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## Review Articles

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# The Prevalence, Impact, and Treatment of Migraine and Severe Headaches in the United States: A Review of Statistics From National Surveillance Studies

Todd A. Smitherman, PhD; Rebecca Burch, MD; Huma Sheikh, MD; Elizabeth Loder, MD, MPH

**Background.**—Four ongoing US public health surveillance studies gather information relevant to the prevalence, impact, and treatment of headache and migraine: the National Health Interview Survey, the National Health and Nutrition Examination Survey, the National Ambulatory Care Survey, and the National Hospital Ambulatory Medical Care Survey. The American Migraine Prevalence and Prevention (AMPP) study is a privately funded study that provides comparative US population-based estimates of the prevalence and burden of migraine and chronic migraine.

**Objective.**—To gather in one place and compare the most current available estimates of the US adult prevalence of headache and migraine, and the number of affected people overall and in various subgroups, and to provide estimates of headache burden and treatment patterns by examining migraine and headache as a reason for ambulatory care and emergency department (ED) visits in the United States.

**Methods.**—We reviewed published analyses from available epidemiological studies identified through searches of PubMed and the National Center for Health Statistics. We aimed to identify information about migraine and headache burden, and treatment in national surveys conducted over the last decade. For each source, we selected the best available and most current estimate of migraine or headache prevalence, and selected associated measures of disability, health care use, and treatment patterns.

**Results.**—Compared with a slightly higher proportion of 22.7% in the National Health and Nutrition Examination Survey, 16.6% of adults 18 or older reported having migraine or other severe headaches in the last 3 months in the 2011 National Health Interview Survey. In contrast, the AMPP study found an overall prevalence of migraine of 11.7% and probable migraine of 4.5%, for a total of 16.2%. Data from National Ambulatory Medical Care Survey/National Hospital Ambulatory Medical Care Survey showed that head pain was the fifth leading cause of ED visits overall in the US and accounted for 1.2% of outpatient visits. The burden of headache was highest in females 18-44, where the 3-month prevalence of migraine or severe headache was 26.1% and head pain was the third leading cause of ED visits. The prevalence and burden of headache was substantial even in the least affected subgroup of males 75 or older, where 4.6% reported experiencing severe headache or migraine in the previous 3 months. Triptans accounted for almost 80% of antimigraine analgesics prescribed at office visits in 2009, nearly half of which were for sumatriptan. Migraine is associated with increased risk for other physical and psychiatric comorbidities, and this risk increases with headache frequency.

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From the Department of Psychology, University of Mississippi, Oxford, MS, USA (T.A. Smitherman); Division of Headache and Pain, Department of Neurology, Brigham and Women's Hospital and Harvard Medical School, Boston, MA, USA (R. Burch, H. Sheikh, and E. Loder).

Address all correspondence to E. Loder, 1153 Centre Street, Suite 470, Boston, MA 02130, USA, email: eloder@partners.org

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**Conclusion.**—This report provides the most current available estimates of the prevalence, impact, and treatment patterns of migraine or severe headache in the United States. Migraine and other severe headaches are a common and major public health problem, particularly among reproductive-aged women. Data about prevalence and disability from the major government-funded surveillance studies are generally consistent with results of studies such as the American Migraine Studies 1 and 2, and the AMPP study.

**Key words:** headache, prevalence, epidemiology, migraine

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Migraine and other benign recurrent headache disorders are a major public health problem. They are associated with substantial personal suffering, disability, and societal expense.<sup>1</sup> In the United States, a number of public health surveillance systems and privately funded studies have collected information on the prevalence, impact, and treatment of headache and migraine. Locating and interpreting the most up-to-date statistics from these sources can be time-consuming. In this article, we provide an overview of current data from a variety of governmental and other sources.

## METHODS

We searched PubMed and the National Center for Health Statistics websites for summary data from population-based or nationally representative survey studies performed in the United States from 1999 to 2011.<sup>2</sup> We limited included studies to those that collected US-wide, population-based information about the prevalence or burden of headache generally or for specific types of headache, such as migraine, for adults 18 or older.

