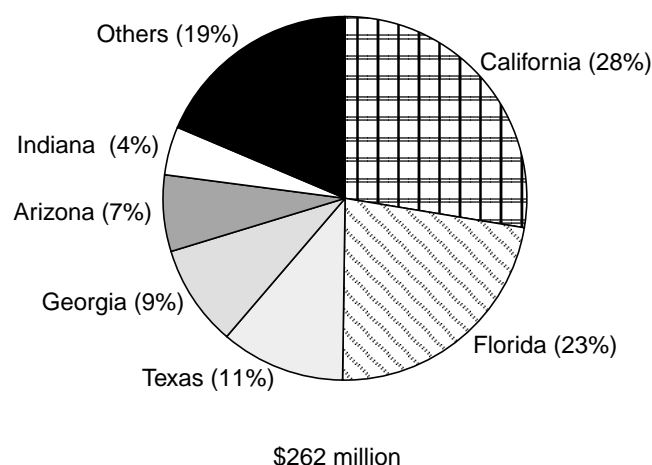
Watermelon Markets and Use

Watermelon is the leading U.S. melon crop in terms of acreage, production, and per capita consumption. Because of higher unit values, cantaloupe is the leading melon in terms of crop value. During 1998-2000, the farm value of watermelon production averaged \$262 million—up 36 percent from a decade earlier.

Although production has been rising, the acreage devoted to watermelon has been trending lower over the past few decades. During the most recent decade, declining acreage has likely been a combination of rising per-acre yields and successive years of freeze damages in Florida and drought in Texas. Increased watermelon yields reflect improved varieties and a larger proportion of acreage covered by irrigation, especially in States like Texas. In addition, seedless varieties now account for a substantial portion of the watermelon crop. With much higher seed costs and more challenging cultural requirements, seedless watermelon acreage tends to be more intensively managed—resulting in less crop abandonment and higher per-acre yields.

Figure A-1

Farm value of U.S. watermelon crop, 1998-2000



Source: National Agricultural Statistics Service, USDA.

Average (1998-2000) U.S. annual per capita use of watermelon has increased 31 percent over the past 20 years (1978-80), and is expected to total 13.2 pounds per person in 2001 (table A-1). Most watermelon is consumed fresh, although there are several processed products in the market such as roasted seeds, pickled watermelon rind, and watermelon juice for which no data are currently available.

Per capita watermelon use began trending higher after bottoming out in 1980 at a record-low 10.7 pounds (records began in 1919). Domestic use of watermelon surged heading into the 1990s but leveled off and declined later in the decade. Consumption averaged 14.9 pounds per capita during the 1990s—up 17 percent from an annual average of 12.7 pounds during the 1980s. The increase was likely the result of better marketing (e.g. more pre-cut and wrapped product), increased promotion efforts, new smaller varieties better suited to the shrinking American household size, surging popularity of seedless melons, and a strong national economy featuring high employment levels. Some of the increase may also have been due to rising public awareness of the impact on overall health of including fruits and vegetables in the diet.

Although it is possible the bubble of popularity may indeed have burst on the upward trend in watermelon consumption, there is another plausible explanation. In fact, the decline in per capita watermelon disappearance statistics since the 1996 peak of 16.8 pounds may not be a true reflection of consumer demand for watermelon. Instead, it may be a reflection of changes in the type of watermelon demanded—namely smaller so called “icebox melons”, including seedless types that have become very popular during the 1990s.

Table A-1--U.S. watermelon and all melons: Per capita use

Year	Watermelon	Other melons 1/	All melons
Pounds, fresh-equivalent			
1960	17.2	8.6	25.8
1965	15.2	7.9	23.1
1970	13.5	8.1	21.6
1975	11.4	6.3	17.7
1980	10.7	7.2	17.9
1985	13.5	10.6	24.1
1990	13.3	11.3	24.6
1995	15.4	11.0	26.4
1996	16.8	12.5	29.3
1997	15.8	13.0	28.8
1998	14.6	13.2	27.8
1999	15.8	14.3	30.1
2000	14.0	13.4	27.4
2001 f	13.2	13.5	26.7
Decade averages:			
1960s	14.9	8.4	23.3
1970s	12.3	7.3	19.6
1980s	12.7	9.9	22.6
1990s	14.9	11.7	26.6

f = ERS forecast.

