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**Chapter 12—Intake of Grain Products**

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**12. INTAKE OF GRAIN PRODUCTS****12.1. INTRODUCTION**

The American food supply is generally considered to be one of the safest in the world. Nevertheless, grain products may become contaminated with toxic chemicals by several different pathways. Ambient air pollutants may be deposited on or absorbed by the plants, or dissolved in rainfall or irrigation waters that contact the plants. Pollutants may also be absorbed through plant roots from contaminated soil and ground water. The addition of pesticides, soil additives, and fertilizers may also result in contamination of grain products. To assess exposure through this pathway, information on ingestion rates of grain products is needed.

A variety of terms may be used to define intake of grain products (e.g., consumer-only intake, per capita intake, total grain intake, as-consumed intake, uncooked edible intake, dry-weight intake). As described in Chapter 9 (Intake of Fruits and Vegetables), consumer-only intake is defined as the quantity of grain products consumed by individuals during the survey period. These data are generated by averaging intake across only the individuals in the survey who consumed these food items. Per capita intake rates are generated by averaging consumer-only intakes over the entire population (including those that reported no intake). In general, per capita intake rates are appropriate for use in exposure assessments for which average dose estimates for individuals are of interest because they represent both individuals who ate the foods during the survey period and those who may eat the food items at some time but did not consume them during the survey period. Per capita intake, therefore, represents an average across the entire population of interest, but does so at the expense of underestimating consumption for the subset of the population that consumed the food in question. Total grain intake refers to the sum of all grain products consumed in a day.

Intake rates may be expressed on the basis of the as-consumed weight (e.g., cooked or prepared) or on the uncooked or unprepared weight. As-consumed intake rates are based on the weight of the food in the form that it is consumed and should be used in assessments where the basis for the contaminant concentrations in foods is also indexed to the as-consumed weight. Some of the food ingestion values provided in this chapter are expressed as as-consumed intake rates because this is the fashion in which data were reported by survey respondents. Others are provided as uncooked weights based on analyses of survey data that account for weight

changes that occur during cooking. This is of importance because concentration data to be used in the dose equation are often measured in uncooked food samples. It should be recognized that cooking can either increase or decrease food weight. Similarly, cooking can increase the mass of contaminant in food (due to formation reactions, or absorption from cooking oils or water) or decrease the mass of contaminant in food (due to vaporization, fat loss, or leaching). The combined effects of changes in weight and changes in contaminant mass can result in either an increase or decrease in contaminant concentration in cooked food. Therefore, if the as-consumed ingestion rate and the uncooked concentration are used in the dose equation, dose may be under-estimated or over-estimated. It is important for the assessor to be aware of these issues and choose intake rate data that best match the concentration data that are being used. For more information on cooking losses and conversions necessary to account for such losses, refer to Chapter 13 of this handbook.

Sometimes contaminant concentrations in food are reported on a dry-weight basis. When these data are used in an exposure assessment, it is recommended that dry-weight intake rates also be used. Dry-weight food concentrations and intake rates are based on the weight of the food consumed after the moisture content has been removed. For information on converting the intake rates presented in this chapter to dry-weight intake rates, refer to Section 12.4.

The purpose of this chapter is to provide intake data for grain products for the general population. The recommendations for ingestion rates of grain products are provided in the next section, along with a summary of the confidence ratings for these recommendations. The recommended values are based on the key study identified by U.S. Environmental Protection Agency (EPA) for this factor. Following the recommendations, the key study on ingestion of grain products is summarized. Relevant data on ingestion of grain products are also provided. These data are presented to provide the reader with added perspective on the current state-of-knowledge pertaining to ingestion of grain products among children.

**12.2. RECOMMENDATIONS**

Table 12-1 presents a summary of the recommended values for per capita and consumer-only intake of grain products. Table 12-2 provides confidence ratings for the grain intake recommendations for the general population.

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The U.S. EPA analysis of data from the 2003–2006 National Health and Nutrition Examination Survey (NHANES) was used in selecting recommended intake rates. The U.S. EPA analysis was conducted using childhood age groups that differed slightly from U.S. EPA’s *Guidance on Selecting Age Groups for Monitoring and Assessing Childhood Exposures to Environmental Contaminants* (U.S. EPA, 2005). However, for the purposes of the recommendations presented here, data were placed in the standardized age categories closest to those used in the analysis.

The NHANES data on which the recommendations are based are short-term survey data and may not necessarily reflect the long-term

distribution of average daily intake rates. However, because broad categories of food (i.e., total grains), are eaten on a daily basis throughout the year with minimal seasonality, the short-term distribution may be a reasonable approximation of the long-term distribution, although it will display somewhat increased variability. This implies that the upper percentiles shown here will tend to overestimate the corresponding percentiles of the true long-term distribution. In general, the recommended values based on U.S. EPA’s analysis of NHANES data represent the uncooked weight of the edible portion of grain products.

Table 12-1. Recommended Values for Intake of Grains, Edible Portion, Uncooked <sup>a</sup>						
Age Group (years)	Per Capita		Consumers Only		Multiple Percentiles	Source
	Mean g/kg-day	95 <sup>th</sup> Percentile g/kg-day	Mean g/kg-day	95 <sup>th</sup> Percentile g/kg-day		
<b>Total Grains</b>						
Birth to 1	3.1	9.5 <sup>b</sup>	4.1	10.3 <sup>b</sup>		
1 to <2	6.4	12.4 <sup>b</sup>	6.4	12.4 <sup>b</sup>		
2 to <3	6.4	12.4 <sup>b</sup>	6.4	12.4 <sup>b</sup>		
3 to <6	6.2	11.1	6.2	11.1		
6 to <11	4.4	8.2	4.4	8.2		
11 to <16	2.4	5.0	2.4	5.0		
16 to <21	2.4	5.0	2.4	5.0		
20 to <50	2.2	4.6	2.2	4.6		
≥50	1.7	3.5	1.7	3.5		
<b>Individual Grain Products—See Table 12-5 and Table 12-6</b>						
<sup>a</sup> Analysis was conducted using slightly different childhood age groups than those recommended in <i>Guidance on Selecting Age Groups for Monitoring and Assessing Childhood Exposures to Environmental Contaminants</i> (U.S. EPA, 2005). Data were placed in the standardized age categories closest to those used in the analysis.						
<sup>b</sup> Estimates are less statistically reliable based on guidance published in the <i>Joint Policy on Variance Estimation and Statistical Reporting Standards on NHANES III and CSFII Reports: NHIS/NCHS Analytical Working Group Recommendations</i> (NCHS, 1993).						

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<b>Table 12-2. Confidence in Recommendations for Intake of Grain Products</b>		
General Assessment Factors	Rationale	Rating
<b>Soundness</b>		
<i>Adequacy of Approach</i>	The survey methodology and data analysis were adequate. The survey sampled more than 16,000 individuals. An analysis of primary data was conducted.	High
<i>Minimal (or defined) Bias</i>	No physical measurements were taken. The method relied on recent recall of grain products eaten.	
<b>Applicability and Utility</b>		
<i>Exposure Factor of Interest</i>	The key study was directly relevant to grain intake.	High
<i>Representativeness</i>	The data were demographically representative of the U.S. population (based on stratified random sample).	
<i>Currency</i>	Data were collected between 2003 and 2006.	
<i>Data Collection Period</i>	Data were collected for two non-consecutive days.	
<b>Clarity and Completeness</b>		
<i>Accessibility</i>	The NHANES data are publicly available.	High
<i>Reproducibility</i>	The methodology used was clearly described; enough information was included to reproduce the results.	
<i>Quality Assurance</i>	NHANES follows strict QA/QC procedures. The U.S. EPA analysis has only been reviewed internally, but the methodology has been used in an analysis of previous data.	
<b>Variability and Uncertainty</b>		
<i>Variability in Population</i>	Full distributions were provided for total grains. Means were provided for individual grain products.	Medium to high for averages, low for long-term upper percentiles; low for individual foods
<i>Minimal Uncertainty</i>	Data collection was based on recall for a two-day period; the accuracy of using these data to estimate long-term intake (especially at the upper percentiles) is uncertain. However, use of short-term data to estimate chronic ingestion can be assumed for broad categories of foods such as total grains. Uncertainty is greater for individual grain products.	
<b>Evaluation and Review</b>		
<i>Peer Review</i>	The NCHS NHANES survey received a high level of peer review. The U.S. EPA analysis of these data has not been peer reviewed outside the Agency, but the methodology has been used in an analysis of previous data.	Medium
<i>Number and Agreement of Studies</i>	There was one key study.	
<b>Overall Rating</b>		<b>Medium to High</b> confidence in the averages; <b>Low</b> confidence in the long-term upper percentiles

### 12.3. INTAKE STUDIES

#### 12.3.1. Key Grain Intake Study

##### 12.3.1.1. U.S. EPA Analysis of Consumption Data From 2003–2006 National Health and Nutrition Examination Survey (NHANES)

The key source of recent information on consumption rates of grain products is the U.S. Centers for Disease Control and Prevention's National Center for Health Statistics' (NCHS) NHANES. Data from NHANES 2003–2006 have been used by the U.S. EPA, Office of Pesticide Programs (OPP) to generate per capita and consumer-only intake rates for both individual grain products and total grain products.

NHANES is designed to assess the health and nutritional status of adults and children in the United States. In 1999, the survey became a continuous program that interviews a nationally representative sample of approximately 7,000 persons each year and examines a nationally representative sample of about 5,000 persons each year, located in counties across the country, 15 of which are visited each year. Data are released on a 2-year basis; thus, for example, the 2003 data are combined with the 2004 data to produce NHANES 2003–2004.

The dietary interview component of NHANES is called *What We Eat in America* and is conducted by the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (DHHS). DHHS' NCHS is responsible for the sample design and data collection, and USDA's Food Surveys Research Group is responsible for the dietary data collection methodology, maintenance of the databases used to code and process the data, and data review and processing. Beginning in 2003, 2 non-consecutive days of 24-hour intake data were collected. The first day was collected in-person, and the second day was collected by telephone, 3 to 10 days later. These data were collected using USDA's dietary data collection instrument, the Automated Multiple Pass Method. This method provides an efficient and accurate means of collecting intakes for large-scale national surveys. It is fully computerized and uses a five-step interview. Details can be found at USDA's Agriculture Research Service (<http://www.ars.usda.gov/ba/bhnrc/fsrg>).

For NHANES 2003–2004, there were 12,761 persons selected; of these, 9,643 were considered respondents to the mobile examination center (MEC) examination and data collection. However, only 9,034 of the MEC respondents provided complete dietary intakes for Day 1. Furthermore, of those providing the Day 1 data, only

8,354 provided complete dietary intakes for Day 2. For NHANES 2005–2006, there were 12,862 persons selected; of these, 9,950 were considered respondents to the MEC examination and data collection. However, only 9,349 of the MEC respondents provided complete dietary intakes for Day 1. Furthermore, of those providing the Day 1 data, only 8,429 provided complete dietary intakes for Day 2.

The 2003–2006 NHANES surveys are stratified, multistage probability samples of the civilian non-institutionalized U.S. population. The sampling frame was organized using 2000 U.S. population census estimates. NHANES oversamples low income persons, adolescents 12 to 19 years, persons 60 years and older, African Americans, and Mexican Americans. Several sets of sampling weights are available for use with the intake data. By using appropriate weights, data for all 4 years of the surveys can be combined. Additional information on NHANES can be obtained at <http://www.cdc.gov/nchs/nhanes.htm>.

In 2010, U.S. EPA, OPP used NHANES 2003–2006 data to update the Food Commodity Intake Database (FCID) that was developed in earlier analyses of data from the USDA's Continuing Survey of Food Intake by Individuals (CSFII) (U.S. EPA, 2000; USDA, 2000) (see Section 12.3.2.4), NHANES data on the foods people reported eating were converted to the quantities of agricultural commodities eaten. "Agricultural commodity" is a term used by U.S. EPA to mean plant (or animal) parts consumed by humans as food; when such items are raw or unprocessed, they are referred to as "raw agricultural commodities." For example, an apple pie may contain the commodities apples, flour, fat, sugar, and spices. FCID contains approximately 558 unique commodity names and 8-digit codes. The FCID commodity names and codes were selected and defined by U.S. EPA and were based on the U.S. EPA Food Commodity Vocabulary (<http://www.epa.gov/pesticides/foodfeed/>).

Intake rates were generated for a variety of food items/groups based on the agricultural commodities included in the FCID. These intake rates represent intake of all forms of the product (e.g., both home produced and commercially produced) for individuals who provided data for two days of the survey. Note that if the person reported consuming food for only one day, their two-day average would be half the amount reported for the one day of consumption. Individuals who did not provide information on body weight or for whom identifying information was unavailable were excluded from the analysis. Two-day average intake rates were calculated for all individuals in the database for each of the food



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items/groups. These average daily intake rates were divided by each individual's reported body weight to generate intake rates in units of grams per kilogram of body weight per day (g/kg-day). The data were weighted according to the 4-year, 2-day sample weights provided in NHANES 2003–2006 to adjust the data for the sample population to reflect the national population.

Summary statistics were generated on a consumer-only and on a per capita basis. Summary statistics, including number of observations, percentage of the population consuming the grains being analyzed, mean intake rate, and standard error of the mean intake rate were calculated for total grains and selected individual grains. Percentiles of the intake rate distribution (i.e., 1<sup>st</sup>, 5<sup>th</sup>, 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, 90<sup>th</sup>, 95<sup>th</sup>, 99<sup>th</sup>, and the maximum value) were also provided for total grains. Data were provided for the following age groups: birth to 1 year, 1 to 2 years, 3 to 5 years, 6 to 12 years, 13 to 19 years, 20 to 49 years, and ≥50 years. Data on females 13 to 49 years were also provided. Because these data were developed for use in U.S. EPA's pesticide registration program, the childhood age groups used are slightly different than those recommended in U.S. EPA's *Guidance on Selecting Age Groups for Monitoring and Assessing Childhood Exposures to Environmental Contaminants* (U.S. EPA, 2005).

Table 12-3 presents per capita intake data for total grains in g/kg-day; Table 12-4 provides consumer-only intake data for total grains in g/kg-day. Table 12-5 provides per capita intake data for individual grains in g/kg-day, and Table 12-6 provides consumer-only intake data for individual grains in g/kg-day. In general, these data represent intake of the edible portions of i.e., uncooked foods.