For each of these sources, we identified the best and most recent relevant prevalence and related information about headache and migraine. The data sources used for this review are the National Health and Nutrition Examination Survey (NHANES), the National Health Interview Survey (NHIS), the National Ambulatory Medical Care Survey (NAMCS), and the National Hospital Ambulatory Medical Care Survey (NHAMCS). NHIS, NHANES, NAMCS, and NHAMCS are all conducted by the United States Centers for Disease Control (CDC), and the data for the NHIS, NAMCS, and NHAMCS were obtained from the CDC's online reports,

whereas the NHANES data are from a published peer-reviewed analysis that was the only publication of migraine data from NHANES within the time period covered by our review. We compare results from these studies to the most recent data generated by the only longitudinal US study of headache epidemiology, the American Migraine Prevalence and Prevention (AMPP) study. A brief description of the methods and characteristics of each of these studies follows. Their key features are summarized in the Table.

## IN-HOME STUDIES ON SELF-REPORTED SEVERE HEADACHE

**The NHANES.**—NHANES is conducted annually by the National Center for Health Statistics of the CDC and Prevention to obtain information about the noninstitutionalized US civilian population. The survey uses a stratified, multistage probability sampling design. Trained lay interviewers administer a face-to-face interview in the participants' homes, and respondents later have a physical examination in a mobile unit. Details about sampling and weighting methods are available at the website of the National Center for Health Statistics.<sup>3</sup>

The survey includes standardized questions on a variety of topics including medical conditions, physical function, and health care use, as well as detailed sociodemographic details. Information about headache is collected during the portion of the interview regarding miscellaneous pain, which is administered to participants who are 20 or older. Specifically, participants are asked whether they have experienced "severe headaches or migraine" during the past 3 months. Information about physical conditions is obtained using a standard chronic condition checklist, a method used in many studies conducted by the

Table.—Data Sources and Characteristics

Survey and year (URL)	Sample and Size	Design	Headache-Relevant Questions or Information
NHANES, 6-year data from 1999 to 2004 ( <a href="http://www.cdc.gov/nchs/nhanes.htm">http://www.cdc.gov/nchs/nhanes.htm</a> )	Adults 20 years of age or older; n = 15,330	Stratified, multistage probability sampling; structured interviews; data collected are at the level of individual respondents.	“During the past 3 months did you have a severe headache or migraine?” Respondents were asked to report pain that had lasted a whole day or more, and not to report fleeting or minor aches or pains.
NHIS, 2011 ( <a href="http://www.cdc.gov/nchs/data/ahcd/2011/052.pdf">http://www.cdc.gov/nchs/data/ahcd/2011/052.pdf</a> )	Adults 18 years of age or older; n = 101,875; response rate 82%	Probability sampling of US households and other living quarters; oversampling of ethnic minorities; structured interviews; data collected are at the level of individual respondents.	“During the past 3 months did you have severe headache or migraine?”
NAMCS, 2009 ( <a href="http://www.cdc.gov/nchs/ahcd.htm">http://www.cdc.gov/nchs/ahcd.htm</a> )	1492 physicians participated in NAMCS, with 32,281 patient record forms completed	Physicians record data on patient visits in ambulatory care settings for randomly selected patients during a 1-week period; data collected are a sample of visits, not patients.	Physicians record principal reason for visit, and the number and type of medications that are prescribed. Headache-relevant reasons for a visit are limited to: S210 Headache, pain in head; S410.1 Sinus headache; or D365.0 Migraine.
NHAMCS, 2009 ( <a href="http://www.cdc.gov/nchs/ahcd.htm">http://www.cdc.gov/nchs/ahcd.htm</a> )	356 hospitals participated, with 35,942 patient record forms completed	Hospitals sampled within selected geographical regions; staff record patient visit data in ambulatory care settings for randomly selected patients during a 4-week period; data collected are a sample of visits, not patients.	Data captured include patient-stated reasons for emergency department visits, physician diagnoses, testing ordered and medications prescribed during visits. Headache-relevant reasons for a visit are limited to: S210 Headache, pain in head; S410.1 Sinus headache; or D365.0 Migraine. Headache-relevant diagnoses are 784.0 (headache) or 346.0 (migraine).
AMPP, 2004	Respondents ages 12 and older; n = 163,576 for Stage 1 (18,968 with migraine)	Longitudinal; Stage 1: questionnaire mailed to stratified random sample of 120,000 households; Stage 2: yearly headache-specific survey of 24,000 randomly selected adults from Stage 1 who reported severe headache; data are collected at the level of the individual.	21 questions assessing headache characteristics, the Migraine Disability Assessment Questionnaire and questions about health care usage and migraine treatments. Self-reported headache characteristics were used to classify respondents according to modified International Classification of Headache Disorders-II diagnostic criteria.

