

**PATTERNS OF MEDICATION USE
IN THE UNITED STATES
2004**

A Report from the Slone Survey



Slone

Epidemiology Center
at Boston University

KEY FINDINGS IN THIS REPORT – *Adults*

- In any given week, 82% of U.S. adults take at least one medication (prescription or nonprescription drug, vitamin/mineral, herbal/natural supplement); 30% take at least five.
- Prescription drugs are taken by 55% of the population, with 11% taking at least five.
- The heaviest users are women aged at least 65: 64% take at least five medications; 29% take at least five prescription medications.
- Over the last five years, there has been an increase in use of prescription drugs and multiple medications.
- Usage of some specific drugs has greatly increased, including metoprolol (Lopressor, Toprol XL) and alendronate (Fosamax).
- Drugs whose usage has decreased include conjugated estrogens and pseudoephedrine.
- Nonprescription analgesics (acetaminophen, aspirin, ibuprofen) are the most frequently used drugs, taken by 16-20% of U.S. adults.
- The most commonly used prescription drugs include thyroid supplements, cholesterol lowering drugs, diuretics, and antihypertensives.
- 42% of U.S. adults take vitamins; 27% take multivitamin products.
- 19% take products containing herbals or other natural supplements.

KEY FINDINGS IN THIS REPORT – *Children*

- In any given week, 56% of those younger than 18 years take at least one medication; 19% take at least one prescription drug.
- As with adults, nonprescription analgesics (acetaminophen, ibuprofen) are the most commonly used medications, particularly among children aged 12-17 years.
- The most frequently used prescription drugs included a bronchodilator (albuterol), an antihistamine (cetirizine), and an antibiotic (amoxicillin).
- Vitamins are taken by 22% of children overall, and by 28% of children <5 years old.
- Use of herbals and other natural supplements is uncommon in the pediatric population.

A substantial proportion of health care dollars in the U.S. goes towards the purchase of medications. However, comprehensive information on the full range of medications that people take, including prescription and OTC drugs, vitamins/minerals, and herbal/natural supplements, is not generally available. In order to provide that information, the Slone Epidemiology Center of Boston University conducts an ongoing telephone survey of a random sample of the noninstitutionalized U.S. population. In a previous report on data from this survey encompassing the period 1998-99,¹ we documented the high prevalence of use of all types of medications by adults; use was especially high among those 65 and older. Here, we focus on general patterns of medication use in the ambulatory U.S. adult and pediatric populations during 2004, and examine time trends among adults since our earlier publication. The Slone Survey report will be updated in future years and posted at this website.

SURVEY METHODOLOGY

The Slone Survey has been conducted continuously since 1998.

Sampling

Residents of households in the 48 contiguous states and District of Columbia are eligible for inclusion in the survey. Not eligible are those without telephones; individuals residing in vacation homes for less than three consecutive months, nursing homes, rehabilitation hospitals, or “group homes” (e.g., halfway houses); and individuals in prisons, military barracks, or college/university dormitories without telephones in individual rooms.

Subjects are identified by random digit dialing (RDD); a two-stage sampling procedure² is used to generate the telephone numbers to be called. At each contacted number, one individual in the household is selected for interview by a computer-generated random number procedure. Subjects aged 14-17 years are interviewed only with the permission of a parent or guardian; for children under the age of 14, and subjects incapable of responding to the questions because of conditions such as Alzheimer's disease, a surrogate (parent, spouse, or caretaker) who has knowledge of the subject's medications is interviewed. Interviews are conducted in English or Spanish.

Survey Information

Information is recorded on prescription and nonprescription drugs, vitamins/minerals, and herbal/natural supplements. The last group includes plant extracts except those marketed in regulated drugs (e.g., senna laxatives), amino acids, animal extracts, enzymes, and other unclassified agents (e.g., glucosamine).

The interviewer explains that information is being sought on use of all medications taken during the preceding seven days and asks the subject to gather the relevant bottles or packages. A list of reasons for use (e.g., pain/headache/backache, depression/tension/emotional disorders) is then read to prompt recall of additional medication use. Finally, a short list of trade names of selected drugs is read. After the names of all reported medications have been recorded, detailed information, e.g. reason for use and route of administration, is obtained for each. For selected products, the dose and number of pills per day are also obtained.

Other information elicited includes age, sex, race (using the 2000 U.S. Census categories³), Hispanic origin, years of education, income (in ranges), zip code of

residence, and for women aged 18-50 years, pregnancy status (including due date or last menstrual period).

Coding of Medications

Medication names are coded for analysis using the Slone Drug Dictionary (<http://128.197.222.56/slone-drug-dictionary/index.php>). The dictionary, developed and maintained by the Slone Epidemiology Center, is a computerized linkage system composed of individual agents and multi-component products, including herbal/natural supplements, each assigned specific code numbers. All combination products are linked to their individual components. Thus, groupings of drugs that contain a particular entity (e.g., aspirin-containing products) can be automatically generated.

Participation

The present report covers data collection for the year 2004; 3667 subjects were interviewed, including 3042 adults and 625 children (aged <18 years). The participation rate of eligible subjects was 60%.

Comparison with U.S. Census Data

Demographic information from the subjects interviewed in 2004 was compared to data from the 2000 U.S. Census (race, ethnicity, education, region)⁴ and U.S. Census projections for 2004 (age, sex).⁵ The distribution according to race of Slone subjects is similar to that of the U.S. population (white – 78% in survey, 75% in U.S.) and the proportion living within each of four broad regions (Northeast, Midwest, South, and

West) is within 2% of the census figures. The age distribution of survey participants is similar to that in the U.S. (median age 37.2 years in survey, 36.5 years in U.S.); there is a small excess of women (55% in survey, 51% in U.S.). The Slone Survey includes somewhat fewer individuals of Hispanic origin (10% vs. 13%). Survey subjects have more education (35% college graduate vs. 25%) and higher annual household incomes (66% with at least \$35,000 vs. 58%) than the U.S. population.