The results are presented in units of g/kg-day. Thus, use of these data in calculating potential dose does not require the body-weight factor to be included in the denominator of the average daily dose (ADD) equation. It should be noted that converting these intake rates into units of g/day by multiplying by a single average body weight is inappropriate, because individual intake rates were indexed to the reported body weights of the survey respondents. Also, it should be noted that the distribution of average daily intake rates generated using short-term data (e.g., 2-day) does not necessarily reflect the long-term distribution of average daily intake rates. The distributions generated from short-term and long-term data will differ to the extent that each individual's intake varies from day to day; the distributions will be similar to the extent that individuals' intakes are constant from day to day. Day-to-day variation in intake among individuals will

be high for grains that are not typically eaten every day. For these grains, the intake distribution generated from short-term data will not be a good reflection of the long-term distribution. On the other hand, for broad categories of foods (e.g., total grains) that are eaten on a daily basis throughout the year, the short-term distribution may be a reasonable approximation of the true long-term distribution, although it will show somewhat more variability. In this chapter, distributions are provided for broad categories of grains (e.g., total grains). Because of the increased variability of the short-term distribution, the short-term upper percentiles shown here may overestimate the corresponding percentiles of the long-term distribution. For individual foods, only the mean, standard error, and percent consuming are provided. An advantage of using the U.S. EPA's analysis of NHANES data is that it provides distributions of intake rates for various age groups of children and adults, normalized by body weight. The data set was designed to be representative of the U.S. population and includes 4 years of intake data combined. Another advantage is the currency of the data; the NHANES data are from 2003–2006. However, short-term dietary data may not accurately reflect long-term eating patterns and may under-represent infrequent consumers of a given food. This is particularly true for the tails (extremes) of the distribution of food intake. Because these are 2-day averages, consumption estimates at the upper end of the intake distribution may be underestimated if these consumption values are used to assess acute (i.e., short-term) exposures. Also, the analysis was conducted using slightly different childhood age groups than those recommended in U.S. EPA's *Guidance on Selecting Age Groups for Monitoring and Assessing Childhood Exposures to Environmental Contaminants* (U.S. EPA, 2005). However, given the similarities in the age groups used, the data should provide suitable intake estimates for the age groups of interest.

**12.3.2. Relevant Grain Intake Studies****12.3.2.1. USDA (1996a, b, 1993, 1980)—Food and Nutrient Intakes of Individuals in 1 Day in the United States**

USDA calculated mean per capita intake rates for total and individual grain products using Nationwide Food Consumption Survey (NFCS) data from 1977–1978 and 1987–1988 (USDA, 1993, 1980) and CSFII data from 1994 and 1995 (USDA, 1996a, b). The mean per capita intake rates for grain products are presented in Table 12-7 and Table 12-8 for the two NFCS survey years, respectively. Table 12-9

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presents similar data from the 1994 and 1995 CSFII for grain products.

The advantages of using these data are that they provide mean intake estimates for various grain products. The consumption estimates are based on short-term (i.e., 1-day) dietary data, which may not reflect long-term consumption. These data are based on older surveys and may not be entirely representative of current eating patterns.

**12.3.2.2. *USDA (1999b)—Food Consumption, Prices, and Expenditures, 1970–1997***

The USDA's Economic Research Service calculates the amount of food available for human consumption in the United States annually. Supply and utilization balance sheets are generated. These are based on the flow of food items from production to end uses. Total available supply is estimated as the sum of production (i.e., some products are measured at the farm level or during processing), starting inventories, and imports (USDA, 1999b). The availability of food for human use commonly termed as "food disappearance" is determined by subtracting exported foods, products used in industries, farm inputs (seed and feed), and end-of-the-year inventories from the total available supply (USDA, 1999b). USDA (1999b) calculates the per capita food consumption by dividing the total food disappearance by the total U.S. population.

USDA (1999b) estimated per capita consumption data for grain products from 1970–1997. In this section, the 1997 values, which are the most recent final data, are presented. Table 12-10 presents per capita consumption in 1997 for grains.

An advantage of this study is that it provides per capita consumption rates for grains that are representative of long-term intake because disappearance data are generated annually. Daily per capita intake rates are generated by dividing annual consumption by 365 days/year. One of the limitations of this study is that disappearance data do not account for losses from the food supply from waste, spoilage, or foods fed to pets. Thus, intake rates based on these data may overestimate daily consumption because they are based on the total quantity of marketable commodity utilized. Therefore, these data may be useful for estimating bounding exposure estimates. It should also be noted that per capita estimates based on food disappearance are not a direct measure of actual consumption or quantity ingested, instead the data are used as indicators of changes in usage over time (USDA, 1999b). These data are based on older surveys and may not be entirely representative of current consumption patterns.

**12.3.2.3. *USDA (1999a)—Food and Nutrient Intakes by Children 1994–1996, 1998, Table Set 17***

USDA (1999a) calculated national probability estimates of food and nutrient intake by children based on 4 years of the CSFII (1994–1996 and 1998) for children age 9 years and under, and on CSFII 1994–1996 only for individuals age 10 years and over. The CSFII was a series of surveys designed to measure the kinds and amounts of foods eaten by Americans. Intake data, based on 24-hour dietary recall, were collected through in-person interviews on 2 non-consecutive days. Section 12.3.2.4 provides additional information on these surveys.

USDA used sample weights to adjust for non-response, to match the sample to the U.S. population in terms of demographic characteristics, and to equalize intakes over the four quarters of the year and the 7 days of the week. A total of 503 breast-fed children were excluded from the estimates, but both consumers and non-consumers were included in the analysis.

USDA (1999a) provided data on the mean per capita quantities (grams) of various food products/groups consumed per individual for 1 day, and the percent of individuals consuming those foods in 1 day of the survey. Table 12-11 and Table 12-12 present data on the mean quantities (grams) of grain products consumed per individual for 1 day, and the percentage of survey individuals consuming grain products that survey day. Data on mean intakes or mean percentages are based on respondents' Day-1 intakes.

The advantage of the USDA (1999a) study is that it uses the 1994–1996, 1998 CSFII data set, which includes 4 years of intake data, combined, and includes the supplemental data on children. These data are expected to be generally representative of the U.S. population, and they include data on a wide variety of grain products. The data set is one of a series of USDA data sets that are publicly available. One limitation of this data set is that it is based on 1-day, and short-term dietary data may not accurately reflect long-term eating patterns. Other limitations of this study are that it only provides mean values of food intake rates, consumption is not normalized by body weight, and presentation of results is not consistent with U.S. EPA's recommended age groups. These data are based on older surveys and may not be entirely representative of current eating patterns.

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**12.3.2.4. U.S. EPA Analysis of Continuing Survey of Food Intake by Individuals (CSFII) 1994–1996, 1998**

U.S. EPA/OPP, in cooperation with USDA's Agricultural Research Service, used data from the 1994–1996, 1998 CSFII to develop the FCID (U.S. EPA, 2000; USDA, 2000), as described in Section 12.3.1.1. The CSFII 1994–1996 was conducted between January 1994 and January 1997 with a target population of non-institutionalized individuals in all 50 states and Washington, DC. In each of the three survey years, data were collected for a nationally representative sample of individuals of all ages. The CSFII 1998 was conducted between December 1997 and December 1998 and surveyed children 9 years of age and younger. It used the same sample design as the CSFII 1994–1996 and was intended to be merged with CSFII 1994–1996 to increase the sample size for children. The merged surveys are designated as CSFII 1994–1996, 1998 (USDA, 2000). Additional information on the CSFII can be obtained at <http://www.ars.usda.gov/Services/docs.htm?docid=14531>.

The CSFII 1994–1996, 1998 collected dietary intake data through in-person interviews on two non-consecutive days. The data were based on 24-hour recall. A total of 21,662 individuals provided data for the first day; of those individuals, 20,607 provided data for a second day. The 2-day response rate for the 1994–1996 CSFII was approximately 76%. The 2-day response rate for CSFII 1998 was 82%. The CSFII 1994–1996, 1998 surveys were based on a complex multistage area probability sample design. The sampling frame was organized using 1990 U.S. population census estimates, and the stratification plan took into account geographic location, degree of urbanization, and socioeconomic characteristics. Several sets of sampling weights are available for use with the intake data. By using appropriate weights, data for all 4 years of the surveys can be combined. USDA recommends that all four years be combined in order to provide an adequate sample size for children.

The grain items/groups selected for the U.S. EPA analysis included total grains, and individual grain products such as cereal and rice. U.S. EPA (2003) presents the food codes and definitions used to determine the various grain products used in the analysis. CSFII data on the foods people reported eating were converted to the quantities of agricultural commodities eaten. Intake rates for these food items/groups and summary statistics were generated on both a per capita and a consumer-only basis using the same general methodology as in the U.S. EPA

analysis of 2003–2006 NHANES data, as described in Section 12.3.1.1. Because these data were developed for use in U.S. EPA's pesticide registration program, the childhood age groups used are slightly different than those recommended in U.S. EPA's *Guidance on Selecting Age Groups for Monitoring and Assessing Childhood Exposures to Environmental Contaminants* (U.S. EPA, 2005).

Table 12-13 presents per capita intake data for total grains in g/kg-day; Table 12-14 provides consumer-only intake data for total grains in g/kg-day. Table 12-15 provides per capita intake data for individual grain products, and Table 12-16 provides consumer-only intake data for individual grain products. In general, these data represent intake of the edible portions of unprepared (i.e., uncooked) foods. Table 12-17 through Table 12-24 present per capita intake data for individual grain products. The data come from CSFII 1994–1996 only. The results are presented in units of g/kg-day. These data represent as-consumed intake rates.

The results are presented in units of g/kg-day. Thus, use of these data in calculating potential dose does not require the body-weight factor to be included in the denominator of the ADD equation. The cautions concerning converting these intake rates into units of g/day by multiplying by a single average body weight and the discussion of the use of short term data in the NHANES description in Section 12.3.1.1, apply to the CSFII estimates as well.

A strength of U.S. EPA's analysis is that it provides distributions of intake rates for various age groups of individuals, normalized by body weight. The analysis uses the 1994–1996, 1998 CSFII data set, which was designed to be representative of the U.S. population. Also, the data set includes 4 years of intake data combined and is based on a 2-day survey period. However, as discussed above, short-term dietary data may not accurately reflect long-term eating patterns and may under-represent infrequent consumers of a given food. This is particularly true for the tails (extremes) of the distribution of food intake. Also, the analysis was conducted using slightly different childhood age groups than those recommended in U.S. EPA's *Guidance on Selecting Age Groups for Monitoring and Assessing Childhood Exposures to Environmental Contaminants* (U.S. EPA, 2005). However, given the similarities in the childhood age groups used, the data should provide suitable intake estimates for the age groups of interest. While the CSFII data are older than the NHANES data, they provide relevant information on consumption by season, region of the United States,

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and urbanization, breakdowns that are not available in the publically released NHANES data.

**12.3.2.5. Smiciklas-Wright et al. (2002)—Foods Commonly Eaten in the United States: Quantities Consumed per Eating Occasion and in a Day, 1994–1996**

Using data gathered in the 1994–1996 USDA CSFII, Smiciklas-Wright et al. (2002) calculated distributions for the quantities of grain products consumed per eating occasion by members of the U.S. population (i.e., serving sizes). The estimates of serving size are based on data obtained from 14,262 respondents, ages two and above, who provided two days of dietary intake information. Only dietary intake data from users of the specified food were used in the analysis (i.e., consumer-only data). Table 12-25 presents, as-consumed, the quantity of grain products consumed per eating occasion and the percentage of individuals using these foods in a 2-day period for a selected variety of grain products. Table 12-26 presents the same data by sex and age.

These data are presented on an as-consumed basis (grams) and represent the quantity of grain products consumed per eating occasion. These estimates may be useful for assessing acute exposures to contaminants in specific foods, or other assessments where the amount consumed per eating occasion is necessary. Only the mean and standard deviation serving size data and percent of the population consuming the food during the 2-day survey period are presented in this handbook. Percentiles of serving sizes of the foods consumed by these age groups of the U.S. population can be found in Smiciklas-Wright et al. (2002).

The advantages of using these data are that they were derived from the USDA CSFII and are representative of the U.S. population. The analysis conducted by Smiciklas-Wright et al. (2002) accounted for individual foods consumed as ingredients of mixed foods. Mixed foods were disaggregated via recipe files so that the individual ingredients could be grouped together with similar foods that were reported separately. Thus, weights of foods consumed as ingredients were combined with weights of foods reported separately to provide a more thorough representation of consumption. However, it should be noted that since the recipes for the mixed foods consumed were not provided by the respondents, standard recipes were used. As a result, the estimates of quantity consumed for some food types are based on assumptions about the types and quantities of ingredients consumed as part of mixed

foods. This study used data from the 1994 to 1996 CSFII; data from the 1998 children's supplement were not included.

**12.3.2.6. Vitolins et al. (2002)—Quality of Diets Consumed by Older Rural Adults**

Vitolins et al. (2002) conducted a survey to evaluate the dietary intake, by food groups, of older (>70 years) rural adults. The sample consisted of 130 community dwelling residents from two rural counties in North Carolina. Data on dietary intake over the preceding year were obtained in face-to-face interviews conducted in participants' homes, or in a few cases, a senior center. The food frequency questionnaire used in the survey was a modified version of the National Cancer Institute Health Habits and History Questionnaire; this modified version included an expanded food list containing a greater number of ethnic foods than the original food frequency form. Demographic and personal data collected included sex, ethnicity, age, education, denture use, marital status, chronic disease, and weight.

Food items reported in the survey were grouped into food groups similar to the USDA Food Guide Pyramid and the National Cancer Institute's 5 A Day for Better Health program. These groups are (1) fruits, and vegetables; (2) bread, cereal, rice, and pasta; (3) milk, yogurt, and cheese; (4) meat, fish, poultry, beans, and eggs; and (5) fats, oils, sweets, and snacks. Medians, ranges, frequencies, and percentages were used to summarize intake of each food group, broken down by demographic and health characteristics. In addition, multiple regression models were used to determine which demographic and health factors were jointly predictive of intake of each of the five food groups.

Thirty-four percent of the survey participants were African American, 36% were European American, and 30% were Native American. Sixty-two percent were female, 62% were not married at the time of the interview, and 65% had some high school education or were high school graduates. Almost all of the participants (95%) had one or more chronic diseases. Sixty percent of the respondents were between 70 and 79 years of age; the median age was 78 years old. Table 12-27 presents the median servings of bread, cereal, rice, and pasta broken down by demographic and health characteristic. Only sex was statistically predictive of bread, cereal, rice, and pasta intake ( $p < 0.01$ ), with males consuming approximately an extra serving per day compared to women. Also, the multiple regression model indicated that sex was predictive of

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bread, cereal, rice, and pasta intake after controlling for other demographic variables.

One limitation of the study, as noted by the study authors, is that the study did not collect information on the length of time the participants had been practicing the dietary behaviors reported in the survey. The questionnaire asked participants to report the frequency of food consumption during the past year. The study authors noted that, currently, there are no dietary assessment tools that allow the collection of comprehensive dietary data over years of food consumption. Another limitation of the study is that the small sample size used makes associations by sex and ethnicity difficult.