AMPP = American Migraine Prevalence and Prevention Study; NAMCS = National Ambulatory Medical Care Survey; NHAMCS = National Hospital Ambulatory Care Survey; NHANES = National Health and Nutrition Examination Survey; NHIS = National Health Interview Survey.

National Center for Health Statistics. It is important to note that this information is self-reported.

**The NHIS.**—The NHIS is a cross-sectional study of the US population that, like the NHANES, uses structured interviews to obtain self-reported health information.<sup>4</sup> It has been conducted yearly since 1957. The sampling plan is designed to representatively sample households and “non-institutional group quarters” (such as dormitories). Sample geographic areas are selected and addresses within those geographic areas are selected for interview. Black, Hispanic, and Asian persons are oversampled at both the geographic and household levels. The sample and interview processes are ongoing throughout the year, with the goal that selected households are a probability sample representative of the target population. Survey participation is voluntary.

There are several segments of the interview. The Family Core component is answered by all adult members of the household aged 17 or over who are available at the time of the interview or about whom information can be given by a present adult. One adult selected at random answers the Sample Adult questionnaire.

The Family Health Status and Limitations Survey, and the Adult Health Status and Limitations Survey include questions about limitations of activities of daily living, employment, and other activities. This section allows interviewees to specify what illnesses are limiting their activities, and one option is migraine. Duration of illness is also specified. The Sample Adult questionnaire includes the question “During the past 3 months, did you have . . . severe headache or migraine?”

### **IN-OFFICE STUDIES OF HEADACHE BURDEN USING PATIENT VISIT ANALYSES**

**The NAMCS.**—NAMCS is an annual cross-sectional study of non-federally employed office-based physicians who provide direct patient care.<sup>5</sup> The survey excludes anesthesiologists, pathologists, and radiologists. The survey began in 1973 and has been conducted annually from 1989. Physicians are visited by trained interviewers who give them survey

forms and provide training. Physicians are then assigned randomly to provide data for a 1-week reporting period, during which they or their office staff provide information on a random sample of patient visits. The data collected include information on symptoms, diagnoses, medications, and other treatments. Survey respondents are asked to record any new or continued medications including nonprescription drugs. Recorded medications are described as “drug mentions.” Drugs are classified based on the Cerner Multum Lexicon scheme; in this scheme, all analgesic drugs, including “antimigraine medications,” are grouped together (ie, second-level category ID = 58). The “Reason for Visit Classification” developed by the American Medical Records Association is used to categorize patient-reported principal reasons for visits. Physician diagnoses are classified using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM).

**The NHAMCS.**—The NHAMCS is intended to collect information on ambulatory care services provided in emergency departments (EDs), hospital outpatient departments and clinics, and (as of 2009) ambulatory surgery centers.<sup>5</sup> The unit of sampling in this study is visits, not patients. The study uses a 4-stage design to identify a selection of hospitals within selected geographic areas of the 50 states and District of Columbia, and within these hospitals, all clinics, EDs, and ambulatory surgery locations are included and patient visits to these are sampled. Federal, military, and Veterans Administration hospitals are excluded from this sample.

Trained interviewers visit facilities selected for inclusion in the study to train staff for data collection procedures. Data are collected using 1 of 3 versions of the Patient Record form. These are completed by medical staff for a random sample of patient visits during a 4-week period. Collected information includes complaints, diagnoses, testing and procedures, medications used, and demographic information. As in the NAMCS, the “Reason for Visit Classification” developed by the American Medical Records Association is used to categorize patient-reported principal reasons for visits. Physician diagnoses are classified using the ICD-9-CM.