Analytical Details

Results are reported separately for 3042 adults and 625 children. One-week prevalence is reported, i.e., any use during the one week period preceding the interview. All percentages are weighted according to household size, a factor that is inversely related to the probability of selection within each household. As examples of the precision of the results, in the full sample of 3,042 adults, for estimates of 1%, the 95% confidence limits are $\pm 0.2\%$; for estimates of 5%, $\pm 0.4\%$; for estimates of 10%, $\pm 0.5\%$; and for estimates of 20%, $\pm 0.7\%$. Corresponding figures among the 625 children are $1 \pm 0.4\%$, $5 \pm 0.9\%$, $10 \pm 1.2\%$, and $20 \pm 1.6\%$.

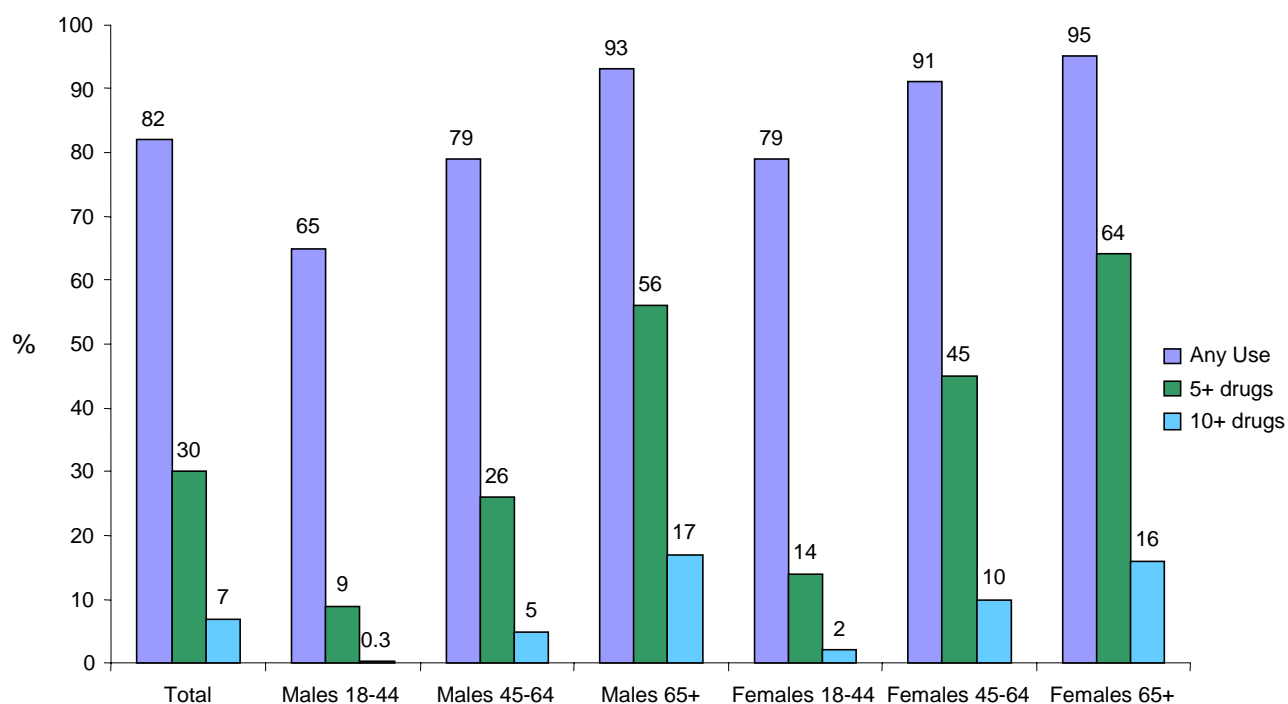


MEDICATION USE AMONG ADULTS

Overall Use

As shown in Figure 1, 82% of the adults had taken at least one medication (prescription or OTC drug, vitamin/mineral, or herbal/natural supplement) during the preceding week. The overall prevalence of use increased with age and was greater in women than men in every age group, with the exception that the proportions who took at least 10 medications were similar among persons aged 65 years or older. The highest overall prevalence was among older women, of whom 95% had taken at least one medication and 16% took 10 or more; among older men, the respective prevalences were 93% and 17%. The lowest prevalence was among 18-44 year old men, of whom 65% took at least one; fewer than 1% took 10 or more drugs in the preceding week.