**12.3.2.7. Fox et al. (2004)—Feeding Infants and Toddlers Study: What Foods Are Infants and Toddlers Eating**

Fox et al. (2004) used data from the Feeding Infants and Toddlers study (FITS) to assess food consumption patterns in infants and toddlers. The FITS was sponsored by Gerber Products Company and was conducted to obtain current information on food and nutrient intakes of children, ages 4 to 24 months old, in the 50 states and the District of Columbia. The FITS is described in detail in Devaney et al. (2004). FITS was based on a random sample of 3,022 infants and toddlers for which dietary intake data were collected by telephone from their parents or caregivers between March and July 2002. An initial recruitment and household interview was conducted, followed by an interview to obtain information on intake based on 24-hour recall. The interview also addressed growth, development, and feeding patterns. A second dietary recall interview was conducted for a subset of 703 randomly selected respondents. The study over-sampled children in the 4 to 6 and 9 to 11 months age groups; sample weights were adjusted for non-response, over sampling, and under coverage of some subgroups. The response rate for the FITS was 73% for the recruitment interview. Of the recruited households, there was a response rate of 94% for the dietary recall interviews (Devaney et al., 2004). Table 12-28 shows the characteristics of the FITS population.

Fox et al. (2004) analyzed the first set of 24-hour recall data collected from all study participants. For this analysis, children were grouped into six age categories: 4 to 6 months, 7 to 8 months, 9 to 11 months, 12 to 14 months, 15 to 18 months, and 19 to 24 months. Table 12-29 provides the percentage of infants and toddlers consuming different types of grains or grain products at least once a day. The percentages of children eating any type of grain or

grain product ranged from 65.8% for 4 to 6 month-olds to 99.2% for 19- to 24-month-olds.

The advantages of this study is that it represents the U.S. population, and the sample size was large. One limitation of the analysis done by Fox et al. (2004) is that only frequency data were provided; no information on actual intake rates was included. In addition, Devaney et al. (2004) noted several limitations associated with the FITS data. For the FITS, a commercial list of infants and toddlers was used to obtain the sample used in the study. Since many of the households could not be located and did not have children in the target population, a lower response rate than would have occurred in a true national sample was obtained (Devaney et al., 2004). In addition, the sample was likely from a higher socioeconomic status when compared with all U.S. infants in this age group (4 to 24 months old), and the use of a telephone survey may have omitted lower-income households without telephones (Devaney et al., 2004).

**12.3.2.8. Ponza et al. (2004)—Nutrient Food Intakes and Food Choices of Infants and Toddlers Participating in WIC**

Ponza et al. (2004) conducted a study using selected data from the FITS to assess feeding patterns, food choices, and nutrient intake of infants and toddlers participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Ponza et al. (2004) evaluated FITS data for the following age groups: 4 to 6 months ( $N = 862$ ), 7 to 11 months ( $N = 1,159$ ), and 12 to 24 months ( $N = 996$ ). Table 12-30 shows the total sample size described by WIC participants and non-participants.

The foods consumed were analyzed by tabulating the percentage of infants who consumed specific foods/food groups per day (Ponza et al., 2004). Weighted data were used in all of the analyses used in the study (Ponza et al., 2004). Table 12-30 presents the demographic data for WIC participants and non-participants. Table 12-31 provides information on the food choices for the infants and toddlers studied. In general, there was little difference in grain product choices among WIC participants and non-participants, except for the 7 to 11 months age category (see Table 12-31). Non-participants, ages 7 to 11 months, were more likely to eat non-infant cereals than WIC participants.

An advantage of this study is that it had a relatively large sample size and was representative of the U.S. general population of infants and children. A limitation of the study is that intake values for foods

were not provided. Other limitations are those associated with the FITS data, as described previously in Section 12.3.2.7.

**12.3.2.9. Fox et al. (2006)—Average Portion of Foods Commonly Eaten by Infants and Toddlers in the United States**

Fox et al. (2006) estimated average portion sizes consumed per eating occasion by children 4 to 24 months of age who participated in the FITS. The FITS is a cross-sectional study designed to collect and analyze data on feeding practices, food consumption, and usual nutrient intake of U.S. infants and toddlers and is described in Section 12.3.2.7 of this chapter. It included a stratified random sample of 3,022 children between 4 and 24 months of age.

Using the 24-hour recall data, Fox et al. (2006) derived average portion sizes for six major food groups, including breads and grains. Average portion sizes for select individual foods within these major groups were also estimated. For this analysis, children were grouped into six age categories: 4 to 5 months, 6 to 8 months, 9 to 11 months, 12 to 14 months, 15 to 18 months, and 19 to 24 months. Table 12-32 and Table 12-33 present the average portion sizes for grain products for infants and toddlers, respectively.

**12.3.2.10. Mennella et al. (2006)—Feeding Infants and Toddlers Study: The Types of Foods Fed to Hispanic Infants and Toddlers**

Mennella et al. (2006) investigated the types of food and beverages consumed by Hispanic infants and toddlers in comparison to the non-Hispanic infants and toddlers in the United States. The FITS 2002 data for children between 4 and 24 months of age were used for the study. The data represent a random sample of 371 Hispanic and 2,367 non-Hispanic infants and toddlers (Mennella et al., 2006). Mennella et al. (2006) grouped the infants as follows: 4 to 5 months (*N* = 84 Hispanic; 538 non-Hispanic), 6 to 11 months (*N* = 163 Hispanic; 1,228 non-Hispanic), and 12 to 24 months (*N* = 124 Hispanic; 871 non-Hispanic) of age.

Table 12-34 provides the percentage of Hispanic and non-Hispanic infants and toddlers consuming grain products. In most instances, the percentages consuming the different types are similar. However, 6 to 11 month old Hispanic children were more likely to eat rice and pasta than non-Hispanic children in this age groups.

The advantage of the study is that it provides information on food preferences for Hispanic and non-Hispanic infants and toddlers. A limitation is that the study did not provide food intake data but provided frequency of use data instead. Other limitations are those noted previously in Section 12.3.2.7 for the FITS data.

**12.4. CONVERSION BETWEEN WET- AND DRY-WEIGHT INTAKE RATES**

The intake data presented in this chapter are reported in units of wet weight (i.e., as-consumed or uncooked weight of grain products consumed per day or per eating occasion). However, data on the concentration of contaminants in grain products may be reported in units of either wet or dry weight (e.g., mg contaminant per gram dry weight of grain products). It is essential that exposure assessors be aware of this difference, so that they may ensure consistency between the units used for intake rates and those used for concentration data (i.e., if the contaminant concentration is measured in dry weight of grain products, then the dry-weight units should be used for their intake values).

If necessary, wet-weight (e.g., as-consumed) intake rates may be converted to dry-weight intake rates using the moisture content percentages presented in Table 12-35 and the following equation:

$$IR_{dw} = IR_{ww} \left[ \frac{100 - W}{100} \right] \quad (\text{Eqn. 12-1})$$

where:

- $IR_{dw}$  = dry-weight intake rate,
- $IR_{ww}$  = wet-weight intake rate, and
- $W$  = percent water content.

Alternatively, dry-weight residue levels in grain products may be converted to wet-weight residue levels for use with wet-weight (e.g., as-consumed) intake rates as follows:

$$C_{ww} = C_{dw} \left[ \frac{100 - W}{100} \right] \quad (\text{Eqn. 12-2})$$

where:

- $C_{ww}$  = wet concentration rate,
- $C_{dw}$  = dry-weight concentration, and
- $W$  = percent water content.

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The moisture data presented in Table 12-35 are for selected grain products taken from USDA (2007).

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**Table 12-3. Per Capita Intake of Total Grains Based 2003–2006 NHANES (g/kg-day, edible portion, uncooked weight)**

Population Group	N	% Consuming	Mean	SE	Percentiles									
					1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
Whole Population	16,783	100	2.6	0.04	0.2	0.6	0.8	1.3	2.0	3.2	5.1	6.7	9.9	34.8*
<b>Age Group</b>														
Birth to 1 year	865	76	3.1	0.20	0.0*	0.0*	0.0	0.1	2.3	5.0	7.5	9.5*	12.5*	34.9*
1 to 2 years	1,052	100	6.4	0.17	1.5*	2.3*	3.0	4.2	5.8	8.4	10.5	12.4*	15.9*	21.1*
3 to 5 years	978	100	6.2	0.13	2.0*	2.4	3.3	4.4	5.9	7.6	9.6	11.1	13.2*	15.6*
6 to 12 years	2,256	100	4.4	0.09	0.6*	1.4	1.8	2.8	4.1	5.5	7.4	8.2	11.1*	14.5*
13 to 19 years	3,450	100	2.4	0.05	0.4	0.7	1.0	1.5	2.1	3.2	4.2	5.0	7.5	14.3*
20 to 49 years	4,289	100	2.2	0.04	0.3	0.6	0.8	1.2	1.9	2.8	3.9	4.6	7.1	15.0*
Females 13 to 49 years	4,103	100	1.9	0.04	0.2	0.5	0.8	1.1	1.7	2.5	3.4	3.9	5.5	9.8*
50 years and older	3,893	100	1.7	0.03	0.3	0.5	0.7	1.0	1.5	2.1	2.9	3.5	5.2	9.4*
<b>Race</b>														
Mexican American	4,450	99	3.0	0.05	0.1	0.8	1.0	1.6	2.4	3.9	5.8	7.2	10.6	17.8*
Non-Hispanic Black	4,265	100	2.4	0.04	0.2	0.5	0.7	1.1	1.8	2.9	5.0	6.8	10.2	21.1*
Non-Hispanic White	6,757	100	2.5	0.05	0.3	0.6	0.8	1.3	1.9	3.1	4.9	6.5	9.6	34.8*
Other Hispanic	562	99	2.7	0.13	0.2*	0.7	1.0	1.5	2.1	3.3	5.3	7.0	9.8*	15.3*
Other Race—Including Multiple Races	749	100	3.0	0.11	0.3*	0.6	0.9	1.5	2.5	3.9	6.0	7.5	11.1*	17.5*
N = Sample size. SE = Standard error. Max = Maximum value. * Estimates are less statistically reliable based on guidance published in the <i>Joint Policy on Variance Estimation and Statistical Reporting Standards on NHANES III and CSFII Reports: NHIS/NCHS Analytical Working Group Recommendations</i> (NCHS, 1993).														
Source: Based on U.S. EPA analysis of 2003–2006 NHANES.														

**Table 12-4. Consumer-Only Intake of Total Grains Based 2003–2006 NHANES (g/kg-day, edible portion, uncooked weight)**

Population Group	N	Mean	SE	Percentiles									
				1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
Whole Population	16,556	2.6	0.04	0.3	0.6	0.8	1.3	2.0	3.2	5.1	6.7	9.9	34.9*
<b>Age Group</b>													
Birth to 1 year	644	4.1	0.18	0.1*	0.4*	0.8*	1.8	3.5	5.9	8.1*	10.3*	13.9*	34.9*
1 to 2 years	1,050	6.4	0.16	1.6*	2.4*	3.0	4.2	5.8	8.4	10.5	12.4*	15.9*	21.1*
3 to 5 years	977	6.2	0.13	2.0*	2.4	3.3	4.4	5.9	7.6	9.6	11.1	13.2*	15.6*
6 to 12 years	2,256	4.4	0.09	0.6*	1.4	1.8	2.8	4.1	5.5	7.4	8.2	11.1*	14.5*
13 to 19 years	3,450	2.4	0.05	0.4	0.7	1.0	1.5	2.1	3.2	4.2	5.0	7.5	14.3*
20 to 49 years	4,288	2.2	0.04	0.3	0.6	0.8	1.2	1.9	2.8	3.9	4.6	7.1	15.0*
Females 13 to 49 years	4,102	1.9	0.03	0.2	0.5	0.8	1.1	1.7	2.5	3.4	3.9	5.5	9.8*
50 years and older	3,891	1.7	0.03	0.3	0.5	0.7	1.0	1.5	2.1	2.9	3.5	5.2	9.4*
<b>Race</b>													
Mexican American	4,341	3.0	0.05	0.4	0.8	1.1	1.6	2.4	3.9	5.9	7.2	10.6	17.8*
Non-Hispanic Black	4,236	2.4	0.04	0.2	0.5	0.7	1.1	1.8	2.9	5.0	6.9	10.3	21.1*
Non-Hispanic White	6,694	2.5	0.05	0.3	0.6	0.8	1.3	2.0	3.1	4.9	6.5	9.6	34.9*
Other Hispanic	548	2.8	0.14	0.4*	0.7	1.0	1.5	2.1	3.4	5.4	7.1	9.8*	15.3*
Other Race—Including Multiple Races	737	3.1	0.11	0.3*	0.7	0.9	1.5	2.5	3.9	6.0	7.5	11.1*	17.5*
N	= Sample size.												
SE	= Standard error.												
Max	= Maximum value.												
*	Estimates are less statistically reliable based on guidance published in the <i>Joint Policy on Variance Estimation and Statistical Reporting Standards on NHANES III and CSFII Reports: NHIS/NCHS Analytical Working Group Recommendations</i> (NCHS, 1993).												
Source:	Based on U.S. EPA analysis of 2003–2006 NHANES.												

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<b>Table 12-5. Per Capita Intake of Individual Grain Products Based 2003–2006 NHANES (g/kg-day, edible portion, uncooked weight)</b>							
Population Group	<i>N</i>	% Consuming			% Consuming		
		Cereal	Mean	SE	Rice	Mean	SE
Whole Population	16,783	100	3.7	0.04	88	0.2	0.01
<b>Age Group</b>							
Birth to 1 year	865	81	5.1	0.30	69	1.1	0.08
1 to 2 years	1,052	100	8.7	0.18	87	0.6	0.06
3 to 5 years	978	100	8.6	0.17	91	0.5	0.06
6 to 12 years	2,256	100	6.3	0.10	89	0.3	0.03
13 to 19 years	3,450	100	3.9	0.08	85	0.2	0.01
20 to 49 years	4,289	100	3.2	0.04	89	0.3	0.01
Females 13 to 49 years	4,103	100	2.9	0.04	86	0.2	0.01
50 years and older	3,893	100	2.2	0.04	89	0.1	0.01
<b>Race</b>							
Mexican American	4,450	100	4.3	0.07	87	0.3	0.02
Non-Hispanic Black	4,265	100	3.6	0.06	86	0.3	0.02
Non-Hispanic White	6,757	100	3.6	0.05	88	0.2	0.01
Other Hispanic	562	99	3.9	0.20	92	0.6	0.05
Other Race—Including Multiple Races	749	100	4.1	0.12	90	0.8	0.08
<i>N</i>	= Sample size.						
SE	= Standard error.						
Source: Based on U.S. EPA analysis of 2003–2006 NHANES.							

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<b>Table 12-6. Consumer-Only Intake of Individual Grain Products Based 2003–2006 NHANES</b> (g/kg-day, edible portion, uncooked weight)						
Population Group	<i>N</i>	Mean	SE	<i>N</i>	Mean	SE
	Cereal			Rice		
Whole Population	16,613	3.7	0.04	14,447	0.3	0.01
<b>Age Group</b>						
Birth to 1 year	696	6.3	0.31	552	1.5	0.10
1 to 2 years	1,051	8.7	0.18	928	0.7	0.07
3 to 5 years	978	8.6	0.17	875	0.5	0.06
6 to 12 years	2,256	6.3	0.10	2,000	0.3	0.03
13 to 19 years	3,450	3.9	0.08	2,898	0.2	0.02
20 to 49 years	4,289	3.2	0.04	3,812	0.3	0.02
Females 13 to 49 years	4,103	2.9	0.04	3,511	0.2	0.02
50 years and older	3,893	2.2	0.04	3,382	0.2	0.01
<b>Race</b>						
Mexican American	4,372	4.3	0.07	3,757	0.3	0.02
Non-Hispanic Black	4,244	3.6	0.06	3,645	0.3	0.02
Non-Hispanic White	6,707	3.6	0.05	5,887	0.2	0.01
Other Hispanic	550	3.9	0.20	491	0.6	0.05
Other Race—Including Multiple Races	740	4.1	0.13	667	0.8	0.08
<i>N</i> = Sample size.						
SE = Standard error.						
Source: Based on U.S. EPA analysis of 2003–2006 NHANES.						