## MIGRAINE-SPECIFIC POPULATION DATA ON PREVALENCE AND DISABILITY

**The AMPP Study.**—The AMPP study is a longitudinal population-based study of Americans with migraine.<sup>6</sup> Previous population-based studies of migraine prevalence, the American Migraine Studies 1 and 2, obtained cross-sectional data on migraine prevalence and disability.<sup>7-9</sup> The AMPP began in 2004 with a questionnaire that was mailed to a stratified random sample of US households drawn from a panel maintained by a survey sampling company.<sup>6</sup> The sample was created to be representative of the US population for key characteristics such as income, number of family members, and age of household head. The survey was mailed to 120,000 household with 257,339 household members. Like NHIS and NHANES, AMPP also uses self-report of symptoms to assign a diagnosis; unlike the NHIS and NHANES questions, those used in AMPP have been validated. The second phase of the survey involved a random sample of 24,000 adults 18 years of age or older from the group who had previously reported having a severe headache. This group was sent a yearly survey from 2005 to 2009. The surveys collected information on the frequency and severity of headaches as well as symptoms, treatment, disability, and demographic information. The surveys were constructed so that a diagnosis of migraine could be made based on International Classification of Headache Disorders-II criteria (ICHD-II citation); a previous study estimated this method to have a sensitivity of 100% and specificity of 82.3%.<sup>6</sup>

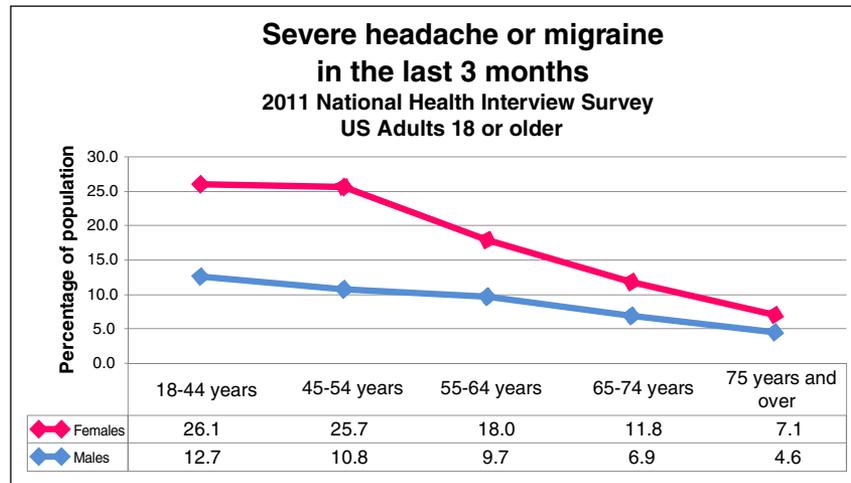
## RESULTS

**The NHANES.**—Kalaydjian and Merikangas analyzed data from 6 years of NHANES spanning the period of 1999-2004.<sup>10</sup> In the sample of 15,322 adults aged 20 or older who were interviewed, 3045 reported severe headache or migraine in the previous 3 months for an overall prevalence of 22.7% (27.6% in females and 14.8% in males). Overall, the odds of having severe headache/migraine were 2.32 higher for females compared with males (95% confidence interval [CI] 2.08-2.39). Prevalence did not differ substantially by race or ethnicity. More frequent health care usage was associated with headache, with 43.32% of

those with headache reporting 4 or more health care visits in the last year (vs 22.7% for those without headache). The odds of being diagnosed with a comorbid physical or psychiatric condition were, respectively, 2.8 and 2.3 times greater in those with headaches compared with those without severe headache after controlling for demographic variables.

**The NHIS.**—The most current NHIS results are from the 2011 survey.<sup>11</sup> In the 2011 survey, 101,875 adults from 39,509 households were interviewed. The overall age-adjusted prevalence of severe headache or migraine in the last 3 months among adults 18 or older was 16.6% (10.8% for males and 22.3% for females). Prevalence within specific age strata were as follows: 19.4% in those aged 18-24, 19.0% in those aged 25-44, 19.4% in those aged 45-54, 14.0% in those aged 55-64, 9.5% in those aged 65-74, and 6.1% in those 75 and older. Substantial sex- and age-related variability in headache prevalence was evident, however, as shown in Figure 1. The highest prevalence of 26.1% occurred among females aged 18-44. The lowest prevalence of 4.6% occurred among males 75 or older. Headache/migraine prevalence was inversely related to income and educational attainment (Figs. 2 and 3). Income-related disparities were less pronounced among Hispanics/Latinos compared with whites or African Americans.