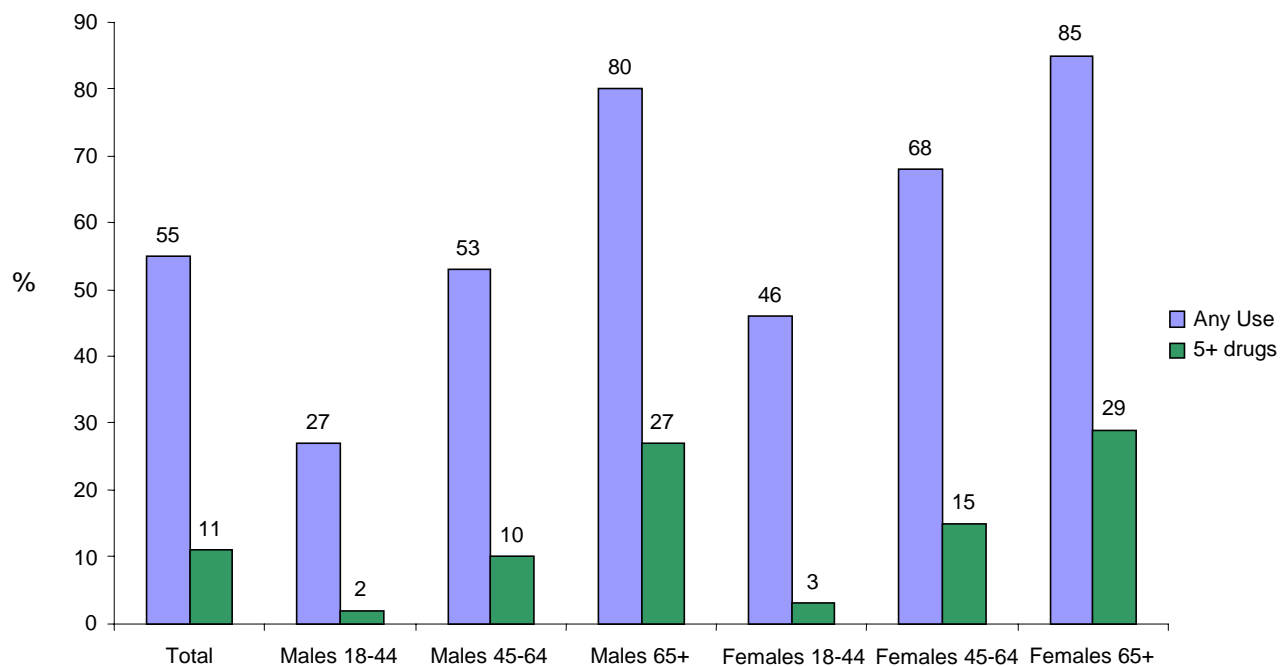
Figure 1. Use* of Medications During the Preceding Week Among U.S. Adults, by Sex and Age



* Percents weighted according to household size.

Use of drugs available only by prescription is shown in Figure 2: 55% of subjects reported taking at least one prescription drug during the previous week and 11% took five or more. Prescription drugs were used more frequently by women than men, and by older than younger persons. Among older women, 29% took five or more prescription drugs during the preceding week; among older men, 27% used at least five prescription drugs.

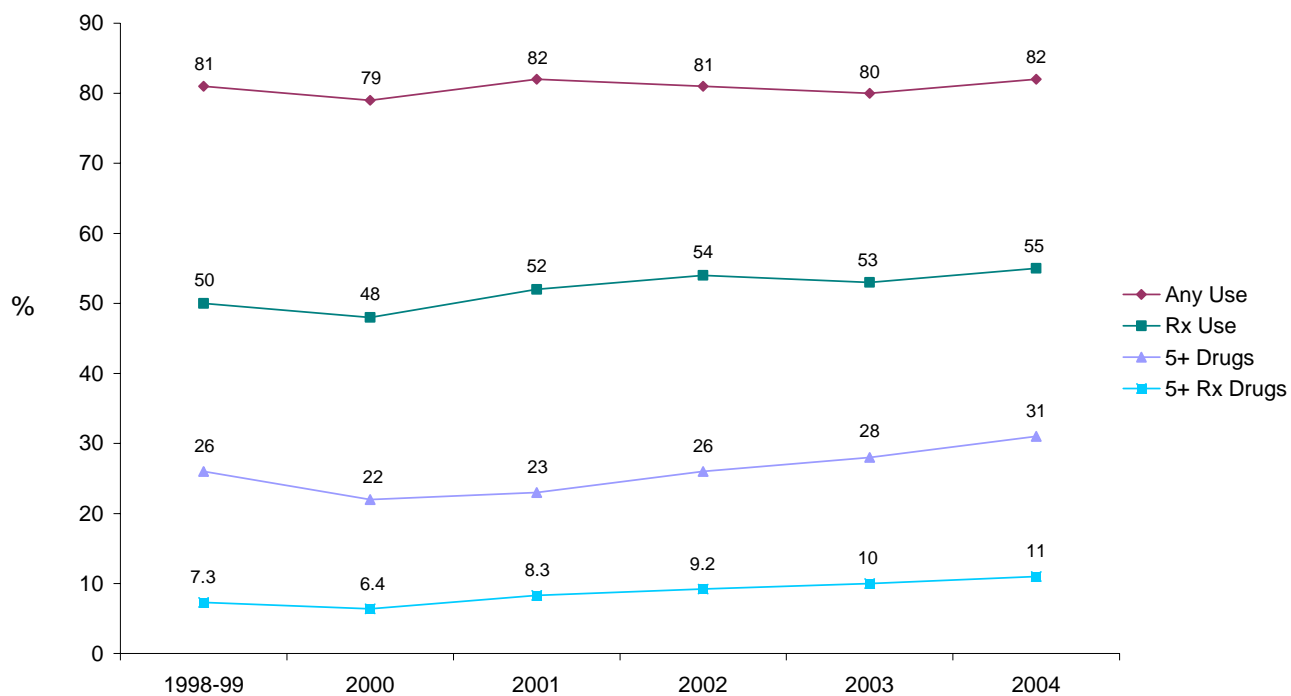
**Figure 2. Use* of Prescription Drugs During the Preceding Week
Among U.S. Adults, by Sex and Age**



* Percents weighted according to household size.

As shown in Figure 3, there has been very little change in overall medication use since the beginning of the survey in 1998-99, while use of prescription medications has increased from 50% to 55%. The prevalence of use of five or more prescription drugs increased over the period from 7-11%.

Figure 3. Medication Use* During the Preceding Week Among Adult Subjects According to Year of Interview



* Percents weighted according to household size.