<b>Table 12-7. Mean Grain Intake per Individual in a Day by Sex and Age (g/day as-consumed)<sup>a</sup> for 1977–1978</b>					
Group Age (years)	Total Grains	Breads, Rolls, Biscuits	Other Baked Goods	Cereals, Pasta	Mixtures, Mainly Grain <sup>b</sup>
<b>Males and Females</b>					
<1	42	4	5	30	3
1 to 2	158	27	24	44	63
3 to 5	181	46	37	54	45
6 to 8	206	53	56	60	38
<b>Males</b>					
9 to 11	238	67	56	51	64
12 to 14	288	76	80	57	74
15 to 18	303	91	77	53	82
19 to 22	253	84	53	64	52
23 to 34	256	82	60	40	74
35 to 50	234	82	58	44	50
51 to 64	229	78	57	48	46
65 to 74	235	71	60	69	35
≥75	196	70	50	58	19
<b>Females</b>					
9 to 11	214	58	59	44	53
12 to 14	235	57	61	45	72
15 to 18	196	57	43	41	55
19 to 22	161	44	36	33	48
23 to 34	163	49	38	32	44
35 to 50	161	49	37	32	43
51 to 64	155	52	40	36	27
65 to 74	175	57	42	47	29
≥75	178	54	44	58	22
Males and Females—All Ages	204	62	49	44	49
<sup>a</sup> Based on USDA Nationwide Food Consumption Survey 1977–1978 data for 1 day.					
<sup>b</sup> Includes mixtures containing grain as the main ingredient.					
Source: USDA (1980).					

**Table 12-8. Mean Grain Intakes per Individual in a Day by Sex and Age (g/day as-consumed)<sup>a</sup> for 1987–1988**

Group Age (years)	Total Grains		Yeast Breads and Rolls		Quick Breads, Pancakes, French Toast		Cakes, Cookies, Pastries, Pies		Crackers, Popcorn, Pretzels, Corn Chips		Cereals and Pastas		Mixtures, Mostly Grain <sup>b</sup>	
Males and Females ≤5	167		30		8		22		4		52		51	
<b>Males</b>														
6 to 11	268		51		16		37		8		74		83	
12 to 19	304		65		28		45		10		72		82	
≥20	272		65		20		37		8		58		83	
<b>Females</b>														
6 to 11	231		43		19		30		6		66		68	
12 to 19	239		45		13		29		7		52		91	
≥20	208		45		14		28		6		53		62	
All Individuals	237		52		16		32		7		57		72	

<sup>a</sup> Based on USDA Nationwide Food Consumption Survey 1987–1988 data for 1 day.

<sup>b</sup> Includes mixtures containing grain as the main ingredient.

Source: USDA (1993).

**Table 12-9. Mean Grain Intakes per Individual in a Day by Sex and Age (g/day as-consumed)<sup>a</sup> for 1994–1995**

Group Age (years)	Total Grains		Yeast Breads and Rolls		Quick Breads, Pancakes, French Toast		Cakes, Cookies, Pastries, Pies		Crackers, Popcorn, Pretzels, Corn Chips		Cereals and Pastas		Mixtures, Mostly Grain <sup>b</sup>	
	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995
	Males and Females ≤5	213	210	26	28	11	11	22	23	8	7	58	57	89
<b>Males</b>														
6 to 11	285	341	51	45	15	21	42	46	12	18	66	97	101	115
12 to 19	417	364	53	54	30	21	54	43	17	22	82	84	180	138
≥20	357	365	64	61	22	24	43	46	13	15	86	91	128	128
<b>Females</b>														
6 to 11	260	286	43	46	16	21	37	51	11	14	57	54	94	100
12 to 19	317	296	40	37	16	14	39	35	17	16	63	52	142	143
≥20	254	257	44	45	16	15	33	34	9	10	59	69	92	83
All Individuals	300	303	50	49	18	19	38	39	12	13	70	76	112	107

<sup>a</sup> Based on USDA CSFII 1994 and 1995 data for 1 day.

<sup>b</sup> Includes mixtures containing grain as the main ingredient.

Source: USDA (1996a, b).

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**Table 12-10. Per Capita Consumption of Flour and Cereal Products in 1997**

<b>Food Item</b>	<b>Per Capita Consumption (g/day)<sup>a</sup></b>
Total Wheat Flour <sup>b</sup>	186
Rye Flour	0.7
Rice <sup>c</sup>	24
Total Corn Products <sup>d</sup>	29
Oat Products <sup>e</sup>	8
Barley Products <sup>f</sup>	0.9
Total Flour and Cereal Products <sup>g</sup>	249

<sup>a</sup> Original data were presented in lbs/year; data were converted to g/day by multiplying by a factor of 454 g/lb and dividing by 365 day/year. Consumption of most items at the processing level. Excludes quantities used in alcoholic beverages and fuel.

<sup>b</sup> Includes white, whole wheat, and durum flour.

<sup>c</sup> Milled basis.

<sup>d</sup> Includes corn flour and meal, hominy and grits, and corn starch.

<sup>e</sup> Includes rolled oats, ready-to-eat oat cereals, oat flour, and oat bran.

<sup>f</sup> Includes barley flour, pearl barley, and malt and malt extract used in food processing.

<sup>g</sup> Excludes wheat not ground into flour.

Source: USDA (1999b).

<b>Table 12-11. Mean Quantities of Grain Products Consumed by Children Under 20 Years of Age, by Sex and Age, per Capita (g/day, as-consumed)<sup>a</sup></b>											
Age Group (years)	Sample Size	Total <sup>b</sup>	Yeast, Breads, and Rolls	Cereals and Pasta			Quick Breads, Pancakes, French Toast	Cakes, Cookies, Pastries, Pies	Crackers, Popcorn, Pretzels, Corn Chips	Mixtures, Mainly Grain <sup>c</sup>	
				Total	Ready-to-Eat Cereals	Rice					Pasta
Males and Females											
<1	1,126	56	2	29	1	2	1 <sup>d</sup>	1	3	1	20
1	1,016	192	16	57	11	9	9	9	16	7	87
2	1,102	219	26	62	16	15	12	12	22	9	87
1 to 2	2,118	206	21	59	13	12	11	11	19	8	87
3	1,831	242	30	64	19	13	12	16	23	11	98
4	1,859	264	36	67	22	15	11	17	30	13	102
5	884	284	41	76	24	17	11	15	33	13	107
3 to 5	4,574	264	36	69	22	15	11	16	29	12	102
≤5	7,818	219	27	61	16	13	10	12	22	9	87
Males											
6 to 9	787	310	45	77	28	18	15	23	39	16	109
6 to 11	1,031	318	46	80	31	16	18	23	40	15	115
12 to 19	737	406	54	82	29	27	17	26	49	19	175
Females											
6 to 9	704	284	43	61	21	12	15	18	42	13	107
6 to 11	969	280	43	62	20	14	15	19	42	14	101
12 to 19	732	306	40	67	17	19	22	15	37	15	132
Males and Females											
≤9	9,309	250	34	64	20	14	12	16	30	12	96
≤19	11,287	298	40	69	22	17	15	18	36	14	120
<sup>a</sup>	Based on data from 1994–1996, 1998 CSFII.										
<sup>b</sup>	Includes yeast breads, rolls, cereals, pastas, quick breads, pancakes, French toast, cakes, cookies, pastries, pies, crackers, popcorn, pretzels, corn chips, and mixtures having a grain product as a main ingredient. Excludes grain products that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, noodles in tuna-noodle casserole are tabulated under Meat, Poultry, and Fish.										
<sup>c</sup>	Includes mixtures having a grain product as a main ingredient, such as burritos, tacos, pizza, egg rolls, quiche, spaghetti with sauce, rice and pasta mixtures; frozen meals in which the main course is a grain mixture; noodle and rice soups; and baby-food macaroni and spaghetti mixtures.										
<sup>d</sup>	Estimate is not statistically reliable due to small sample size reporting intake.										
Note:	Consumption amounts shown are representative of the first day of each participant's survey response.										
Source:	USDA (1999a).										



**Table 12-12. Percentage of Individuals Under 20 Years of Age Consuming Grain Products, by Sex and Age (%)<sup>a</sup>**

Age Group (years)	Sample Size	Total <sup>b</sup>	Yeast, Breads and Rolls	Cereals and Pasta			Quick Breads, Pancakes, French Toast	Cakes, Cookies, Pastries, Pies	Crackers, Popcorn, Pretzels, Corn Chips	Mixtures, Mainly Grain <sup>c</sup>	
				Total	Ready-to-Eat Cereals	Rice					Pasta
Males and Females											
<1	1,126	70.6	10.9	62.8	9.1	3.4	2.1	4.4	16.5	10.3	15.0
1	1,016	98.2 <sup>d</sup>	48.4	70.6	45.3	11.3	9.4	23.0	47.0	39.0	47.8
2	1,102	99.0 <sup>d</sup>	58.7	71.1	51.9	14.4	9.4	27.5	46.6	37.9	45.3
1 to 2	2,118	98.7	53.7	70.9	48.7	12.9	9.4	25.3	46.8	38.4	46.5
3	1,831	99.4 <sup>d</sup>	64.1	69.7	53.3	11.1	8.6	28.8	46.1	38.5	49.0
4	1,859	99.5 <sup>d</sup>	67.0	69.1	54.8	11.4	7.1	28.6	52.3	39.4	46.2
5	884	99.9 <sup>d</sup>	69.2	70.4	54.9	11.4	6.8	25.2	52.4	32.1	47.4
3 to 5	4,574	99.6 <sup>d</sup>	66.8	69.7	54.3	11.3	7.5	27.5	50.3	36.7	47.5
≤5	7,818	95.8	55.5	69.3	46.9	10.9	7.5	24.0	45.0	34.1	43.3
Males											
6 to 9	787	98.9 <sup>d</sup>	69.8	62.6	50.8	10.5	7.4	28.1	52.5	36.0	44.5
6 to 11	1,031	99.0 <sup>d</sup>	69.1	64.0	52.4	9.7	8.1	27.1	52.3	33.8	45.3
12 to 19	737	98.2 <sup>d</sup>	62.7	44.6	33.2	10.0	5.9	24.4	41.3	27.2	46.2
Females											
6 to 9	704	99.7 <sup>d</sup>	71.5	61.2	47.6	9.0	7.9	26.3	57.1	38.3	48.0
6 to 11	969	99.3 <sup>d</sup>	71.0	59.3	45.6	9.4	7.1	27.1	55.0	37.1	45.7
12 to 19	732	97.6 <sup>d</sup>	60.9	45.9	30.3	8.6	9.3	19.8	40.6	30.9	46.1
Males and Females											
≤9	9,309	97.2	61.6	66.4	47.9	10.5	7.6	25.3	48.9	35.3	44.4
≤19	11,287	97.6	62.4	57.6	41.7	9.9	7.6	24.2	46.1	32.5	45.1
<sup>a</sup>	Based on data from 1994–1996, 1998 CSFII.										
<sup>b</sup>	Includes yeast breads, rolls, cereals, pastas, quick breads, pancakes, French toast, cakes, cookies, pastries, pies, crackers, popcorn, pretzels, corn chips, and mixtures having a grain product as a main ingredient. Excludes grain products that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, noodles in tuna-noodle casserole are tabulated under Meat, Poultry, and Fish.										
<sup>c</sup>	Includes mixtures having a grain product as a main ingredient, such as burritos, tacos, pizza, egg rolls, quiche, spaghetti with sauce, rice and pasta mixtures; frozen meals in which the main course is a grain mixture; noodle and rice soups; and baby-food macaroni and spaghetti mixtures.										
<sup>d</sup>	Estimate is not statistically reliable due to small sample size reporting intake.										
Note:	Percentages shown are representative of the first day of each participant's survey response.										
Source: USDA (1999a).											

**Table 12-13. Per Capita Intake of Total Grains Based on 1994–1996, 1998 CSFII (g/kg-day, edible portion, uncooked weight)**

Population Group	N	Percent Consuming	Mean	SE	Percentiles									
					1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
<b>Whole Population</b>	20,607	99.5	2.7	0.0	0.2	0.6	0.9	1.3	2.1	3.3	5.2	6.8	10.3	31.6
<b>Age group</b>														
Birth to 1 year	1,486	70.5	2.5	0.1	0.0	0.0	0.0	0.0	1.6	3.8	6.2	8.6	12.7	26.3
1 to 2 years	2,096	99.8	6.4	0.1	1.1	2.1	2.8	4.2	5.9	7.9	10.4	12.1	16.8	31.6
3 to 5 years	4,391	100.0	6.3	0.1	1.8	2.6	3.2	4.3	5.9	7.8	9.9	11.5	15.6	27.0
6 to 12 years	2,089	100.0	4.3	0.1	0.9	1.7	2.0	2.8	4.0	5.4	7.0	8.2	11.1	17.2
13 to 19 years	1,222	100.0	2.5	0.1	0.4	0.8	1.1	1.5	2.3	3.1	4.4	5.1	7.9	12.4
20 to 49 years	4,677	99.9	2.2	0.0	0.3	0.6	0.8	1.3	1.9	2.8	3.9	4.7	7.1	16.1
≥50 years	4,646	100.0	1.7	0.0	0.3	0.6	0.7	1.1	1.5	2.1	2.8	3.5	4.9	11.2
<b>Season</b>														
Fall	4,687	99.5	2.6	0.0	0.2	0.6	0.9	1.3	2.1	3.3	5.0	6.6	10.0	26.3
Spring	5,308	99.6	2.7	0.0	0.2	0.6	0.8	1.3	2.1	3.4	5.5	7.0	10.5	29.4
Summer	5,890	99.5	2.6	0.0	0.3	0.7	0.9	1.3	2.1	3.3	5.1	6.8	10.5	28.2
Winter	4,722	99.5	2.7	0.0	0.2	0.6	0.9	1.4	2.1	3.3	5.2	6.8	10.1	31.6
<b>Race</b>														
Asian, Pacific Islander	557	98.5	3.6	0.2	0.0	1.1	1.5	2.3	3.2	4.7	6.2	7.3	11.2	24.6
Black	2,740	99.4	2.6	0.1	0.1	0.5	0.7	1.1	1.9	3.3	5.4	7.3	11.5	29.4
American Indian, Alaskan Native	177	99.7	2.9	0.2	0.3	0.5	0.8	1.3	2.2	4.2	6.3	7.5	12.0	16.8
Other/NA	1,638	98.8	3.1	0.1	0.0	0.7	0.9	1.5	2.4	4.1	6.1	7.7	11.7	27.0
White	15,495	99.6	2.6	0.0	0.3	0.7	0.9	1.3	2.0	3.2	5.0	6.6	9.8	31.6
<b>Region</b>														
Midwest	4,822	99.7	2.7	0.0	0.3	0.7	0.9	1.4	2.1	3.4	5.3	7.0	10.4	23.8
Northeast	3,692	99.6	2.8	0.0	0.3	0.7	1.0	1.4	2.2	3.5	5.3	6.8	11.0	31.6
South	7,208	99.5	2.5	0.0	0.2	0.6	0.8	1.2	1.9	3.0	5.0	6.6	9.7	28.2
West	4,885	99.4	2.8	0.1	0.2	0.7	0.9	1.4	2.2	3.5	5.4	7.0	10.3	20.8
<b>Urbanization</b>														
Central City	6,164	99.5	2.7	0.0	0.1	0.6	0.9	1.3	2.1	3.5	5.4	7.0	10.7	29.4
Suburban	9,598	99.5	2.7	0.0	0.3	0.7	0.9	1.4	2.1	3.4	5.3	6.9	10.0	31.6
Non-metropolitan	4,845	99.6	2.4	0.1	0.3	0.6	0.8	1.2	1.9	2.9	4.8	6.3	10.4	23.8
N	= Sample size.													
SE	= Standard error.													
Source:	U.S. EPA analysis of 1994–1996, 1998 CSFII.													