**The NAMCS.**—The most current summary NAMCS results are from the 2009 survey.<sup>12</sup> Based on the “Reason for Visit Classification” used in this survey, “pain in the head” was among the top 20 reasons (as provided by patients) for outpatient office visits. Overall head pain was listed as the reason for an office visit in 1.2% ( $\pm 0.1$  standard error [SE]) of visits. For females, headache was responsible for 1.5% of visits (SE 0.2) and for males 0.7% (SE 0.1). This translates, based on 2000 census estimates, into 12,100,000 office visits for headache (SE 1,680,000). NAMCS also provides detailed information on prescriptions issued at outpatient visits. Analgesics were the most commonly mentioned drugs, accounting for 11.4% of all drugs mentioned. An estimated 6,227,452 prescriptions were written for antimigraine drugs in 2009. As shown in Figures 4 and 5, triptans account for over 80% of prescriptions issued for specific antimigraine drugs, nearly half of which were for sumatriptan.

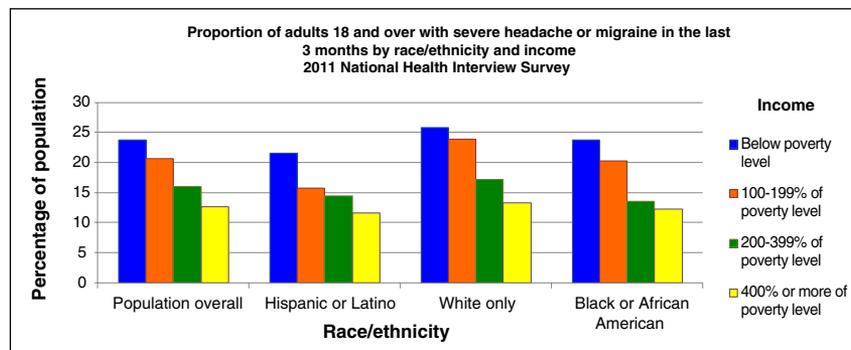


**Fig 1.**—Data from the 2011 National Health Interview Survey show the proportion of US adults in various age categories who reported severe headache or migraine in the preceding 3 months. Results are age-standardized to the year 2000 population.

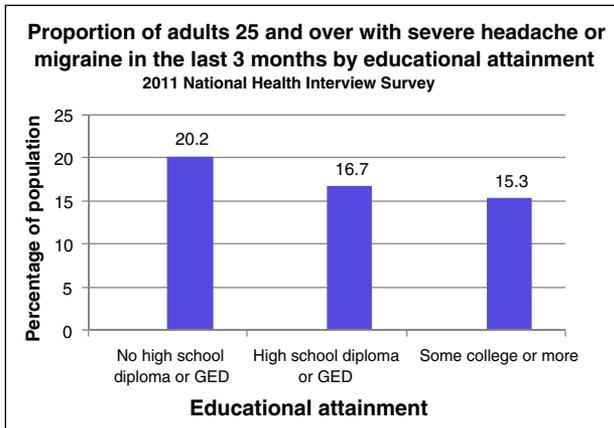
**The NHAMCS.**—The most recent summary NHAMCS data are for 2009.<sup>12</sup> Overall, headache or pain in the head was the fifth leading cause of visits to the ED, as reported by patients (Fig. 6). When examined by age and sex, however, head pain was the third leading patient-reported reason for ED visits for women 15-64, accounting for 2.6% of ED visits; in men in that age group, it was the fifth leading reason (1.1%). 2009 NHAMCS data on final, physician diagnoses for ED visits also showed that in females ages 15-64 who attended the ED, “headache” was the seventh most common diagnosed condition (1.3%) and “migraine” specifically the 16th most common (1.0%). Comparatively, among males, “headache”

ranked as the 19th most common condition diagnosed in emergency settings (0.5%), while migraine was not among the top 20 conditions.