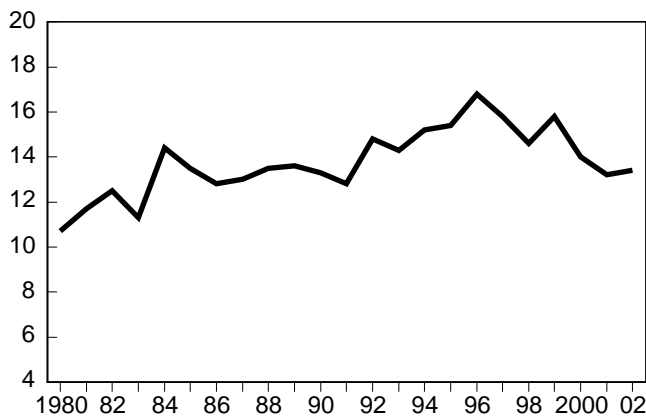
1/ Includes cantaloupe and honeydew melons except for the 1960s, which are just cantaloupe.

Source: Economic Research Service, USDA.

Figure A-2

U.S. per capita watermelon use

Pounds per person



Source: Economic Research Service, USDA.

Seedless melons tend to be smaller and lighter than the average seeded variety. As seedless garner a larger share of the watermelon crop, the result may indeed be a reduction in the total weight of watermelon produced, even as the number of melons sold rises. The USDA’s production statistics measure the total weight of melons produced (several decades ago, USDA measured the actual number of melons produced). Although this paper does not address this concern, it is likely that watermelon retail sales have actually increased the past few years (as retailers report) but weight-based volume measures, reflecting declining average melon weight, cannot reflect increased eating occasions of individual melons and pre-wrapped melon quarters.

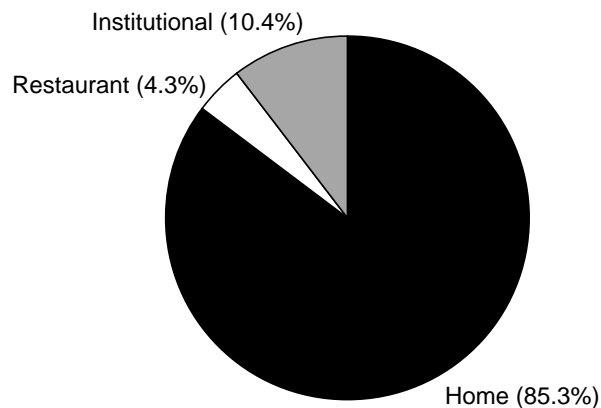
Market Share by Location

In the CSFII survey, 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 a 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 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 home food. A commercially prepared pizza delivered and consumed at home is classified as food away from home. Fast food places include self-service establishments and carryout places; restaurants are places that have wait staff; and school cafeterias include day care facilities and summer camps. The category “others” is a catch-all category, including such things as community feeding centers, bar/taverns, vending machines, etc.

According to the survey, the bulk (85 percent) of watermelon was purchased at retail stores and considered as

Figure A-3

Consumption of watermelon by location



Source: Economic Research Service, USDA.

home foods (table A-2). Away-from-home sources accounted for about 15 percent of the watermelon market during 1994-96. The results were somewhat higher than expected since watermelon is rarely found on fast food menus. However, use in restaurant salad and breakfast bars, plus a very strong institutional presence was responsible for the strong consumption in the away-from-home market. The institutional market includes such places as community feeding programs, residential dining facilities, and child/adult care centers.