Use of Specific Drugs

The 30 most commonly used prescription and OTC drug entities (including those available as both), taken either as single or multiple component products, are listed in Table 1. Although most are prescription drugs, five of the 10 most frequently used entities are available OTC. The three most commonly used drugs were acetaminophen (used by 20% of the adult population), aspirin, and ibuprofen. The most frequently used prescription drugs were thyroid supplement (fourth – 6% of the population); atorvastatin, a cholesterol-lowering drug (fifth); hydrochlorothiazide, a diuretic (sixth); lisinopril, an ACE-inhibitor (ninth); and metoprolol, a beta-blocker (tenth).

Some of the drugs had strong sex- or age-specific patterns of use. For example, aspirin was most commonly taken by older men, with a prevalence of 44%. The prevalence of ibuprofen use was higher in the younger subjects. Among prescription drugs, lisinopril and simvastatin were most frequently used by older men, while levothyroxine, atorvastatin, hydrochlorothiazide, and metformin were most frequently taken by older women. In addition to the Cox-2 inhibitor celecoxib, which at 2% overall prevalence was number 33 on the list, rofecoxib, another drug in this class removed from the market in September, was taken by 1.3% of adults, and the other Cox-2 marketed in the U.S., valdecoxib, was taken by 0.9% (data not shown).

Table 1. Thirty Most Commonly Used Prescription and OTC Drugs Taken by U.S. Adults in 2004, Overall and By Sex and Age

	Male 18-44 (n=472)		Male 45-64 (n=500)		Male 65+ (n=314)		Female 18-44 (n=583)		Female 45-64 (n=658)		Female 65+ (n=512)		Total (n=3042)	
	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*
Acetaminophen	76	(18)	71	(15)	31	(9.7)	133	(24)	159	(25)	96	(18)	566	(20)
Aspirin	41	(8)	145	(27)	137	(44)	53	(8.4)	130	(19)	153	(29)	659	(19)
Ibuprofen	79	(18)	60	(13)	23	(7.8)	112	(20)	115	(17)	49	(10)	438	(16)
Levothyroxine	7	(1.4)	6	(0.8)	16	(5.3)	26	(5.0)	69	(10)	93	(19)	217	(6.2)
Atorvastatin	7	(1.4)	54	(9.0)	36	(12)	2	(0.4)	52	(7.4)	78	(16)	229	(6.1)
Hydrochlorothiazide	8	(1.4)	23	(4.0)	40	(13)	11	(1.8)	50	(8.4)	74	(15)	206	(5.8)
Naproxen	16	(3.6)	27	(6.4)	11	(4.1)	36	(5.2)	42	(5.9)	22	(3.8)	154	(5.0)
Pseudoephedrine	28	(5.9)	20	(3.4)	5	(1.9)	38	(6.1)	39	(6.4)	7	(1.4)	137	(4.8)
Lisinopril	5	(1.1)	31	(6.0)	44	(15)	3	(0.8)	33	(5.1)	44	(9.0)	160	(4.6)
Metoprolol	5	(1.1)	27	(4.8)	37	(13)	4	(0.4)	19	(3.2)	52	(11)	144	(4.0)
Simvastatin	3	(0.6)	18	(3.5)	50	(18)	2	(0.6)	21	(3.4)	36	(6.6)	130	(3.7)
Atenolol	5	(1.2)	17	(3.6)	32	(10)	3	(0.7)	30	(3.7)	54	(9.8)	141	(3.7)
Metformin	3	(0.5)	35	(6.5)	13	(4.6)	6	(0.9)	27	(4.8)	32	(6.8)	116	(3.5)
Diphenhydramine	6	(1.4)	20	(3.5)	5	(1.8)	22	(4.1)	24	(3.7)	16	(2.7)	93	(3.1)
Amlodipine	3	(0.8)	16	(3.0)	25	(8.8)	5	(1.0)	20	(2.7)	53	(8.9)	122	(3.1)
Fluticasone	7	(1.5)	19	(4.8)	5	(1.6)	11	(1.3)	30	(4.2)	20	(4.2)	92	(2.9)
Albuterol	5	(1.0)	15	(2.9)	10	(3.4)	24	(3.7)	16	(2.4)	15	(3.1)	85	(2.7)
Furosemide	0	(--)	9	(1.6)	28	(9.0)	1	(0.2)	23	(2.9)	44	(9.1)	105	(2.6)
Fexofenadine	10	(2.4)	8	(1.7)	3	(0.9)	18	(2.7)	23	(4.2)	7	(1.3)	69	(2.5)
Alendronate	0	(--)	1	(0.1)	2	(0.5)	3	(0.4)	22	(3.9)	64	(12)	92	(2.2)
Conjugated estrogens	0	(--)	0	(--)	0	(--)	3	(0.5)	46	(6.8)	29	(5.5)	78	(2.1)
Hydrocodone	9	(1.9)	17	(3.1)	5	(1.6)	9	(2.0)	12	(1.7)	11	(2.1)	63	(2.1)
Celecoxib	2	(0.4)	11	(2.4)	10	(3.0)	5	(0.9)	18	(2.5)	25	(4.8)	71	(2.0)
Lansoprazole	8	(1.6)	15	(2.8)	7	(2.3)	2	(0.2)	18	(2.2)	18	(3.3)	68	(1.8)
Omeprazole	5	(1.0)	10	(1.6)	14	(4.8)	2	(0.6)	18	(2.6)	14	(2.5)	63	(1.8)
Triamterene	1	(0.2)	4	(0.6)	9	(2.7)	2	(0.2)	24	(3.3)	33	(6.6)	73	(1.8)
Ranitidine	8	(1.4)	8	(1.6)	9	(3.2)	4	(0.5)	16	(2.7)	13	(2.2)	58	(1.7)
Dextromethorphan	11	(2.6)	6	(1.2)	2	(0.9)	14	(2.4)	8	(1.3)	6	(1.2)	47	(1.7)
Salmeterol	0	(--)	12	(3.4)	3	(1.1)	5	(0.5)	14	(2.1)	14	(3.0)	48	(1.5)
Losartan	1	(0.2)	4	(1.2)	8	(2.1)	0	(--)	19	(2.7)	24	(4.9)	56	(1.5)

*Weighted according to household size.