NHAMCS also provides data on imaging and other testing performed during ED visits. It is not possible to determine what fraction of imaging tests are ordered for headache, but it is likely that a substantial fraction of computed tomography (CT) scans of the head, for example, are ordered in patients who present with headache. Other reasons for head CT scans, such as stroke evaluations, probably also contribute to testing. In data from the NHAMCS for 2009, CT scans of the head accounted for 7.1% (SE 0.3) of all ED imaging tests ordered, which extrapo-



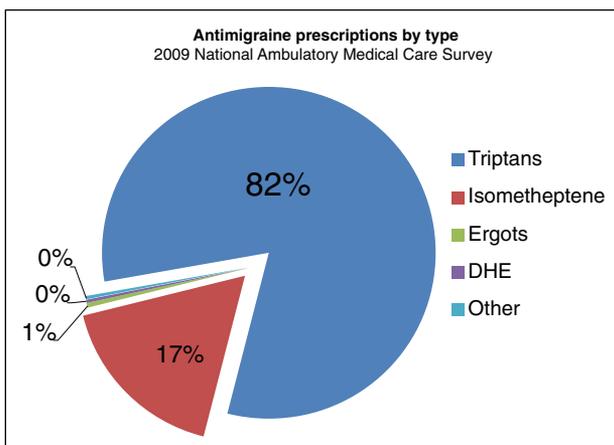
**Fig 2.**—Data from the 2011 National Health Interview Survey, showing the proportion of US adults in specific racial/ethnic and income categories who reported experiencing severe headache or migraine in the last 3 months. Percentage of poverty level is based on family income, size, and composition. The category “below 100%” refers to incomes below the poverty level; 100-199% refers to incomes between poverty level and up to 199% of the poverty level, and so on.



**Fig 3.**—Data from the 2011 National Health Interview Survey show that the prevalence of severe headache or migraine is highest in those with the lowest level of educational attainment. GED = general educational development, an alternative to a traditional high school diploma.

lates to 9,669,000 (SE 678,000) ED visits in which a head CT was ordered. Information on magnetic resonance imaging scans is not available.

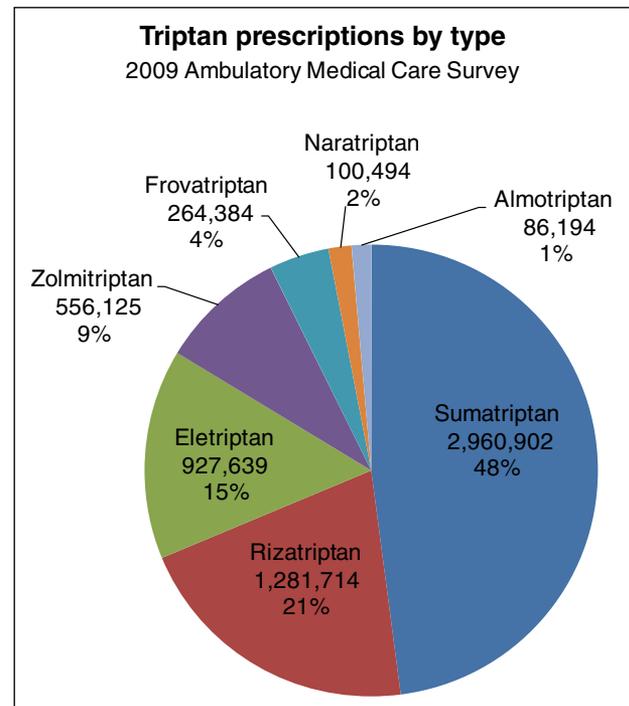
**The AMPP Study.**—The response rate to the 2004 AMPP survey was 64.9% (77,879 households), with information obtained on 162,756 people 12 years of age or older. Of these, 30,721 reported that they experienced severe headache in the year preceding the survey. Of those who returned usable data, 18,968 met ICHD-II diagnostic criteria for migraine, for an unadjusted 1-year period prevalence of 11.7%.<sup>6</sup> With the