About 4 percent of watermelon was purchased in standard (non-fast food) restaurants. Like other melons, very little was purchased at fast food establishments or at schools. The school breakfast/lunch program may be a possible future growth market since the survey indicated school-age children generally enjoy watermelon. However, the survey shows that very little (less than 1 percent) watermelon is now consumed through schools, reflecting the historical use of processed fruits and vegetables in the school lunch program.

In comparison, among the top three melons, honeydew is most prevalent in the away-from-home market, with 30 percent of servings originating from this side of the market. Cantaloupe use is similar to watermelon with 16 percent purchased as food away from home.

Watermelon Use by Region And Urbanization

The CSFII data show distinct regional patterns in the consumption of fresh watermelon during the 1994-96 survey period. There are four Census-defined regions—Northeast (20 percent of the population), Midwest (24 percent), South (35 percent), and West (22 percent). The East, Midwest, and South each consume proportionately less watermelon than their share of the national population, although use in the Midwest and East are nearly proportionate to their share of

Table A-2--Consumption distribution of watermelon

Item	Population 1/	Water melon	Per capita proportion 2/
		Percent	
Food sources			
Home	99.3	85.3	--
Away from home	81.2	14.7	--
Fast food	42.5	0.2	--
Other restaurant	28.6	3.9	--
School	10.4	0.2	--
Others	52.4	10.4	--
Census region			
Northeast	19.6	18.7	95
Midwest	23.5	22.5	96
South	34.9	28.7	82
West	22.0	30.2	137
MSA status			
Metropolitan	32.0	23.9	75
Suburban	46.9	56.4	120
Rural	21.1	19.7	93
Race/Ethnic origin			
White, non-Hispanic	72.6	63.6	88
Black, non-Hispanic	12.5	11.1	89
Hispanic	10.5	12.6	120
Others	4.4	12.7	289
Household income as percentage of poverty			
0 - 130 percent	19.2	17.2	90
131 - 350 percent	41.8	48.0	115
351 percent and above	39.0	34.8	89
Gender and age			
Male, all	48.9	47.2	97
Age 2 - 19	15.1	14.8	98
Age 20 - 59	27.0	22.1	82
Age 60 and over	6.8	10.3	151
Female, all	51.1	52.7	103
Age 2 - 19	14.5	11.1	77
Age 20 - 59	27.7	30.4	110
Age 60 and over	8.9	11.2	126

1/ Percent of the population that ate at the food source over a two-day period or percent of the population in each category. Data based on number of servings. 2/ Serving proportion divided by population percentage.

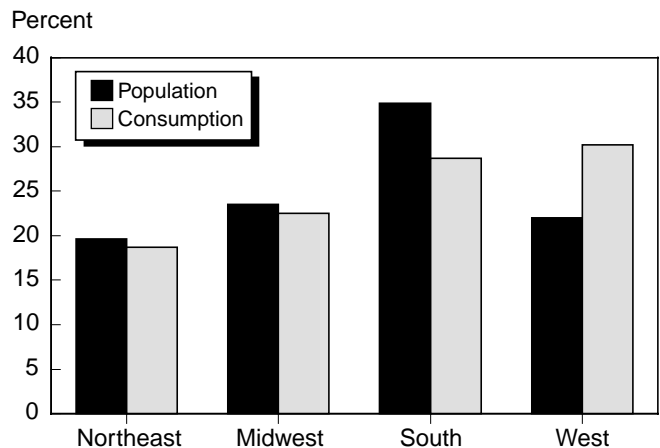
Sources: U.S. Department of Agriculture, Agricultural Research Service, 1998. 1994-96 Continuing Survey of Food Intakes by Individuals and 1994-96 Diet and Health Knowledge Survey. CD-ROM. Available from National Technical Information Service, Springfield, VA..

population. As table A-2 shows, on a per-capita basis, watermelon appears to be much more popular (about one-third more) in the West than in the Midwest and East. In the South, although total volume is second only to the West, per capita use of watermelon is smallest of the four regions. Interestingly, much of the growth in demand over the past decade has been in seedless varieties. According to industry sources, seedless watermelon is much more popular in the West (particularly in California) with seeded watermelon heavily favored in the South. Most other areas slightly favor seeded varieties over seedless.