Table 2 displays ten selected drugs for which there have been notable changes in use since our previous report for 1998-99.¹ The prevalence of use more than doubled for metoprolol, alendronate, and fluticasone. Use of conjugated estrogens declined by 60%, from fifth to twenty-first most common, most markedly since 2002 (data not shown),⁶ and pseudoephedrine use declined by 40%, with the bulk of the change coming since 2003, when the prevalence was 7%.

Table 2. Changes in Use* of Commonly Reported Medications Among U.S. Adults Between 1998-99 and 2004

	1998-99	2004	<i>Percent Change</i>
Metoprolol	0.7	4.0	+471
Alendronate	0.8	2.2	+175
Fluticasone	1.4	2.9	+107
Naproxen	2.6	5.0	+92
Lisinopril	2.6	4.6	+77
Hydrochlorothiazide	3.5	5.8	+66
Atorvastatin	3.7	6.1	+65
Levothyroxine	4.2	6.2	+48
Pseudoephedrine	8.1	4.8	-41
Conjugated estrogens	5.2	2.1	-60

*Percents weighted according to household size.

Use of Multivitamins and Herbal/Natural Supplements

Vitamin products were taken in the week before interview by 42% of the population; much of this was in the form of multivitamins (products containing at least four different vitamins), taken by 27% (Table 3). Use increased with age and was higher among women than men in each age category. Herbal and other natural supplements were taken by 19% of adults; the 10 most commonly used entities (range, 1-8%) are also shown in Table 3. Lutein, a component in several mainstream multivitamin products, was taken by 8.2%. Among men, use increased with age for all entities except *Thea sinensis*. The same pattern was generally observed in women, with the following exceptions: use of garlic, flaxseed oil, ginger, and *Thea sinensis* was highest in subjects aged 45-64 years. Overall, 13% of prescription drug users also reported use of one or more herbal/natural supplements.



Table 3. Vitamins and Herbal/Natural Supplements Used by U.S. Adults in 2004, Overall and By Sex and Age

	Male 18-44 (n=472)		Male 45-64 (n=500)		Male 65+ (n=314)		Female 18-44 (n=583)		Female 45-64 (n=658)		Female 65+ (n=512)		Total (n=3042)	
	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*
Vitamins	119	(23)	197	(36)	178	(58)	211	(34)	383	(56)	330	(65)	1418	(42)
Multivitamins	77	(15)	138	(25)	104	(34)	153	(25)	239	(36)	189	(37)	900	(27)
Herbal/natural supplements	59	(11)	107	(20)	91	(30)	83	(13)	185	(27)	146	(28)	671	(19)
Lutein	19	(3.2)	54	(9.7)	45	(15)	22	(3.0)	78	(11)	91	(17)	309	(8.2)
Lycopene	23	(3.8)	50	(9.1)	40	(13)	19	(2.9)	61	(8.3)	65	(12)	258	(7.0)
Glucosamine	4	(0.8)	25	(4.5)	26	(9.0)	6	(0.8)	41	(5.7)	35	(7.0)	137	(3.8)
Chondroitin	3	(0.8)	12	(2.2)	16	(5.3)	3	(0.4)	24	(3.4)	27	(5.9)	85	(2.4)
Garlic	7	(1.1)	20	(3.2)	11	(4.2)	6	(0.8)	16	(2.7)	6	(1.4)	66	(2.0)
Flaxseed oil	4	(1.1)	10	(1.9)	9	(3.2)	6	(1.0)	16	(2.5)	5	(1.0)	50	(1.7)
Co-enzyme Q	1	(0.1)	12	(1.9)	8	(2.7)	7	(0.7)	18	(2.4)	13	(2.7)	59	(1.5)
Ginkgo biloba	3	(0.7)	6	(1.0)	10	(3.5)	4	(0.5)	12	(1.3)	9	(2.0)	44	(1.2)
Ginger	10	(1.7)	10	(1.6)	6	(1.9)	1	(0.2)	7	(1.2)	1	(0.4)	35	(1.1)
<i>Thea sinensis</i>	4	(1.0)	4	(0.4)	2	(0.5)	5	(0.8)	12	(1.9)	5	(0.9)	32	(1.0)

*Weighted according to household size.

Reasons for Use

Table 4 provides the 10 most commonly reported reasons for use of prescription and OTC drugs, accounting for 58% of all medication use. Hypertension was the most common reason, accounting for 12% of reported episodes of drug use. Other frequently mentioned reasons, each accounting for more than 5% of drug use episodes, were headache, pain, “heart,” and “cholesterol.”