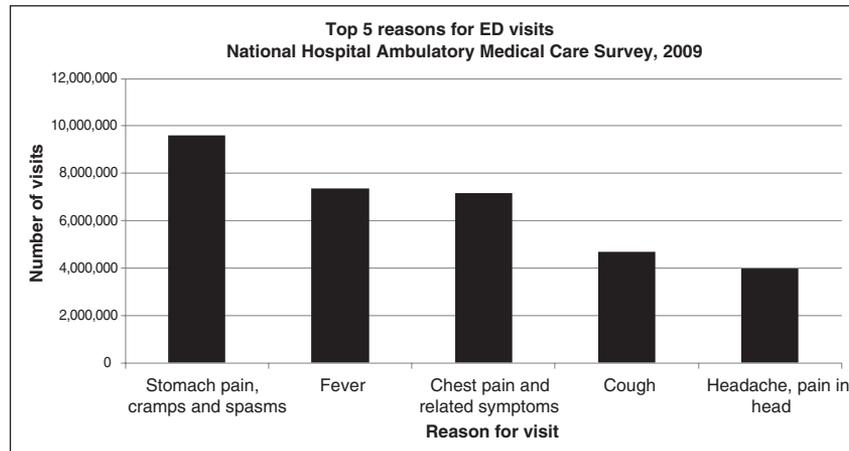
**Fig 4.**—In 2009, over 80% of prescriptions for specific antimigraine medications were for triptans. Isometheptene-containing compounds accounted for nearly 1 in every 5 prescriptions.

highest prevalence observed among those ages 18-59, 17.1% of women and 5.6% of men met diagnostic criteria for migraine. Migraine was more common among whites than blacks and among those with lower income levels. Over half (53.7%) of migraineurs endorsed severe impairment or need for bed rest during their attacks, and 22.0% obtained scores indicative of moderate or severe migraine-related disability on the Migraine Disability Assessment Questionnaire (MIDAS).<sup>13</sup> Thirty-two percent of migraineurs who had never used a preventive medication were current candidates for pharmacological prophylaxis based on expert-defined consensus criteria. The 1-year period prevalence of probable migraine (meeting all but 1 criterion for a diagnosis of migraine) was 4.5% overall (5.1% in women and 3.9% in men).<sup>14</sup>

The overall prevalence of chronic migraine (CM), defined as meeting criteria for migraine and having an average of 15 or more days of headache per month over the preceding 3 months, was 0.91%



**Fig 5.**—Data from the 2009 National Ambulatory Care Survey, showing the number and proportion of triptan prescriptions by specific drug. Sumatriptan accounted for almost half of all triptan prescriptions, and rizatriptan and eletriptan together for about a third.



**Fig 6.—Headache is the fifth leading cause of emergency department visits in the United States, estimated to account for over 4 million visits annually. Among women 15-64, it rises to third place, accounting for 2.6% of emergency department (ED) visits in that group.**

(1.29% of females and 0.48% of males). CM comprised 7.7% of total migraine cases and was inversely related to household income. In both sexes, the prevalence of CM was highest between ages 18 and 49 (as high as 1.9% for women ages 40-49).<sup>15</sup> CM was associated with significantly greater headache-related disability than episodic migraine (38.0% vs 9.5% endorsing severe disability on the MIDAS),<sup>11</sup> as well as rates of significant depression or anxiety that were more than double those of individuals with episodic migraine.<sup>16</sup> With 1% of migraineurs reporting 4 or more visits during the year, 7.3% of migraineurs in the AMPP reported an ED visit for headache during 2004. That 1%, however, accounted for 51% (95% CI 49-53%) of all ED visits.<sup>17</sup>

## DISCUSSION

This report summarizes the best available data on migraine prevalence, impact, and treatment in the US using data from recent large-scale surveillance studies. These large, ongoing, government-funded population surveys used different sampling frames and methods to identify migraine and severe headaches. Despite this, the data from these sources are remarkably consistent and support 5 general conclusions: (1) migraine/severe headache is more common among females than males, with a peak sex prevalence ratio of roughly 3:1 during midlife; data suggest that roughly 1 in every 4 women will experi-

ence migraine; (2) prevalence peaks between early and middle adulthood and declines substantially thereafter; (3) prevalence is inversely related to income and educational attainment; (4) migraine is significantly disabling and burdensome; and (5) migraine is associated with increased rates of medical and psychiatric comorbidities. These general conclusions are consistent with those from the migraine-specific AMPP study, supporting the view that most of the “severe” headaches reported in the NHIS and NHANES are in fact migraine.