About 47 percent of American consumers reside in suburban areas, 32 percent live in metropolitan cities, and 21 percent

Figure A-4

U.S. population and watermelon consumption by region



Source: Economic Research Service, USDA.

live in rural areas. Watermelon consumption was strongest in suburban areas, followed distantly by rural sections of the country. This is not surprising given the historical identification of watermelon with summer picnics and barbecues—very popular activities in the suburbs. The greatest variation from the population share occurred in metropolitan areas where per capita use was relatively weak. This weakness may reflect the perceived or real inconvenience in transporting and using larger fruits such as watermelon, particularly in inner city environments.

Racial/Ethnic Makeup of Watermelon Consumers

Non-Hispanic white consumers represent 73 percent of the U.S. population but only consume 64 percent of watermelon. Thus, on a per-capita basis (market share divided by population share), white consumers had a consumption ratio less than 1. This differs from consumption of cantaloupe and honeydew in which whites are strong consumers. The difference may be the strong consumption of the two so called “breakfast melons” during the early morning meal. Despite widespread appearance on breakfast bars, most consumers more closely identify watermelon as a dessert melon rather than a breakfast melon.

About two-thirds of the category “others” in the race/ethnic origin table consists of Asians. Thus, it is likely Asian consumers were the top consumers (in terms of per capita consumption) of watermelon, with a ratio nearly 3 times as great as their proportion of the population. Asians are also strong consumers of honeydew melon, but are average consumers of cantaloupe. Black consumers represent nearly 13 percent of the U.S. population yet only accounted for 11 percent of watermelon consumption during the 1994-96 survey period.

People of Hispanic descent were also strong consumers of watermelon. Hispanics accounted for nearly 11 percent of the population and reported consuming nearly 13 percent of watermelon. Strong consumption by Hispanics and Asians is potentially important to the industry, as these are two of the fastest growing ethnic groups in the United States.

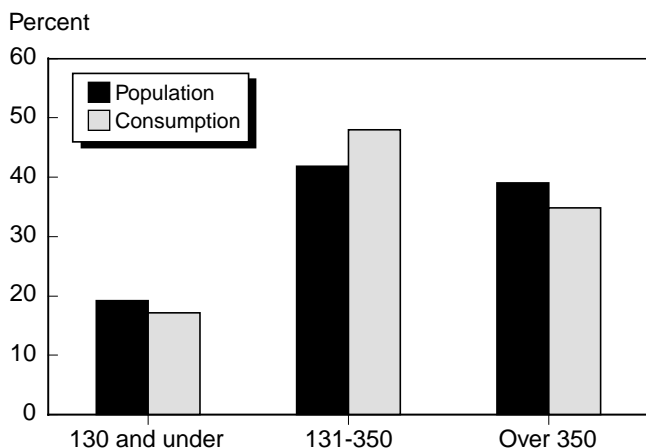
Watermelon Use and Income

According to the CSFII survey, there is variability with respect to watermelon consumption and income. Households were classified into three income brackets using the Federal poverty guidelines. The poverty guideline was developed by the U.S. Dept. 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).

The survey indicated that middle-income consumers are the leading consumers of watermelon. This tends to make sense given the strong consumption seen in the suburbs, typically dominated by middle-income consumers—many with families. Households in the highest income bracket, with income greater than 350 percent of the poverty level, represented 39 percent of the U.S. population and consumed just 35 percent of watermelon. Consumers in the high-income group likely take a greater percentage of their meals away from home. Thus, their exposure to watermelon is somewhat reduced since restaurants account for just 4 percent of the watermelon sold. At the other end of the income spectrum, low-

Figure A-5

Watermelon consumption and income



Source: Economic Research Service, USDA.

income consumers account for 19 percent of the population and consume just 17 percent of watermelon.