Table 4. Ten Most Commonly Reported Reasons for Medication Use During the Week Before Interview by U.S. Adults in 2004*

Reason	No.	(%)
Hypertension	1062	(12)
Headache/Migraine	606	(7.3)
Pain	589	(7.1)
Heart	536	(6.5)
Cholesterol	485	(5.9)
Arthritis/Joint Problems	375	(4.5)
Diabetes	338	(4.1)
Allergy	327	(4.0)
Anticoagulation	244	(3.0)
Depression	212	(2.6)

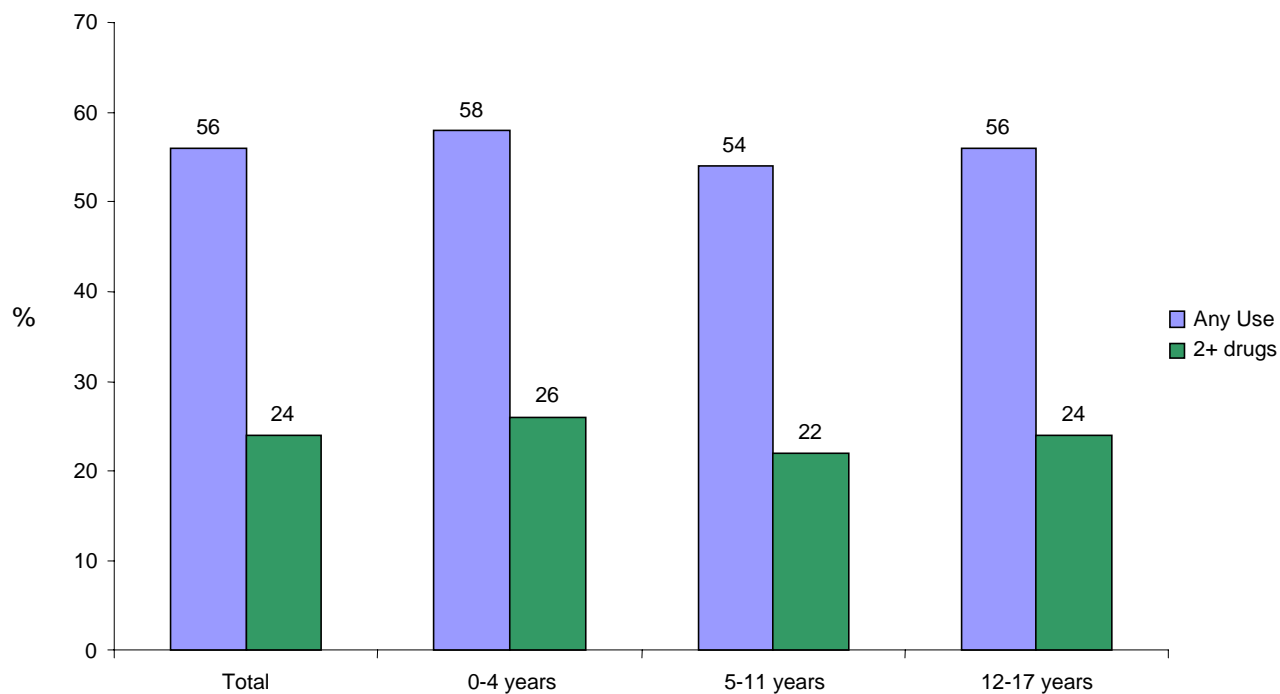
*Denominator is 8249 episodes of drug use.

MEDICATION USE AMONG CHILDREN

Overall Use

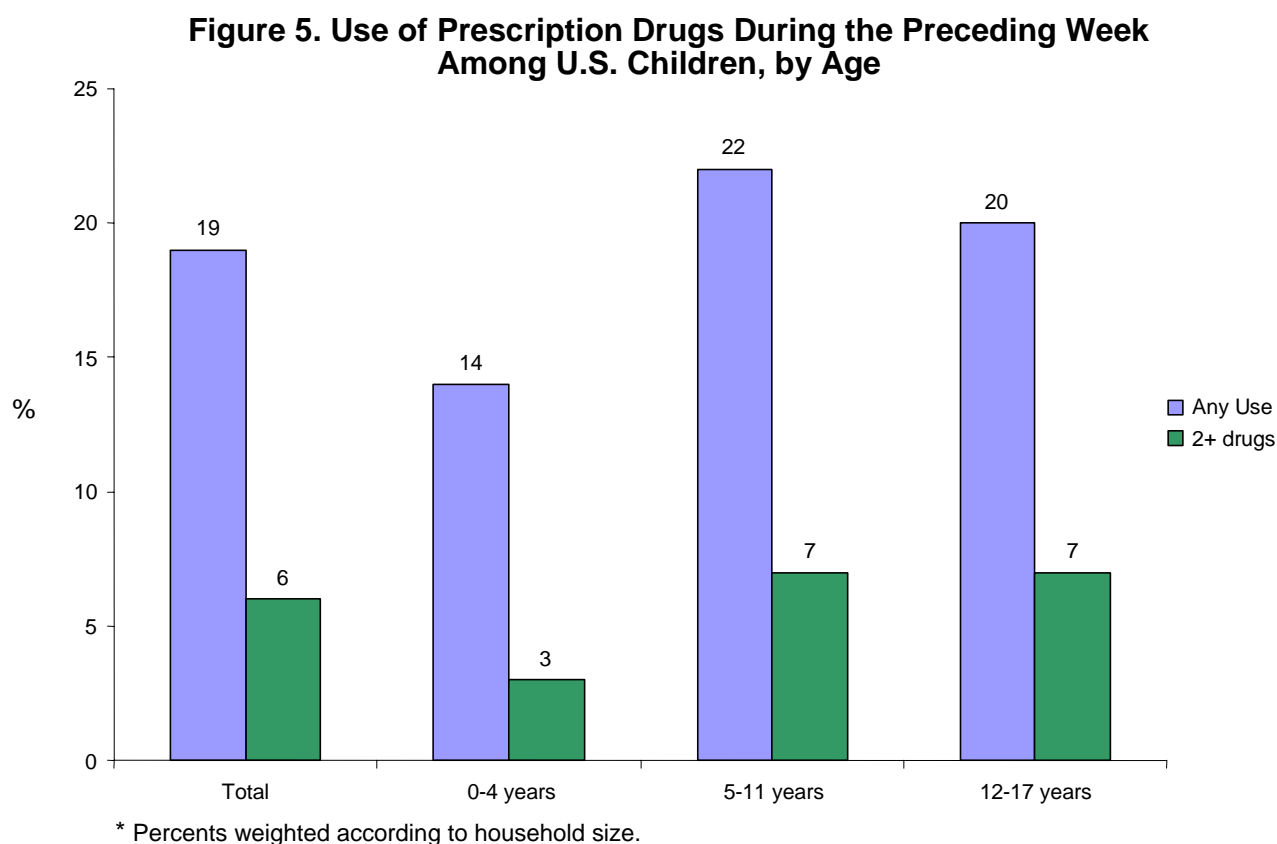
As shown in Figure 4, 56% of subjects aged <18 years had taken at least one medication (prescription or OTC drug, vitamin/mineral, or herbal/natural supplement) during the preceding week. The overall prevalence of use was similar (range 54-58%) for the three age categories. The proportions that took at least 2 medications were also similar (22-26%).