Three-month prevalence rates from the major general health surveillance studies ranged from 16.6% (NHIS) to 22.7% (NHANES). The peak prevalence of roughly a quarter of the female population with severe headache or migraine is remarkably consistent with other population-based estimates of the prevalence of migraine in women, and the decline in headache prevalence with age also mirrors findings from other large population-based studies. The reason for the higher prevalence finding in NHANES compared with NHIS is unclear; this almost 6-point gap is surprising in view of the fact that both surveys use the same question. Respondents to NHANES differ from those in NHIS in that they have agreed to undergo an examination and testing in addition to answering questions. Respondents who agree to this additional burden may differ from those who agree only to answer questions, or their reporting

behavior may differ as a result of the scrutiny they expect their symptoms to receive.

Prevalence estimates from NHIS and NHANES are somewhat higher than those obtained in the migraine-specific AMPP study (11.7%)<sup>6</sup> likely because NHIS and NHANES ask about physician- or self-reported migraine (ie, they do not assess ICHD-II diagnostic criteria specifically) and because they inquire also about “severe headache” in addition to migraine. NHIS and NHANES do not capture data on people who had a severe headache prior to the 3-month recall interval and likely capture a small proportion of individuals with headaches of other causes, given the high prevalence of migraine.

Combining the prevalence of migraine (11.7%) and probable migraine (4.5%) in AMPP, however, produces a prevalence of 16.2%, which is very close to the NHIS result. Notably, however, the AMPP study assessed migraine criteria only among those with self-reported severe headache initially and thus may not capture migraineurs with headaches of less severe intensity. Although the AMPP study and American Migraine Studies 1 and 2 found that migraine was more common among whites than blacks,<sup>6,9</sup> data from the surveillance surveys did not show such striking racial differences. This may be the result of applying strict criteria for migraine as opposed to asking about “severe headache” or differences in the samples, among other factors. Consistent with data from previous studies, information from NHIS shows an inverse relationship between headache prevalence and income. It should be noted, however, that NHIS does not stratify income above 400% of the poverty level, so it is not possible to examine this association at higher levels of income. Within the categories of income that are reported, however, for the population as a whole and in all racial/ethnic groups, the prevalence of headache is inversely proportional to income level, although disparities are less extreme among the Hispanic/Latino population. This inverse relationship is consistent with data from other population-based studies, including the American Migraine Studies 1 and 2,<sup>7,8</sup> and the AMPP studies.

The impact of migraine is substantial because of its high prevalence, accompanying significant disability, and risk for other comorbidities. Data from the

NAMCS and NHAMCS indicate that headache is among the top 20 reasons for outpatient medical visits and among the top 5 reasons for ED visits. As with prevalence, medical visits for migraine are more common among women than men. Based on NAMCS data, over 12 million office visits for migraine occurred in 2009, and over 6 million prescriptions were issued for antimigraine drugs. This suggests that roughly half of all outpatient visits for headache result in the prescription of an antimigraine agent, most of which are for a triptan. Sumatriptan accounted for almost half of all triptan prescriptions and rizatriptan and eletriptan together for about a third. The reasons for this pattern of triptan prescriptions are not completely known. As the first of 7 commercially available triptans, sumatriptan has always been the most prescribed triptan; its share of prescriptions may have increased since it became available in generic formulations in the late 2000s. The distribution of triptan prescriptions seems likely to change in the future as more triptans become available in less expensive generic versions. A large proportion of migraineurs who merit prophylactic therapy remain untreated. The mismatch between prevalence and appropriate treatment suggests that the public health impact of migraine will continue as a major problem until provider assessment and recognition of migraine improve. AMPP data extend our understanding of ED use in migraineurs by showing that a small proportion of the migraine population accounts for almost half of ED use for migraine. Further research should aim to characterize this population and identify interventions that might decrease ED use. Beyond the burden of migraine itself, migraine confers increased risk for other physical and psychiatric comorbidities, and rates of these comorbidities are highest among those with CM.

Our aim was to summarize the most recent large-scale data on prevalence and impact of migraine within the US population. While these are the best and most current available data, they must be considered in the context of potential limitations. As noted earlier, case definitions and measurement intervals vary across studies. Data are self-reported, and the validity of having received a physician diagnosis of migraine is unknown. Generalizability to the entire

US population depends on the extent to which the sample populations in the studies are representative of the general US population, so estimates for under-represented subgroups may not be entirely accurate. The consistency of prevalence estimates across the various studies, however, is reassuring and supports the view that data from these surveys are reliable.

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