**Table 12-14. Consumer-Only Intake of Total Grains Based on 1994–1996, 1998 CSFII (g/kg-day, edible portion, uncooked weight)**

Population Group	N	Mean	SE	Percentiles									
				1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
<b>Whole Population</b>	20,157	2.7	0.0	0.3	0.7	0.9	1.3	2.1	3.3	5.2	6.8	10.3	31.6
<b>Age Group</b>													
Birth to 1 year	1,048	3.6	0.1	0.1	0.3	0.6	1.4	2.8	4.8	7.4	9.2	13.4	26.3
1 to 2 years	2,092	6.4	0.1	1.2	2.1	2.8	4.2	5.9	7.9	10.4	12.1	16.8	31.6
3 to 5 years	4,389	6.3	0.1	1.8	2.6	3.2	4.3	5.9	7.8	9.9	11.5	15.6	27.0
6 to 12 years	2,089	4.3	0.1	0.9	1.7	2.0	2.8	4.0	5.4	7.0	8.2	11.1	17.2
13 to 19 years	1,222	2.5	0.1	0.4	0.8	1.1	1.5	2.3	3.1	4.4	5.1	7.9	12.4
20 to 49 years	4,673	2.2	0.0	0.3	0.6	0.8	1.3	1.9	2.8	3.9	4.7	7.1	16.1
≥50 years	4,644	1.7	0.0	0.3	0.6	0.7	1.1	1.5	2.1	2.8	3.5	4.9	11.2
<b>Season</b>													
Fall	4,587	2.6	0.0	0.3	0.7	0.9	1.3	2.1	3.3	5.0	6.6	10.0	26.3
Spring	5,190	2.7	0.0	0.3	0.7	0.9	1.3	2.1	3.4	5.5	7.0	10.6	29.4
Summer	5,751	2.7	0.0	0.4	0.7	0.9	1.4	2.1	3.3	5.2	6.8	10.5	28.2
Winter	4,629	2.7	0.0	0.3	0.7	0.9	1.4	2.1	3.3	5.2	6.8	10.1	31.6
<b>Race</b>													
Asian, Pacific Islander	527	3.7	0.2	0.8	1.2	1.6	2.3	3.2	4.7	6.2	7.3	11.2	24.6
Black	2,675	2.6	0.1	0.2	0.5	0.7	1.1	1.9	3.3	5.4	7.3	11.5	29.4
American Indian, Alaskan Native	175	3.0	0.2	0.3	0.5	0.8	1.3	2.2	4.2	6.3	7.5	12.0	16.8
Other/NA	1,570	3.2	0.1	0.5	0.7	1.0	1.5	2.4	4.1	6.2	7.7	11.7	27.0
White	15,210	2.6	0.0	0.4	0.7	0.9	1.3	2.0	3.2	5.1	6.6	9.8	31.6
<b>Region</b>													
Midwest	4,743	2.7	0.0	0.4	0.7	0.9	1.4	2.1	3.4	5.3	7.0	10.4	23.8
Northeast	3,628	2.8	0.0	0.4	0.8	1.0	1.4	2.2	3.5	5.3	6.8	11.0	31.6
South	7,053	2.5	0.0	0.3	0.6	0.8	1.2	1.9	3.0	5.0	6.6	9.8	28.2
West	4,733	2.8	0.1	0.4	0.7	0.9	1.4	2.2	3.5	5.4	7.0	10.3	20.8
<b>Urbanization</b>													
Central City	6,023	2.8	0.0	0.3	0.7	0.9	1.3	2.1	3.5	5.4	7.0	10.7	29.4
Suburban	9,378	2.7	0.0	0.4	0.7	0.9	1.4	2.1	3.4	5.3	6.9	10.0	31.6
Non-metropolitan	4,756	2.4	0.1	0.3	0.6	0.8	1.2	1.9	2.9	4.8	6.4	10.4	23.8
<i>N</i> = Sample size. <i>SE</i> = Standard error.													
Source: U.S. EPA analysis of 1994–1996, 1998 CSFII.													

Table 12-15. Per Capita Intake of Individual Grain Products Based on 1994–1996, 1998 CSFII (g/kg-day, edible portion, uncooked weight)							
Population Group	N	Cereal			Rice		
		Percent Consuming	Mean	SE	Percent Consuming	Mean	SE
<b>Whole Population</b>	20,607	99.6	3.7	0.03	86.5	0.3	0.01
<b>Age Group</b>							
Birth to 1 year	1,486	74.6	4.0	0.14	60.2	0.7	0.04
1 to 2 years	2,096	99.8	8.4	0.08	86.4	0.6	0.03
3 to 5 years	4,391	100.0	8.7	0.07	87.9	0.5	0.03
6 to 12 years	2,089	100.0	6.2	0.06	88.0	0.4	0.02
13 to 19 years	1,222	100.0	4.1	0.06	85.8	0.3	0.02
20 to 49 years	4,677	99.9	3.1	0.04	88.3	0.3	0.01
≥50 years	4,646	100.0	2.2	0.02	84.5	0.2	0.01
<b>Season</b>							
Fall	4,687	99.6	3.7	0.06	85.1	0.3	0.02
Spring	5,308	99.6	3.8	0.07	87.1	0.3	0.02
Summer	5,890	99.5	3.8	0.06	86.9	0.3	0.02
Winter	4,722	99.6	3.7	0.05	87.1	0.3	0.02
<b>Race</b>							
Asian, Pacific Islander	557	98.5	4.4	0.20	96.6	1.7	0.19
Black	2,740	99.5	3.8	0.12	86.3	0.3	0.02
American Indian, Alaskan Native	177	99.7	4.2	0.15	92.6	0.3	0.10
Other/NA	1,638	98.9	4.3	0.12	85.9	0.6	0.08
White	15,495	99.7	3.7	0.04	86.2	0.2	0.01
<b>Region</b>							
Midwest	4,822	99.7	3.9	0.09	88.2	0.2	0.02
Northeast	3,692	99.7	3.7	0.06	87.2	0.3	0.03
South	7,208	99.6	3.6	0.04	85.0	0.2	0.01
West	4,885	99.4	3.8	0.09	86.7	0.4	0.03
<b>Urbanization</b>							
Central City	6,164	99.6	3.8	0.06	87.2	0.4	0.02
Suburban	9,598	99.5	3.8	0.05	86.6	0.3	0.02
Non-metropolitan	4,845	99.7	3.5	0.06	85.6	0.2	0.01
N = Sample size.							
SE = Standard error.							
Source: U.S. EPA analysis of 1994–1996, 1998 CSFII.							

Chapter 12—Intake of Grain Products

<b>Table 12-16. Consumer-Only Intake of Individual Grain Products Based on 1994–1996, 1998 CSFII (g/kg-day, edible portion, uncooked weight )</b>						
Population Group	Cereal			Rice		
	<i>N</i>	Mean	SE	<i>N</i>	Mean	SE
<b>Whole Population</b>	20,227	3.8	0.03	17,481	0.3	0.01
<b>Age Group</b>						
Birth to 1 year	1,116	5.4	0.16	900	1.2	0.07
1 to 2 years	2,092	8.4	0.08	1,819	0.7	0.04
3 to 5 years	4,389	8.7	0.07	3,869	0.6	0.03
6 to 12 years	2,089	6.2	0.06	1,847	0.4	0.02
13 to 19 years	1,222	4.1	0.06	1,038	0.3	0.03
20 to 49 years	4,674	3.1	0.04	4,102	0.3	0.01
≥50 years	4,645	2.2	0.02	3,906	0.2	0.01
<b>Season</b>						
Fall	4,598	3.7	0.06	3,957	0.3	0.02
Spring	5,213	3.8	0.07	4,530	0.3	0.02
Summer	5,768	3.8	0.06	4,989	0.3	0.02
Winter	4,648	3.7	0.06	4,005	0.3	0.02
<b>Race</b>						
Asian, Pacific Islander	529	4.5	0.20	513	1.8	0.19
Black	2,683	3.8	0.12	2,346	0.4	0.02
American Indian, Alaskan Native	175	4.3	0.15	151	0.3	0.10
Other/NA	1,579	4.4	0.13	1,375	0.7	0.08
White	15,261	3.7	0.04	13,096	0.2	0.01
<b>Region</b>						
Midwest	4,759	3.9	0.09	4,186	0.2	0.02
Northeast	3,639	3.7	0.06	3,152	0.4	0.04
South	7,081	3.6	0.04	6,029	0.3	0.01
West	4,748	3.9	0.09	4,114	0.5	0.03
<b>Urbanization</b>						
Central City	6,039	3.8	0.06	5,303	0.5	0.03
Suburban	9,410	3.8	0.05	8,105	0.3	0.02
Non-metropolitan	4,778	3.6	0.06	4,073	0.2	0.02
<i>N</i>	= Sample size.					
SE	= Standard error.					
Source: U.S. EPA analysis of 1994–1996, 1998 CSFII.						

**Table 12-17. Per Capita Intake of Breads<sup>a</sup> Based on 1994–1996, 1998 CSFII (g/kg-day, as-consumed)**

Population Group	Percent Consuming	Percentile											
		Mean	SE	1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
<b>Whole Population</b>	87.2	1.1	0.01	0.0	0.0	0.0	0.4	0.9	1.5	2.3	3.1	5.1	20.0
<b>Age Group</b>													
≤5 months	0.9	0.0	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
6 to 12 months	30.2	0.5	0.16	0.0	0.0	0.0	0.0	0.0	0.5	1.8	3.0	4.8	7.3
<1 year	14.6	0.3	0.11	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.7	4.6	7.3
1 to 2 years	77.2	2.0	0.06	0.0	0.0	0.0	0.4	1.4	2.9	4.4	6.0	8.5	20.0
3 to 5 years	86.5	2.3	0.05	0.0	0.0	0.0	0.9	2.0	3.3	4.7	5.8	8.7	13.2
6 to 11 years	87.1	1.7	0.04	0.0	0.0	0.0	0.7	1.4	2.4	3.5	4.3	6.7	11.3
12 to 19 years	86.2	1.1	0.03	0.0	0.0	0.0	0.4	0.9	1.5	2.3	2.8	4.0	7.5
20 to 39 years	88.1	0.9	0.02	0.0	0.0	0.0	0.4	0.8	1.3	2.0	2.5	3.9	6.2
40 to 69 years	90.0	0.9	0.01	0.0	0.0	0.0	0.4	0.8	1.3	1.9	2.3	3.5	8.4
≥70 years	91.6	0.9	0.02	0.0	0.0	0.2	0.4	0.8	1.3	1.9	2.3	2.9	4.3
<b>Season</b>													
Fall	87.4	1.1	0.02	0.0	0.0	0.0	0.4	0.9	1.5	2.4	3.1	4.9	14.6
Spring	87.1	1.1	0.02	0.0	0.0	0.0	0.4	0.9	1.5	2.3	3.1	5.1	11.6
Summer	87.3	1.1	0.02	0.0	0.0	0.0	0.4	0.9	1.5	2.4	3.1	5.2	17.1
Winter	86.9	1.1	0.02	0.0	0.0	0.0	0.4	0.8	1.4	2.3	3.1	5.1	20.0
<b>Race</b>													
Asian	69.1	0.8	0.06	0.0	0.0	0.0	0.0	0.4	1.2	1.9	2.9	4.5	14.6
Black	83.1	1.1	0.03	0.0	0.0	0.0	0.3	0.7	1.4	2.3	3.3	6.3	11.6
American Indian/Alaska Native	82.2	1.4	0.18	0.0	0.0	0.0	0.3	0.9	1.7	3.6	4.1	6.2	20.0
Other/NA	80.4	1.2	0.04	0.0	0.0	0.0	0.3	0.9	1.6	2.7	3.4	5.6	7.5
White	89.0	1.1	0.01	0.0	0.0	0.0	0.4	0.9	1.5	2.3	3.0	4.9	17.1
<b>Region</b>													
Midwest	89.1	1.2	0.02	0.0	0.0	0.0	0.4	0.9	1.5	2.5	3.3	5.7	12.0
Northeast	88.3	1.1	0.02	0.0	0.0	0.0	0.4	0.9	1.5	2.3	2.9	4.5	9.8
South	87.5	1.1	0.02	0.0	0.0	0.0	0.4	0.9	1.5	2.3	3.1	4.9	17.1
West	83.7	1.1	0.02	0.0	0.0	0.0	0.3	0.8	1.4	2.4	3.2	5.1	20.0
<b>Urbanization</b>													
Central City	85.6	1.1	0.02	0.0	0.0	0.0	0.4	0.8	1.4	2.3	3.1	5.1	13.2
Suburban	87.7	1.1	0.01	0.0	0.0	0.0	0.4	0.9	1.5	2.4	3.1	5.0	14.6
Non-metropolitan	88.5	1.1	0.02	0.0	0.0	0.0	0.4	0.9	1.5	2.3	3.1	5.0	20.0

<sup>a</sup> Includes breads, rolls, muffins, bagels, biscuits, cornbread, and tortillas.

SE = Standard error.

Source: U.S. EPA analysis of the 1994–1996 CSFII.