Figure 4. Use* of Medications During the Preceding Week Among U.S. Children (<18 years), by Age



* Percents weighted according to household size.

Use of drugs available only by prescription in children is shown in Figure 5: 19% of subjects had taken at least one prescription drug during the previous week and 6% took at least two. Use of any prescription drug and use of at least two prescription drugs was similar in the two older age categories, and higher than in the youngest subjects.



Use of Specific Drugs, Multivitamins, and Herbal/Natural Supplements

The 10 most commonly used prescription and OTC drug entities taken by children are listed in Table 5. Six of the products were available OTC, including the top four: ibuprofen (11%), acetaminophen, pseudoephedrine, and dextromethorphan. The most frequently used prescription-only drugs were albuterol, a bronchodilator (fifth –

2.4%); cetirizine, an antihistamine (sixth); amoxicillin (seventh); and fluticasone, a corticosteroid (eighth). Ibuprofen and loratadine were most commonly taken by children aged 12-17 years and pseudoephedrine, dextromethorphan, amoxicillin, and chlorpheniramine had the highest prevalence of use among the youngest children.

Table 5. Ten Most Commonly Used Prescription and Over-the-Counter Drugs Taken by U.S. Children in 2004, by Age

Medication	0-4yrs (n=182)		5-11yrs (n=221)		12-17yrs (n=222)		Total (n=625)	
	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*
Ibuprofen	13	(8.8)	14	(6.2)	39	(18)	66	(11)
Acetaminophen	17	(9.8)	18	(7.8)	19	(8.8)	54	(8.7)
Pseudoephedrine	13	(7.7)	10	(4.5)	7	(3.1)	30	(4.9)
Dextromethorphan	8	(4.6)	4	(1.9)	4	(1.6)	16	(2.5)
Albuterol	5	(2.7)	5	(2.4)	4	(2.2)	14	(2.4)
Cetirizine	3	(1.5)	8	(3.4)	3	(1.4)	14	(2.2)
Amoxicillin	6	(3.3)	3	(2.0)	2	(1.2)	11	(2.0)
Fluticasone	2	(1.2)	3	(1.8)	5	(2.3)	10	(1.8)
Chlorpheniramine	6	(3.0)	5	(2.3)	0	(--)	11	(1.7)
Loratadine	1	(0.4)	2	(0.9)	8	(3.3)	11	(1.6)

*Weighted according to household size.

Vitamin products were taken in the week before interview by 22% of pediatric subjects overall (Table 6); these were almost entirely multivitamins (20%), for which the prevalence was highest in the youngest subjects (26%). Because herbal/natural supplements are uncommonly used by children (total prevalence, 2.6%), only the four most commonly used are listed; overall use for each these entities ranged between 0.4% and 0.6%. There was no use of these substances in subjects younger than five years.

Table 6. Vitamins and Herbal/Natural Supplements Taken by U.S. Children in 2004, by Age

	0-4yrs (n=182)		5-11yrs (n=221)		12-17yrs (n=222)		Total (n=625)	
	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*
Vitamins	51	(28)	54	(23)	35	(17)	140	(22)
Multivitamins	46	(26)	51	(22)	29	(14)	126	(20)
Herbal/natural supplement	4	(2.0)	6	(2.5)	8	(3.2)	18	(2.6)
Lutein	0	(--)	1	(0.3)	4	(1.5)	5	(0.6)
Lycopene	0	(--)	1	(0.3)	4	(1.5)	5	(0.6)
<i>Ananas comosus</i>	0	(--)	2	(1.0)	0	(--)	2	(0.4)
Spinacia	0	(--)	2	(1.0)	0	(--)	2	(0.4)

*Weighted according to household size.

Reasons for Use

Table 7 provides the 10 most commonly reported reasons for use of prescription and OTC drugs, which accounted for 80% of all episodes of drug use in subjects aged <18 years. The most common reason was upper respiratory infection (22%), followed by allergy and headache, each with 12%.

Table 7. Ten Most Commonly Reported Reasons for Medication Use During the Week Before Interview by U.S. Children in 2004*

Reason	No.	(%)
Upper Respiratory Infection	94	(22)
Allergy	52	(12)
Headache/Migraine	50	(12)
Pain	34	(8.0)
Asthma	29	(6.8)
Skin Conditions	23	(5.4)
Fever	19	(4.5)
Attention Deficit Disorder	15	(3.5)
Depression/Anxiety	12	(2.8)
Otitis/Earache	12	(2.8)

*Denominator is 425 episodes of drug use.