Watermelon Consumption By Age and Gender

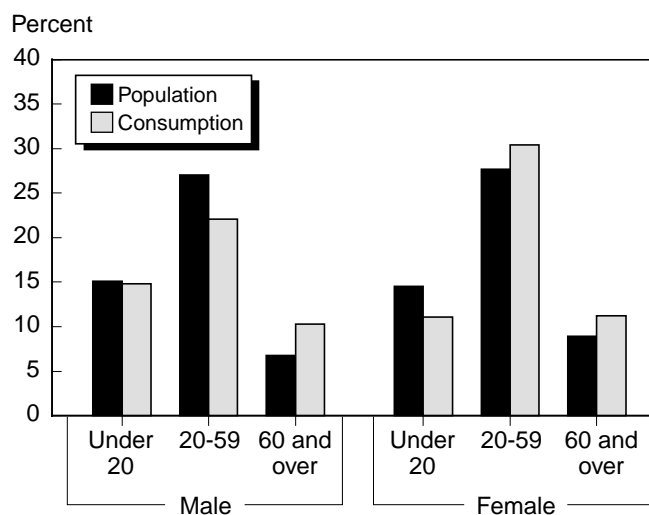
There are distinct watermelon consumption patterns by age. The CSFII data indicated that men and women over the age of 60 consume the most watermelon per capita. This group represents about 16 percent of the population, yet they eat nearly 22 percent of all watermelon. Compared with younger consumers, this may reflect greater attention to the nutritional aspects of their diets.

As shown in table A-2, women generally consume more watermelon than males. Women, constituting 51 percent of the population, consumed 53 percent of watermelon. The data also suggest that as women mature their consumption of watermelon increases. Women less than 20 years of age (15 percent of the population) consumed the smallest amount of watermelon per capita. This may indicate that calorie-conscious teen girls still embrace the old mistaken belief that watermelon, because it is sweet, is heavy in calories. In fact, one serving of watermelon (2 cups diced) contains just 80 calories, while also providing 25 percent of the RDA for vitamin C, 20 percent of the vitamin A, 8 percent of the dietary fiber, plus smaller amounts of potassium, iron, calcium, and lycopene.

Women between the ages of 20 and 59 eat 43 percent more watermelon per capita than the youngest age group. This could be interpreted to imply that as women mature, they become better educated and more focused on their nutritional intake and gain a greater appreciation for foods such as watermelon. Following this line of reasoning, it is not

Figure A-6

U.S. watermelon consumption by age and gender



Source: Economic Research Service, USDA.

surprising that the strongest per capita watermelon use for women was found among those aged 60 and over. This group accounts for 9 percent of the population but consumed 11 percent of watermelon.

Similar to women, the strongest per capita consumption among men occurred for those aged 60 and over. The survey indicated that per capita watermelon use by this age group was the strongest of all men and women, averaging 20 percent higher than for women of the same age grouping. However, unlike women, per capita use did not rise smoothly with age for men, with the youngest group consuming more than the middle group. Males aged 2 to 19 account for 15 percent of the population and consumed nearly 15 percent of watermelon.

Conclusion

While much is known about the supply side of the U.S. watermelon market, little is known about the consumer side of the market. In this paper, using data from USDA's CSFII survey we show where and how much watermelon is con-

sumed and link this consumption to consumer's economic, social, and demographic characteristics. The important findings in this article include:

- ◆ The bulk of watermelon were purchased at retail stores and considered as home foods. The institutional market was the strongest among the various away-from-home markets;
- ◆ Watermelon was heavily favored in the West and consumed about in proportion to population share in the Midwest and East. Per capita use was weakest in the South;
- ◆ Asian and Hispanic consumers were the strongest consumers of watermelon. Compared with other consumers, watermelon was discovered to be less important in the diets of non-Hispanic black and white consumers;
- ◆ Per capita consumption of watermelon is strongest among middle-income consumers—about one-fourth stronger than for lower income and upper income consumers;
- ◆ Women consume more watermelon than men. Men and women 60 and above represent about 16 percent of the population, yet they consume 22 percent of all watermelon.