**Table 12-18. Per Capita Intake of Sweets<sup>a</sup> Based on 1994–1996, 1998 CSFII (g/kg-day, as-consumed)**

Population Group	Percent Consuming	Percentile											
		Mean	SE	1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
<b>Whole Population</b>	52.6	0.6	0.01	0.0	0.0	0.0	0.0	0.1	0.8	1.8	2.5	4.6	22.0
<b>Age Group</b>													
≤5 months	2.5	0.0	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.6
6 to 12 months	23.0	0.3	0.14	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.0	3.6	6.4
<1 year	12.1	0.2	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	3.6	6.4
1 to 2 years	53.2	1.2	0.07	0.0	0.0	0.0	0.0	0.3	1.7	3.5	4.8	7.2	19.3
3 to 5 years	62.1	1.3	0.06	0.0	0.0	0.0	0.0	0.8	1.9	3.6	4.6	8.8	22.0
6 to 11 years	64.2	1.2	0.06	0.0	0.0	0.0	0.0	0.6	1.7	3.2	3.9	6.7	20.9
12 to 19 years	54.3	0.6	0.03	0.0	0.0	0.0	0.0	0.2	1.0	1.8	2.4	3.7	10.7
20 to 39 years	47.2	0.4	0.02	0.0	0.0	0.0	0.0	0.0	0.6	1.4	1.9	3.2	11.1
40 to 69 years	52.9	0.5	0.02	0.0	0.0	0.0	0.0	0.1	0.7	1.3	1.9	3.2	7.3
≥70 years	58.6	0.5	0.03	0.0	0.0	0.0	0.0	0.2	0.8	1.6	2.1	3.6	5.7
<b>Season</b>													
Fall	53.7	0.6	0.03	0.0	0.0	0.0	0.0	0.2	0.9	1.8	2.5	4.7	20.9
Spring	52.2	0.6	0.02	0.0	0.0	0.0	0.0	0.1	0.8	1.8	2.6	4.7	22.0
Summer	50.0	0.5	0.02	0.0	0.0	0.0	0.0	0.0	0.7	1.6	2.3	4.1	18.2
Winter	54.5	0.6	0.03	0.0	0.0	0.0	0.0	0.2	0.9	1.9	2.6	4.8	12.3
<b>Race</b>													
Asian	40.2	0.4	0.08	0.0	0.0	0.0	0.0	0.0	0.6	1.4	2.0	3.1	15.7
Black	41.4	0.5	0.04	0.0	0.0	0.0	0.0	0.0	0.6	1.5	2.3	4.7	19.3
American Indian/Alaska Native	35.3	0.4	0.11	0.0	0.0	0.0	0.0	0.0	0.3	1.7	2.1	2.8	2.9
Other/NA	35.0	0.4	0.05	0.0	0.0	0.0	0.0	0.0	0.5	1.3	1.9	4.1	7.0
White	56.3	0.6	0.01	0.0	0.0	0.0	0.0	0.2	0.9	1.8	2.5	4.7	22.0
<b>Region</b>													
Midwest	60.1	0.7	0.03	0.0	0.0	0.0	0.0	0.3	1.0	2.0	2.9	5.3	22.0
Northeast	55.4	0.6	0.03	0.0	0.0	0.0	0.0	0.2	0.9	1.7	2.5	4.8	12.7
South	49.1	0.6	0.02	0.0	0.0	0.0	0.0	0.0	0.8	1.7	2.3	4.4	20.9
West	47.7	0.5	0.02	0.0	0.0	0.0	0.0	0.0	0.7	1.6	2.3	3.8	15.7
<b>Urbanization</b>													
Central City	51.2	0.6	0.02	0.0	0.0	0.0	0.0	0.1	0.8	1.6	2.3	4.6	20.9
Suburban	54.6	0.6	0.02	0.0	0.0	0.0	0.0	0.2	0.9	1.8	2.6	4.5	12.7
Non-metropolitan	50.5	0.6	0.03	0.0	0.0	0.0	0.0	0.1	0.8	1.8	2.5	5.1	22.0

<sup>a</sup> Includes breakfast foods made with grains such as pancakes, waffles, and French toast.

SE = Standard error.

Source: U.S. EPA analysis of the 1994–1996 CSFII.

Table 12-19. Per Capita Intake of Snacks Containing Grains <sup>a</sup> Based on 1994–1996, 1998 CSFII (g/kg-day, as-consumed)													
Population Group	Percent Consuming	Percentile											
		Mean	SE	1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
<b>Whole Population</b>	43.1	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.3	0.7	1.2	2.6	9.1
<b>Age Group</b>													
≤5 months	1.0	0.0	0.11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.7
6 to 12 months	29.0	0.3	0.08	0.0	0.0	0.0	0.0	0.0	0.2	0.9	2.2	2.5	2.8
<1 year	14.1	0.1	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.9	2.2	3.7
1 to 2 years	58.1	0.7	0.04	0.0	0.0	0.0	0.0	0.4	1.1	2.0	2.8	5.0	8.9
3 to 5 years	56.7	0.7	0.04	0.0	0.0	0.0	0.0	0.3	0.9	1.8	3.2	5.9	9.1
6 to 11 years	51.3	0.5	0.03	0.0	0.0	0.0	0.0	0.1	0.6	1.3	1.9	4.6	7.3
12 to 19 years	45.0	0.3	0.02	0.0	0.0	0.0	0.0	0.0	0.4	0.9	1.4	2.4	5.1
20 to 39 years	41.1	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.9	1.8	5.5
40 to 69 years	41.1	0.1	0.01	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.7	1.4	5.6
≥70 years	37.7	0.1	0.01	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.8	1.8
<b>Season</b>													
Fall	42.3	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.3	0.7	1.0	2.3	8.0
Spring	43.6	0.3	0.01	0.0	0.0	0.0	0.0	0.0	0.3	0.8	1.3	2.9	8.9
Summer	40.6	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.0	2.3	7.1
Winter	45.8	0.3	0.02	0.0	0.0	0.0	0.0	0.0	0.3	0.8	1.3	2.9	9.1
<b>Race</b>													
Asian	24.1	0.1	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	2.3	4.4
Black	29.5	0.2	0.02	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.9	2.1	7.4
American Indian/Alaska Native	38.3	0.2	0.08	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.1	3.2	4.9
Other/NA	28.4	0.2	0.03	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.8	2.4	8.7
White	47.1	0.3	0.01	0.0	0.0	0.0	0.0	0.0	0.3	0.8	1.2	2.7	9.1
<b>Region</b>													
Midwest	49.2	0.3	0.01	0.0	0.0	0.0	0.0	0.0	0.3	0.8	1.2	2.7	8.9
Northeast	41.9	0.2	0.02	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.2	2.7	9.1
South	41.1	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.1	2.4	8.0
West	40.7	0.2	0.02	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.2	2.6	8.7
<b>Urbanization</b>													
Central City	40.1	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.1	2.6	7.8
Suburban	44.6	0.3	0.01	0.0	0.0	0.0	0.0	0.0	0.3	0.7	1.2	2.7	9.1
Non-metropolitan	44.1	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.3	0.7	1.1	2.3	8.1
<sup>a</sup> Includes grain snacks such as crackers, salty snacks, popcorn, and pretzels.													
SE = Standard error.													
Source: U.S. EPA analysis of the 1994–1996 CSFII.													



Table 12-20. Per Capita Intake of Breakfast Foods <sup>a</sup> Based on 1994–1996, 1998 CSFII (g/kg-day, as-consumed)													
Population Group	Percent Consuming	Percentile											
		Mean	SE	1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
<b>Whole Population</b>	11.8	0.1	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	2.4	13.6
<b>Age Group</b>													
≤5 months	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 to 12 months	4.2	0.1	0.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	4.1
<1 year	2.0	0.1	0.16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	4.1
1 to 2 years	20.4	0.4	0.07	0.0	0.0	0.0	0.0	0.0	0.0	1.9	2.7	4.8	13.6
3 to 5 years	20.8	0.4	0.06	0.0	0.0	0.0	0.0	0.0	0.0	1.6	2.5	4.5	8.0
6 to 11 years	23.7	0.4	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1.5	2.2	3.4	6.5
12 to 19 years	13.0	0.1	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.9	2.3	3.9
20 to 39 years	8.9	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.5	3.0
40 to 69 years	9.5	0.1	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.4	3.8
≥70 years	10.4	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	1.2	3.5
<b>Season</b>													
Fall	11.6	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	2.3	13.6
Spring	11.6	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	2.3	6.4
Summer	12.8	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	2.4	6.0
Winter	11.3	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.9	2.6	8.0
<b>Race</b>													
Asian	5.9	0.1	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.0	2.8
Black	12.7	0.1	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.2	2.1	6.7
American Indian/Alaska Native	8.8	0.1	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.2	1.2
Other/NA	10.2	0.1	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.6	8.0
White	12.0	0.1	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	2.4	13.6
<b>Region</b>													
Midwest	12.1	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.1	2.6	6.7
Northeast	12.7	0.1	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.2	2.3	8.0
South	10.7	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8	2.2	7.8
West	12.4	0.2	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	2.6	13.6
<b>Urbanization</b>													
Central City	12.0	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	2.5	13.6
Suburban	12.2	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	2.4	7.8
Non-metropolitan	10.7	0.1	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.9	2.2	6.4

<sup>a</sup> Includes breakfast food made with grains such as pancakes, waffles, and French toast.  
SE = Standard error.  
Source: U.S. EPA analysis of the 1994–1996 CSFII.

Table 12-21. Per Capita Intake of Pasta Based on 1994–1996, 1998 CSFII (g/kg-day, as-consumed)													
Population Group	Percent Consuming	Percentile											
		Mean	SE	1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
<b>Whole Population</b>	13.0	0.3	0.02	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.2	5.1	29.1
<b>Age Group</b>													
≤5 months	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 to 12 months	7.5	0.1	0.22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3.3	6.7
<1 year	3.5	0.1	0.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	6.7
1 to 2 years	16.0	0.8	0.15	0.0	0.0	0.0	0.0	0.0	0.0	3.4	6.2	10.6	16.7
3 to 5 years	12.8	0.6	0.13	0.0	0.0	0.0	0.0	0.0	0.0	2.1	4.4	8.4	14.3
6 to 11 years	13.4	0.5	0.12	0.0	0.0	0.0	0.0	0.0	0.0	2.0	3.8	7.5	11.9
12 to 19 years	11.7	0.3	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.1	4.2	29.1
20 to 39 years	13.9	0.3	0.04	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.2	4.1	11.2
40 to 69 years	13.7	0.2	0.03	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.9	3.6	11.8
≥70 years	9.0	0.2	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	2.9	7.7
<b>Season</b>													
Fall	13.6	0.3	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1.2	2.4	4.7	16.7
Spring	13.2	0.3	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.3	5.8	14.7
Summer	12.6	0.3	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.1	5.2	15.4
Winter	12.6	0.3	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.1	5.1	29.1
<b>Race</b>													
Asian	19.4	0.5	0.17	0.0	0.0	0.0	0.0	0.0	0.0	2.0	3.3	6.6	11.2
Black	7.0	0.2	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	3.6	29.1
American Indian/Alaska Native	1.8	0.1	0.23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	3.6
Other/NA	9.6	0.2	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	3.5	15.4
White	14.1	0.3	0.03	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.3	5.3	16.7
<b>Region</b>													
Midwest	12.1	0.3	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.1	5.2	16.7
Northeast	20.1	0.5	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1.9	2.8	5.9	15.4
South	9.5	0.2	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	4.4	29.1
West	13.2	0.3	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.2	5.7	14.1
<b>Urbanization</b>													
Central City	13.4	0.3	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1.2	2.5	5.3	29.1
Suburban	14.0	0.3	0.03	0.0	0.0	0.0	0.0	0.0	0.0	1.2	2.2	5.3	16.7
Non-metropolitan	10.3	0.2	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.5	4.2	14.1
SE	= Standard error.												
Source:	U.S. EPA analysis of the 1994–1996 CSFII.												

**Table 12-22. Per Capita Intake of Cooked Cereals Based on 1994–1996, 1998 CSFII (g/kg-day, as-consumed)**

Population Group	Percent Consuming	Percentile												
		Mean	SE	1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max	
<b>Whole Population</b>	10.4	0.4	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.3	7.2	72.5
<b>Age Group</b>														
≤5 months	0.9	0.1	0.54	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
6 to 12 months	16.6	1.9	1.18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	16.1	22.8	22.8
<1 year	8.3	0.9	0.82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	22.8	22.8
1 to 2 years	18.4	1.6	0.29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	10.7	20.6	33.9
3 to 5 years	16.0	1.3	0.28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	7.9	16.1	72.5
6 to 11 years	8.7	0.5	0.17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	9.4	24.1
12 to 19 years	5.6	0.2	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	4.3	10.6
20 to 39 years	6.2	0.1	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	3.3	9.2
40 to 69 years	11.6	0.3	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.9	4.4	8.7
≥70 years	24.5	0.6	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	3.4	5.6	10.6
<b>Season</b>														
Fall	12.0	0.4	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.6	8.1	45.9
Spring	9.1	0.3	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	6.4	20.9
Summer	9.3	0.3	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	6.9	72.5
Winter	11.1	0.4	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.5	7.4	44.5
<b>Race</b>														
Asian	4.4	0.2	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	16.1
Black	20.1	0.7	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	4.4	10.9	33.9
American Indian/Alaska Native	7.6	0.3	0.32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	5.8	12.3
Other/NA	7.6	0.4	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	10.6	72.5
White	9.3	0.3	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	6.1	45.9
<b>Region</b>														
Midwest	9.6	0.3	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	5.7	45.9
Northeast	9.0	0.3	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	5.9	72.5
South	12.4	0.4	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.6	7.9	31.7
West	9.4	0.4	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	8.0	39.5
<b>Urbanization</b>														
Central City	11.6	0.4	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.6	8.1	72.5
Suburban	9.9	0.3	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	6.9	45.9
Non-metropolitan	9.7	0.3	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	5.7	26.9
SE	= Standard error.													
Source:	U.S. EPA analysis of the 1994–1996 CSFII.													