THE FINDINGS IN CONTEXT

These recent findings from a nationally representative survey document the high prevalence of medication use in the U.S. population. In 2004, more than 80% of adults and more than half of children took at least one medication in the preceding week; 30% of adults took five or more. Use of prescription drugs was also widespread: 55% of adults and 19% of children took at least one. Women aged ≥ 65 years were the heaviest consumers of medications: 95% took at least one, 64% took five or more, and 16% ten or more. Use of prescription drugs was highest in that group, with rates of 85% and 29%, respectively, for at least one and at least five drugs. In most categories, the prevalence among men 65 years or older was nearly as high.

In adult subjects, OTC analgesics were the most frequently used individual “drug” products (i.e., not vitamins or herbals/natural supplements), taken by 16-20%. Prescription drugs predominated among the remaining commonly used compounds. The most common prescription drugs among women were a thyroid supplement, a cholesterol-lowering drug, and a diuretic; among men, they were a cholesterol-lowering drug and an ACE-inhibitor. Among OTC agents, decongestants, antihistamines, and anti-ulcer agents followed analgesics in frequency. Cox-2 inhibitors deserve special mention because of the considerable controversy surrounding these agents in 2004. The prevalences reported reflect an average for the year, including the period after rofecoxib was withdrawn from the market in September, with a corresponding drop in the use of the other two drugs, celecoxib and valdecoxib (these changes were seen in monthly totals not presented in this report). Nonetheless, celecoxib was still among the 30 most commonly used drugs by adults.

Over the span of six years during which the Slone Survey has been conducted, the prevalence of overall medication use in adults was largely flat, but there were increases in the use of prescription drugs. Some of the largest increases in use over time for individual drugs were observed for metoprolol, alendronate, and fluticasone. Metoprolol was recently shown in a randomized clinical trial to significantly reduce total mortality in individuals with congestive heart failure,⁷ and was subsequently approved for this indication. The increased use of alendronate, a drug used in the prevention and treatment of osteoporosis, is probably related to the recent decline in use of post-menopausal hormone therapy.

As has been well documented elsewhere, including a recent published report from the Slone Survey,⁶ there was a considerable decline in the use of conjugated estrogens following the publication of clinical trial results in 2002 that failed to demonstrate cardiovascular benefits.⁸ That decline was reflected in the present data. More recently, abuse of OTC pseudoephedrine by conversion to methamphetamine has led to a variety of efforts to restrict access,⁹ and this phenomenon likely accounts for the dramatic decrease in use of this common drug since 2003.

Forty percent of the adult population took a vitamin product, mostly multivitamins. Herbal/natural supplements are also widely used: 19% of the survey respondents had taken at least one product containing a herbal component in the preceding week. The most common individual herbal/natural supplements, lutein and lycopene, were taken by 8.2% and 7.0%, respectively, of the adult population. These substances have been added to multivitamins in recent years, representing a source of exposure to herbals that may be unintentional or unrecognized on the part of the consumer.¹⁰

The four individual drugs with the highest prevalence of use among children were OTC analgesics (ibuprofen, acetaminophen) and cough/cold preparations (dextromethorphan, pseudoephedrine). Ibuprofen use was particularly common among subjects aged 12-17 years. Multivitamins were taken by 20% of subjects younger than 18 years; the prevalence was highest in those aged <5 years. Herbal/natural supplement use was quite uncommon in the children. The most commonly reported reason for use was upper respiratory infection (22%); 3.5% of drug episodes in children were for attention deficit disorder and 2.8% were for depression.

The present data also provide users' own perceptions of why they are taking medications. The distribution of stated reasons for use of drugs by adults was largely dominated by hypertension and other specific medical indications. In contrast, among children, upper respiratory infection, allergy, and headache together accounted for almost half of the reported episodes of drug use.

PERSPECTIVE ON THE SLONE SURVEY

The Slone Survey is the first population-based survey to provide comprehensive and ongoing information on use in the U.S. of the broad range of medications, including herbal/natural supplements. Until now, most information on use of regulated drugs has been derived from sales data or reports of dispensed prescriptions; these sources are typically proprietary and unpublished, and they do not measure use by individual patients. Overall rankings of specific drug products by sales are readily available,^{11,12} but again, that information does not necessarily reflect actual use of the drugs. Sales data do not provide information on characteristics of users or details such as perceived indications or concurrent medications that have direct clinical relevance with regard to

compliance and drug interactions. The product sales rankings are not directly comparable to the present results, which provide information on the actual use of drug entities that may be contained in multiple products.

The Slone Survey population is generally similar to the U.S. population. Most differences from U.S. Census data were small, including a modest deficit of Hispanics and males. The largest difference was a deficit of survey subjects from lower socioeconomic levels. Both the latter underrepresentation and the excess of female participants are known aspects of RDD surveys.¹³

Bias due to differences between participants and nonparticipants is a possibility in any survey. However, the Slone Survey participation rate of 60% is high for such studies, particularly in recent years with the development of no call lists and other mechanisms for avoiding unwanted telephone calls. Another potential source of error, differential reporting of the use of specific products, was minimized: all interviewers were rigorously trained to conduct the interviews in a consistent manner, the exposure interval of interest was brief and recent, and subjects were asked to confirm the names of as many medications as possible from containers.

On balance, we judge that the Slone Survey data provide an accurate overall picture of medication use that can be extrapolated to the U.S. population. Whether focused on 2004 or on changes over recent years, the findings are of critical importance in defining the “what, how, and why” of the full spectrum of medication use among U.S. adults and children.

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