Table 12-23. Per Capita Intake of Ready-to-Eat Cereals <sup>a</sup> Based on 1994–1996, 1998 CSFII (g/kg-day, as-consumed)													
Population Group	Percent Consuming	Percentile											
		Mean	SE	1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
<b>Whole Population</b>	39.7	0.3	0.01	0.0	0.0	0.0	0.0	0.0	0.4	1.0	1.5	2.9	10.1
<b>Age</b>													
≤5 months	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 to 12 months	19.9	0.1	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	1.8	2.6
<1 year	9.3	0.1	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.7	2.6
1 to 2 years	64.9	1.0	0.04	0.0	0.0	0.0	0.0	0.7	1.5	2.5	3.3	4.9	8.8
3 to 5 years	69.8	1.1	0.04	0.0	0.0	0.0	0.0	0.9	1.7	2.6	3.3	4.8	10.1
6 to 11 years	64.0	0.8	0.03	0.0	0.0	0.0	0.0	0.6	1.2	2.0	2.5	4.0	8.0
12 to 19 years	45.7	0.4	0.02	0.0	0.0	0.0	0.0	0.0	0.6	1.1	1.5	2.2	6.4
20 to 39 years	30.5	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.3	0.7	1.0	1.7	5.3
40 to 69 years	31.8	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.9	1.4	5.2
≥70 years	47.9	0.2	0.01	0.0	0.0	0.0	0.0	0.0	0.4	0.7	0.9	1.5	2.7
<b>Season</b>													
Fall	39.1	0.3	0.02	0.0	0.0	0.0	0.0	0.0	0.4	1.1	1.6	2.9	8.8
Spring	40.1	0.3	0.02	0.0	0.0	0.0	0.0	0.0	0.4	1.0	1.5	2.9	7.7
Summer	39.6	0.3	0.02	0.0	0.0	0.0	0.0	0.0	0.4	1.1	1.6	3.0	7.8
Winter	39.9	0.3	0.02	0.0	0.0	0.0	0.0	0.0	0.5	1.0	1.4	2.7	10.1
<b>Race</b>													
Asian	25.4	0.2	0.05	0.0	0.0	0.0	0.0	0.0	0.1	0.8	1.2	2.7	4.9
Black	34.0	0.3	0.02	0.0	0.0	0.0	0.0	0.0	0.4	1.0	1.5	3.2	10.1
American Indian/Alaska Native	33.1	0.3	0.09	0.0	0.0	0.0	0.0	0.0	0.4	0.8	1.4	2.6	4.4
Other/NA	33.3	0.3	0.04	0.0	0.0	0.0	0.0	0.0	0.3	1.1	1.7	3.0	6.6
White	41.7	0.3	0.01	0.0	0.0	0.0	0.0	0.0	0.5	1.1	1.5	2.8	8.8
<b>Region</b>													
Midwest	42.2	0.4	0.02	0.0	0.0	0.0	0.0	0.0	0.5	1.1	1.6	2.9	8.0
Northeast	42.3	0.4	0.02	0.0	0.0	0.0	0.0	0.0	0.5	1.1	1.6	2.9	8.0
South	37.4	0.3	0.01	0.0	0.0	0.0	0.0	0.0	0.4	1.0	1.3	2.8	10.1
West	38.4	0.3	0.02	0.0	0.0	0.0	0.0	0.0	0.4	1.1	1.6	3.1	8.8
<b>Urbanization</b>													
Central City	40.0	0.3	0.01	0.0	0.0	0.0	0.0	0.0	0.5	1.1	1.5	2.8	10.1
Suburban	41.2	0.4	0.01	0.0	0.0	0.0	0.0	0.0	0.5	1.1	1.6	3.1	8.0
Non-metropolitan	35.8	0.3	0.01	0.0	0.0	0.0	0.0	0.0	0.4	0.8	1.2	2.6	8.8
<sup>a</sup> Includes dry ready-to-eat corn, rice, wheat, and bran cereals in the form of flakes, puffs, etc.													
SE = Standard error.													
Source: U.S. EPA analysis of the 1994–1996 CSFII.													

**Table 12-24. Per Capita Intake of Baby Cereals Based on 1994–1996, 1998 CSFII (g/kg-day, as-consumed)**

Population Group	Percent Consuming	Percentile											
		Mean	SE	1 <sup>st</sup>	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>	Max
<b>Whole Population</b>	1.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	37.6
<b>Age</b>													
≤5 months	40.8	0.8	0.24	0.0	0.0	0.0	0.0	0.0	1.0	2.4	3.1	8.8	26.6
6 to 12 months	67.8	2.5	0.45	0.0	0.0	0.0	0.0	0.8	2.8	6.9	11.3	21.1	37.6
<1 year	53.4	1.6	0.27	0.0	0.0	0.0	0.0	0.2	1.7	4.1	7.3	19.7	37.6
1 to 2 years	6.2	0.2	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	5.8	12.5
3 to 5 years	0.3	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8
6 to 11 years	0.1	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
12 to 19 years	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20 to 39 years	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40 to 69 years	0.1	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
≥70 years	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Season</b>													
Fall	0.9	0.0	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.1
Spring	1.2	0.0	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	26.6
Summer	0.8	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.0
Winter	1.1	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	37.6
<b>Race</b>													
Asian	0.7	0.0	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Black	1.0	0.0	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.6
American Indian/Alaska Native	0.6	0.0	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Other/NA	1.7	0.1	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	26.6
White	1.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.0
<b>Region</b>													
Midwest	1.1	0.0	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	21.1
Northeast	1.2	0.0	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	12.5
South	0.9	0.0	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.6
West	0.9	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.6
<b>Urbanization</b>													
Central City	1.1	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	37.6
Suburban	1.1	0.0	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	21.1
Non-metropolitan	0.8	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.0
SE	= Standard error.												
Source: U.S. EPA analysis of the 1994–1996 CSFII.													

**Table 12-25. Quantity (as-consumed) of Grain Products Consumed per Eating Occasion and the Percentage of Individuals Using These Foods in 2 Days**

Food Category	% Indiv. Using Food at Least Once in 2 days	Quantity Consumed per Eating Occasion (grams)		Consumers Only Quantity Consumed per Eating Occasion at Specified Percentiles (grams)						
		Average	SE	5 <sup>th</sup>	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	95 <sup>th</sup>
		White bread	59.6	50	1	21	24	33	46	52
Whole grain and wheat bread	28.1	50	1	24	25	37	50	56	72	92
Rolls	48.0	58	1	27	33	43	48	70	89	110
Biscuits	10.9	61	1	19	19	35	57	76	104	139
Tortillas	15.5	60	1	14	21	32	48	79	107	135
Quick breads and muffins	12.5	82	2	21	28	52	60	94	142	187
Doughnuts and sweet rolls	12.4	77	1	26	36	47	65	93	133	164
Crackers	17.4	26	1	6	9	12	18	30	47	62
Cookies	30.7	40	1	9	12	20	31	50	75	96
Cake	16.2	92	3	22	28	41	77	116	181	217
Pie	8.5	150	3	52	72	102	143	168	246	300
Pancakes and waffles	10.3	85	3	21	35	42	75	109	158	205
Cooked cereal	10.3	248	6	81	117	157	233	291	455	484
Oatmeal	6.1	264	6	116	117	176	232	333	454	473
Ready-to-eat cereal	40.6	54	1	18	24	30	46	67	93	113
Corn flakes	8.1	46	1	17	22	25	37	56	75	100
Toasted oat rings	6.8	42	1	14	16	27	38	54	65	83
Rice	28.0	150	3	27	40	76	131	192	312	334
Pasta	36.0	162	3	26	43	73	133	210	318	420
Macaroni and cheese	8.5	244	9	53	81	121	191	324	477	556
Spaghetti with tomato sauce	8.0	436	15	122	124	246	371	494	740	983
Pizza	19.9	169	5	36	52	78	140	214	338	422
SE	= Standard error.									
Source: Smiciklas-Wright et al. (2002) (based on 1994–1996 CSFII data).										

**Table 12-26. Quantity (as-consumed) of Grain Products Consumed per Eating Occasion and Percentage of Individuals Using These Foods in 2 Days, by Sex and Age**

Food Category	Quantity Consumed per Eating Occasion (grams)											
	2 to 5 years			6 to 11 years			12 to 19 years					
	Males and Females (N = 2,109)			Males and Females (N = 1,432)			Males (N = 696)			Females (N = 702)		
	PC	Mean	SE	PC	Mean	SE	PC	Mean	SE	PC	Mean	SE
White bread	66.9	34	<sup>a</sup>	67.1	42	1	61.3	56	1	57.9	47	1
Whole grain and wheat bread	24.3	37	1	20.5	44	1	14.5	60	2	17.6	53	2
Rolls	40.0	39	1	53.5	48	1	61.9	69	2	48.8	51	1
Biscuits	8.3	38	2	9.7	48	3	12.2	72	4	10.3	55	4
Tortillas	14.6	32	2	16.4	47	2	22.9	76	5	20.1	56	3
Quick breads and muffins	9.6	55	4	9.6	67	5	11.0	125	12	11.0	79	10
Doughnuts and sweet rolls	11.3	59	2	13.4	69	2	17.3	102	12	13.8	78	5
Crackers	25.4	17	1	17.2	26	2	10.6	39	5	14.2	26	3
Cookies	51.0	28	1	46.7	37	2	29.0	53	3	31.8	42	2
Cake	14.6	70	3	19.7	79	4	15.1	99	9	15.5	85	8
Pie	2.9	76	8	5.6	116	8	6.6	188	15	4.8	138 <sup>b</sup>	12 <sup>b</sup>
Pancakes and waffles	19.1	49	1	21.5	77	3	13.5	96	6	8.2	74	5
Cooked cereal	16.8	211	10	9.0	245	14	5.2	310 <sup>b</sup>	29 <sup>b</sup>	6.0	256 <sup>b</sup>	31 <sup>b</sup>
Oatmeal	10.4	221	9	5.7	256	19	2.4	348 <sup>b</sup>	45 <sup>b</sup>	2.3	321 <sup>b</sup>	40 <sup>b</sup>
Ready-to-eat cereal	72.9	33	1	67.3	47	1	45.6	72	3	46.3	52	2
Corn flakes	11.2	33	2	13.1	42	2	10.4	62	4	8.7	49	4
Toasted oat rings	20.6	30	1	12.5	45	2	7.3	62	5	8.1	42	3
Rice	29.6	84	3	24.6	124	6	24.2	203	10	28.8	157	10
Pasta	49.4	90	3	41.4	130	5	33.4	203	9	37.8	155	9
Macaroni and cheese	17.8	159	8	13.2	217	13	7.5	408	46	10.7	260	30
Spaghetti with tomato sauce	16.8	242	11	11.5	322	18	10.1	583	46	8.5	479	51
Pizza	23.7	86	3	32.8	108	6	39.6	205	13	30.5	143	8
Corn chips	19.6	29	2	25.6	33	2	26.9	58	5	25.1	44	3
Popcorn	11.6	20	1	12.7	31	2	7.8	54	5	10.5	37	4

**Table 12-26. Quantity (as-consumed) of Grain Products Consumed per Eating Occasion and Percentage of Individuals Using These Foods in 2 Days, by Sex and Age (continued)**

Food Category	Quantity Consumed per Eating Occasion (g)																	
	20 to <40 years						40 to <60 years						≥60 years					
	Males			Females			Males			Females			Males			Females		
	(N = 1,543)			(N = 1,449)			(N = 1,663)			(N = 1,694)			(N = 1,545)			(N = 1,429)		
	PC	Mean	SE	PC	Mean	SE	PC	Mean	SE	PC	Mean	SE	PC	Mean	SE	PC	Mean	SE
White bread	63.0	63	2	54.9	47	1	59.7	59	2	55.3	46	1	59.3	51	1	54.8	41	1
Whole grain and wheat bread	25.3	63	1	25.2	48	1	32.8	57	1	32.3	46	2	39.8	48	1	43.1	41	1
Rolls	62.0	73	4	46.4	53	1	47.9	65	1	43.4	52	1	37.8	54	1	30.6	43	1
Biscuits	11.5	73	3	9.4	55	2	13.4	80	3	11.2	56	2	13.0	58	3	9.8	48	3
Tortillas	20.6	79	4	20.1	53	2	13.4	67	3	12.7	52	2	4.2	47	4	5.4	41	2
Quick breads and muffins	8.0	93	7	11.3	79	5	15.7	93	7	14.9	72	4	17.4	86	5	18.3	72	4
Doughnuts and sweet rolls	13.3	94	5	11.2	68	2	13.4	88	4	11.0	72	4	11.4	65	2	10.4	56	2
Crackers	11.9	36	3	15.6	28	2	16.6	30	1	17.5	24	1	25.6	23	1	25.9	17	1
Cookies	20.8	56	4	26.5	39	2	27.6	47	2	29.0	36	1	29.7	40	2	32.2	30	1
Cake	13.5	113	6	14.9	94	7	16.5	108	6	16.8	83	4	19.2	85	4	18.3	87	7
Pie	5.8	161	7	7.2	150	9	11.8	162	6	9.9	151	8	16.4	154	7	13.3	137	5
Pancakes and waffles	8.0	126	15	7.4	80	6	7.5	117	8	8.0	74	5	10.8	99	5	8.2	68	4
Cooked cereal	5.2	313	30	7.3	219	11	9.7	300	16	10.3	243	11	20.9	255	8	20.2	216	8
Oatmeal	2.7	360 <sup>a</sup>	42 <sup>a</sup>	3.7	258	17	6.0	332	16	6.2	242	10	13.6	257	10	12.9	224	10
Ready-to-eat cereal	26.9	77	3	34.7	55	1	29.8	68	2	29.7	51	1	44.6	53	1	44.0	41	1
Corn flakes	6.5	73	6	5.3	43	2	5.9	49	3	5.2	40	3	12.4	37	2	10.4	30	1
Toasted oat rings	4.2	62	4	5.4	42	2	4.8	46	2	4.1	35	2	4.3	36	3	4.9	27	2
Rice	30.8	199	9	32.1	139	6	29.4	167	5	28.8	130	4	23.1	147	6	21.4	118	5
Pasta	37.1	214	8	37.1	155	6	34.3	208	7	34.7	140	5	27.9	167	7	27.9	132	5
Macaroni and cheese	7.8	301	19	7.8	235	19	6.1	302	31	6.0	210	12	7.1	230	13	6.5	215	18
Spaghetti with tomato sauce	8.6	630	48	7.8	385	22	5.5	543	59	5.4	386	18	5.0	450	22	4.5	379	33
Pizza	23.7	253	12	20.2	150	6	13.0	220	13	14.5	147	8	5.3	187	18	4.7	109	8
Corn chips	16.2	61	5	17.9	35	2	12.8	47	4	12.0	33	2	4.8	30	3	5.3	21	2
Popcorn	8.1	63	6	9.7	35	2	9.6	50	4	10.9	39	3	6.1	52	4	7.6	34	3

<sup>a</sup> Indicates a SE value that is greater than 0 but less than 0.5.

<sup>b</sup> Indicates a statistic that is potentially unreliable because of small sample size or large coefficient of variation.

N = Sample size.

PC = Percent consuming at least once in 2 days.

SE = Standard error of the mean.

Source: Smiciklas-Wright et al. (2002) (based on 1994–1996 CSFII data).



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Table 12-27. Consumption of Major Food Groups by Older Adults: Median Daily Servings (and ranges) by Demographic and Health Characteristics		
Subject Characteristic	<i>N</i>	Bread, Cereal, Rice and Pasta (servings/day) <sup>a</sup>
<b>Sex</b>		
Females	80	2.7 (0.9–6.5)
Males	50	3.6 (1.4–7.3)
<b>Ethnicity</b>		
African American	44	3.3 (1.4–6.4)
European American	47	3.2 (0.9–6.8)
Native American	39	2.9 (1.1–7.3)
<b>Age</b>		
70 to 74 years	42	3.3 (1.1–6.3)
75 to 79 years	36	3.0 (0.9–6.8)
80 to 84 years	36	3.2 (1.5–6.4)
≥85 years	16	3.6 (1.6–7.3)
<b>Marital Status</b>		
Married	49	3.3 (1.1–5.8)
Not Married	81	3.0 (0.9–7.3)
<b>Education</b>		
8 <sup>th</sup> grade or less	37	3.1 (1.1–7.3)
9 <sup>th</sup> to 12 <sup>th</sup> grades	47	3.3 (1.1–6.8)
>High School	46	3.2 (0.9–6.5)
<b>Dentures</b>		
Yes	83	3.3 (1.1–6.4)
No	47	3.1 (0.9–7.3)
<b>Chronic Diseases</b>		
0	7	4.1 (2.2–6.4)
1	31	3.3 (0.9–7.3)
2	56	3.1 (1.1–5.8)
3	26	3.7 (1.1–5.8)
≥4	10	2.9 (1.4–5.3)
<b>Weight<sup>b</sup></b>		
≤130 pounds	18	3.1 (1.1–5.4)
131 to 150 pounds	32	3.3 (0.9–5.2)
151 to 170 pounds	27	3.1 (1.4–7.3)
171 to 190 pounds	22	3.6 (1.4–6.2)
≥191 pounds	29	3.0 (1.1–6.8)
<sup>a</sup> <i>p</i> < 0.05.		
<sup>b</sup> 2 missing values.		
<i>N</i> = Number of subjects.		
Source: Vitolins et al. (2002).		

**Table 12-28. Characteristics of the Feeding Infant and Toddlers Study (FITS) Sample Population**

	Sample Size	Percentage of Sample
<b>Sex</b>		
Males	1,549	51.3
Females	1,473	48.7
<b>Age of Child</b>		
4 to 6 months	862	28.5
7 to 8 months	483	16.0
9 to 11 months	679	22.5
12 to 14 months	374	12.4
15 to 18 months	308	10.2
19 to 24 months	316	10.4
<b>Child's Ethnicity</b>		
Hispanic or Latino	367	12.1
Non-Hispanic or Latino	2,641	87.4
Missing	14	0.5
<b>Child's Race</b>		
White	2,417	80.0
Black	225	7.4
Other	380	12.6
<b>Urbanicity</b>		
Urban	1,389	46.0
Suburban	1,014	33.6
Rural	577	19.1
Missing	42	1.3
<b>Household Income</b>		
Under \$10,000	48	1.6
\$10,000 to \$14,999	48	1.6
\$15,000 to \$24,999	221	7.3
\$25,000 to \$34,999	359	11.9
\$35,000 to \$49,999	723	23.9
\$50,000 to \$74,999	588	19.5
\$75,000 to \$99,999	311	10.3
\$100,000 and Over	272	9.0
Missing	452	14.9
<b>Receives WIC</b>		
Yes	821	27.2
No	2,196	72.6
Missing	5	0.2
Sample Size (Unweighted)	3,022	100.0
WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.		
Source: Devaney et al. (2004).		

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Food Group/Food	Percentage of Infants and Toddlers Consuming at Least Once in a Day					
	4 to 6 Months	7 to 8 Months	9 to 11 Months	12 to 14 Months	15 to 18 Months	19 to 24 Months
<b>Any Grain or Grain Product</b>	65.8	91.5	97.5	97.8	98.6	99.2
Infant Cereals	64.8	81.2	63.8	23.9	9.2	3.1
Non-infant Cereals <sup>a</sup>	0.6	18.3	44.3	58.9	60.5	51.9
Not Pre-sweetened	0.5	17.0	37.0	44.5	40.6	31.9
Pre-sweetened <sup>b</sup>	0.0	1.8	9.0	17.7	26.4	22.7
Breads and Rolls <sup>c</sup>	0.6	9.9	24.5	47.3	52.7	53.1
Crackers, Pretzels, Rice Cakes	3.0	16.2	33.4	45.2	46.4	44.7
Cereal or Granola Bars	0.0	1.1	3.4	9.8	10.0	9.7
Pancakes, Waffles, French Toast	0.1	0.8	7.5	15.1	16.1	15.4
Rice and Pasta <sup>d</sup>	2.3	4.5	18.2	26.2	39.0	35.9
Other	0.2	0.1	2.7	2.8	2.5	4.5
<b>Grains in Mixed Dishes</b>	0.4	5.3	24.1	48.3	52.0	55.1
Sandwiches	0.0	1.1	8.6	21.5	25.8	25.8
Burrito, Taco, Enchilada, Nachos	0.0	0.0	1.0	4.5	2.8	2.1
Macaroni and Cheese	0.2	1.6	4.9	14.6	15.0	15.0
Pizza	0.1	0.7	2.2	6.8	9.0	9.4
Pot Pie/Hot Pocket	0.0	0.9	0.5	2.0	1.0	1.8
Spaghetti, Ravioli, Lasagna	0.1	1.8	9.9	15.3	12.1	8.8
<sup>a</sup>	Includes both ready-to-eat and cooked cereals.					
<sup>b</sup>	Defined as cereals with more than 21.1 grams sugar per 100 grams.					
<sup>c</sup>	Does not include bread in sandwiches. Sandwiches are included in mixed dishes.					
<sup>d</sup>	Does not include rice or pasta in mixed dishes.					
Source: Fox et al. (2004).						

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**Table 12-30. Characteristics of Women, Infants, and Children (WIC) Participants and Non-Participants<sup>a</sup> (percentages)**

	Infants 4 to 6 month		Infants 7 to 11 month		Toddlers 12 to 24 month	
	WIC Participant	Non-Participant	WIC Participant	Non-Participant	WIC Participant	Non-Participant
Sex						
Males	55	54	55	51	57	52
Females	45	46 <sub>b</sub>	45	49 <sub>b</sub>	43	48 <sub>b</sub>
Child's Ethnicity						
Hispanic or Latino	20	11	24	8	22	10
Non-Hispanic or Latino	80	89 <sub>b</sub>	76	92 <sub>b</sub>	78	89 <sub>b</sub>
Child's Race						
White	69	84	63	86	67	84
Black	15	4	17	5	13	5
Other	22	11	20	9 <sub>b</sub>	20	11 <sub>c</sub>
Child in Daycare						
Yes	39	38	34	46	43	53
No	61	62 <sub>b</sub>	66	54 <sub>b</sub>	57	47 <sub>b</sub>
Age of Mother						
14 to 19 years	18	1	13	1	9	1
20 to 24 years	33	13	38	11	33	14
25 to 29 years	29	29	23	30	29	26
30 to 34 years	9	33	15	36	18	34
≥35 years	9	23	11	21	11	26
Missing	2	2 <sub>b</sub>	1	1 <sub>b</sub>	0	1 <sub>b</sub>
Mother's Education						
11 <sup>th</sup> Grade or Less	23	2	15	2	17	3
Completed High School	35	19	42	20	42	19
Some Postsecondary	33	26	32	27	31	28
Completed College	7	53	9	51	9	48
Missing	2	1 <sub>b</sub>	2	0 <sub>b</sub>	1	2 <sub>b</sub>
Parent's Marital Status						
Married	49	93	57	93	58	88
Not Married	50	7	42	7	41	11
Missing	1	1	1	0 <sub>b</sub>	1	1 <sub>c</sub>
Mother or Female Guardian Works						
Yes	46	51	45	60	55	61
No	53	48	54	40	45	38
Missing	1	1	1	0	0	1

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**Table 12-30. Characteristics of Women, Infants, and Children (WIC) Participants and Non-Participants<sup>a</sup> (percentages) (continued)**

	Infants 4 to 6 months		Infants 7 to 11 months		Toddlers 12 to 24 months	
	WIC		WIC		WIC	
	Participant	Non-Participant	Participant	Non-Participant	Participant	Non-Participant
Urbanicity		<sup>c</sup>		<sup>c</sup>		<sup>c</sup>
Urban	34	55	37	50	35	48
Suburban	36	31	31	34	35	35
Rural	28	13	30	15	28	16
Missing	2	1	2	1	2	2
Sample Size (Unweighted)	265	597	351	808	205	791

<sup>a</sup>  $\chi^2$  tests were conducted to test for statistical significance in the differences between WIC participants and non-participants within each age group for each variable. The results of  $\chi^2$  tests are listed next to the variable under the column labeled non-participants for each of the three age groups.

<sup>b</sup> =  $p < 0.05$  non-participants significantly different from WIC participants on the variable.

<sup>c</sup> =  $p < 0.01$  non-participants significantly different from WIC participants on the variable.

WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

Source: Ponza et al. (2004).

**Table 12-31. Food Choices for Infants and Toddlers by Women, Infants, and Children (WIC) Participation Status**

	Infants 4 to 6 months		Infants 7 to 11 months		Toddlers 12 to 24 months	
	WIC	Non-	WIC	Non-	WIC	Non-
	Participant	Participant	Participant	Participant	Participant	Participant
Infant Cereals	69.7	62.5	74.7	69.7	13.5	9.2
Non-infant Cereals, Total	0.9	0.5	21.7	38.5 <sup>a</sup>	58.1	56.0
Not Pre-sweetened	0.5	0.5	18.7	32.9 <sup>a</sup>	43.7	36.3
Pre-sweetened	0.0	0.0	4.0	6.9	17.7	24.1
Grains in Combination Foods	0.9	0.1	18.8	14.7	50.3	52.9
Sample Size (unweighted)	265	597	351	808	205	791

<sup>a</sup> =  $p < 0.01$  non-participants significantly different from WIC participants.

WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

Source: Ponza et al. (2004).

**Table 12-32. Average Portion Sizes per Eating Occasion of Grain Products Commonly Consumed by Infants From the 2002 Feeding Infants and Toddlers Study**

Food Group	Reference Unit	4 to 5 months	6 to 8 months	9 to 11 months
		(N = 624)	(N = 708)	(N = 687)
		Mean ± SE		
Infant cereal, dry	tablespoon	3.1 ± 0.14	4.5 ± 0.14	5.2 ± 0.18
Infant cereal, jarred	tablespoon	-	5.6 ± 0.26	7.4 ± 0.34
Ready-to-eat cereal	tablespoon	-	2.3 ± 0.34	3.4 ± 0.21
Crackers	ounce	-	0.2 ± 0.02	0.3 ± 0.01
Crackers	saltine	-	2.2 ± 0.14	2.7 ± 0.12
Bread	slice	-	0.5 ± 0.10	0.8 ± 0.06

- = Cell size was too small to generate a reliable estimate.

N = Number of respondents.

SE = Standard error of the mean.

Source: Fox et al. (2006).

**Table 12-33. Average Portion Sizes per Eating Occasion of Grain Products Commonly Consumed by Toddlers From the 2002 Feeding Infants and Toddlers Study**

Food Group	Reference Unit	12 to 14 months	15 to 18 months	19 to 24 months (N = 320)
		(N = 371)	(N = 312)	
		Mean ± SE		
Bread	slice	0.8 ± 0.04	0.9 ± 0.05	0.9 ± 0.05
Rolls	ounce	0.9 ± 0.11	1.0 ± 0.10	0.9 ± 0.15
Ready-to-eat cereal	cup	0.3 ± 0.02	0.5 ± 0.03	0.6 ± 0.04
Hot cereal, prepared	cup	0.6 ± 0.05	0.6 ± 0.05	0.7 ± 0.05
Crackers	ounce	0.3 ± 0.02	0.4 ± 0.02	0.4 ± 0.02
Crackers	saltine	3.3 ± 0.22	3.5 ± 0.22	3.7 ± 0.22
Pasta	cup	0.4 ± 0.04	0.4 ± 0.04	0.5 ± 0.05
Rice	cup	0.3 ± 0.04	0.4 ± 0.05	0.4 ± 0.05
Pancakes and waffles	1 (4-inch diameter)	1.0 ± 0.08	1.4 ± 0.21	1.4 ± 0.17

N = Number of respondents.

SE = Standard error of the mean.

Source: Fox et al. (2006).

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	Age 4 to 5 months		Age 6 to 11 months		Age 12 to 24 months	
	Hispanic ( <i>N</i> = 84)	Non-Hispanic ( <i>N</i> = 538)	Hispanic ( <i>N</i> = 163)	Non-Hispanic ( <i>N</i> = 1,228)	Hispanic ( <i>N</i> = 124)	Non-Hispanic ( <i>N</i> = 871)
Any Grain or Grain Product	56.5	56.9	95.0	93.5	97.1	98.9
Infant Cereal	55.2	56.5	74.1	73.6	15.9	9.3
Non-infant Cereal	-	-	18.2	29.2	45.3	57.8
Breads <sup>b</sup>	1.4 <sup>c</sup>	-	4.0 <sup>c</sup>	15.1	44.0	52.9
Tortillas	1.4 <sup>c</sup>	-	27.8	-	6.7 <sup>a, c</sup>	0.6 <sup>c</sup>
Crackers, Pretzels, Rice Cakes	1.3 <sup>c</sup>	-	1.4 <sup>c</sup>	22.5	35.6	46.9
Pancakes, Waffles, French Toast	-	-	20.1 <sup>a</sup>	4.3	13.0	16.0
Rice and Pasta <sup>d</sup>	-	-	15.9 <sup>e</sup>	10.3	44.3	32.9
Rice	-	-	4.7	26.9 <sup>a, c</sup>	13.0	13.0
Grains in Mixed Dishes	-	-	15.9	13.0	38.8 <sup>a</sup>	54.4
Sandwiches	-	-	4.0 <sup>c</sup>	4.6	24.2	24.9
Burrito, Taco, Enchilada, Nachos	-	-	1.3 <sup>c</sup>	-	2.1 <sup>c</sup>	3.0
Macaroni and Cheese	-	-	3.0 <sup>c</sup>	3.1	10.1	15.5
Pizza	-	-	-	1.4	1.0 <sup>c, e</sup>	9.7
Spaghetti, Ravioli, Lasagna	-	-	8.3 <sup>c</sup>	4.6	9.3 <sup>c</sup>	12.1
<sup>a</sup>	= Significantly different from non-Hispanic at <i>p</i> < 0.05.					
<sup>b</sup>	Does not include bread in sandwiches. Sandwiches are included in mixed dishes. Includes tortillas, also shown separately.					
<sup>c</sup>	= Statistic is potentially unreliable because of a high coefficient of variation.					
<sup>d</sup>	Does not include rice or pasta in mixed dishes. Includes rice (e.g., white, brown, wild, and Spanish rice without meat) and pasta (e.g., spaghetti, macaroni, and egg noodles). Rice is also shown separately.					
<sup>e</sup>	= Significantly different from non-Hispanic at <i>p</i> < 0.01.					
-	= Less than 1% of the group consumed this food on a given day.					
<i>N</i>	= Sample size.					

Source: Mennella et al. (2006).

**Table 12-35. Mean Moisture Content of Selected Grain Products Expressed as Percentages of Edible Portions (grams per 100 grams of edible portion)**

Food	Moisture Content		Comments
	Raw	Cooked	
Barley—pearled	10.09	68.80	
Corn—grain—endosperm	10.37	-	
Corn—grain—bran	4.71	-	crude
Millet	8.67	71.41	
Oats	8.22	-	
Rice—white—long-grained	11.62	68.44	
Rye	10.95	-	
Rye—flour—medium	9.85	-	
Sorghum	9.20	-	
Wheat—hard white	9.57	-	
Wheat—germ	11.12	-	crude
Wheat—bran	9.89	-	crude
Wheat—flour—whole grain	10.27	-	
- Indicates that the grain product was not assessed for water content under these conditions.			
Source: USDA (2007).			