

# Prevalence estimates for MS in the United States and evidence of an increasing trend for women

**Abstract**—The purpose of this study was to provide current age-, sex-, and region-specific MS prevalence estimates and to identify trends using the National Health Interview Survey. The overall prevalence estimate was 85/100,000 population, or approximately 211,000 ( $\pm 20,000$ ) persons. A 50% increase was observed in the number of women reporting MS for 1991 through 1994 vs 1982 through 1986. The observed trend in higher numbers of self-reported MS among women is consistent with recent observations of higher prevalence and incidence.

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Residents of several communities living near hazardous waste sites have expressed concerns about the perceived high prevalence of MS in their communities and the potential linkage with environmental contaminants. The ability of health agencies to respond to these concerns is limited because of a lack of reliable data on expected numbers of MS cases.

Prevalence figures from community-based studies in the United States range from 39 to 173 cases/100,000 population.<sup>1</sup> The only national data for MS prevalence by age groups and race/ethnicity are based on a 1976 survey sponsored by the National Institute of Neurologic and Communicative Disorders and Stroke.<sup>2,3</sup> Given the changes that have occurred in diagnostic criteria and the increasing use of laboratory methods for detection of MS, more current estimates are needed.

**Methods.** The National Health Interview Survey (NHIS) is conducted annually among a probability sample of the civilian, noninstitutionalized population of the United States by the National Center for Health Statistics (NCHS).<sup>4</sup> Our analysis was restricted to the years 1982 through 1996 because the sample design and core questionnaire remained relatively unchanged during these years, and, starting in 1997, MS was no longer included as a condition in the NHIS. Information was gathered through direct interview, or surrogate interview for some family members, about health conditions resulting in limitation of activity, doctor visits, or hospital visits.

Reports of limitation of activity caused by MS were used to reflect trends over time to lessen the impact that changes in media attention or public perception could have had on self-reporting of MS. Six recent years (1989 through 1994) of NHIS data were combined for analyses of overall prevalence and geographic, age, and race/ethnicity distributions of MS. Strata-specific prevalence estimates for the combined years 1989 through 1994 were based on reports among the one-sixth of the survey population that was specifically asked about the disease and the remainder who self-reported MS for other reasons. SUDAAN (RTI,

Research Triangle Park, NC) and weights provided by the NCHS were used to determine prevalence and relative SE of the estimates (RSE). An estimate with an RSE greater than 30% was considered unstable and noted in the data presented below. Differences between strata-specific estimates were evaluated using pairwise  $\chi^2$  tests.

**Results.** Figure 1 shows a 15-year (1982 through 1996) trend in NHIS data in the estimated number of persons reporting MS as a cause of limitation of activity. Estimates for limitation of activity due to MS among women were approximately 50% higher in recent years, as compared with the earlier survey years. The estimates (per 100,000 women) were 75 for the grouped years 1982 through 1986, 102 for 1987 through 1990, and 113 for 1991 through 1994 ( $p < 0.05$ , pairwise  $\chi^2$  test for the years 1982 through 1986 vs 1987 through 1990 or 1991 through 1994). Similar trends over time were observed when evaluating MS prevalence estimates rather than limitation of activity (data not shown). There were no trends over time observed among men reporting MS as a cause for limitation of activity.

Based on reporting by participants who were specifically asked about MS, the overall combined prevalence estimate for MS (1989 through 1994) is 85/100,000 population, or approximately 211,000 ( $\pm 20,000$ ) persons with the disease among the civilian, noninstitutionalized population of the United States. The reporting of MS among those who were specifically asked about the condition and the remaining five-sixths of the sample was proportionally similar, thus all 609 reported cases of MS were used to achieve stable strata-specific estimates. The age and race/ethnicity distribution of MS are presented in the table. The ratio of women to men for the combined data are 2.6:1, but the ratio ranges from 1.9:1 to 3.6:1 for the specific age groups evaluated in this study. The MS prevalence estimates among both women and men were highest for the age groups 40 to 49 years and 50 to 59 years. White women had a higher prevalence estimate than women in other race/ethnicity groups ( $p$  value  $< 0.05$ , pairwise  $\chi^2$  tests). Figure 2 presents estimates of MS for each sex by the four geographic regions used in the NHIS. The estimate for women in the South was lower than for the other regions ( $p$  value  $< 0.05$ , pairwise  $\chi^2$  tests).

**Discussion.** This is the first use of a national probability sample combined over several years to estimate age- and sex-specific MS prevalence and to examine trends over time. The only previous age-

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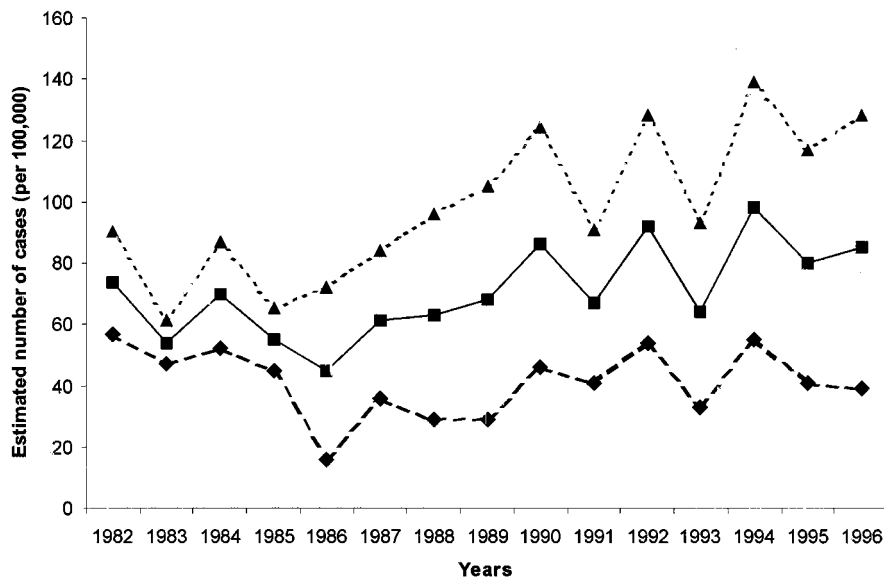


Figure 1. Estimated number of persons (per 100,000 civilian, noninstitutionalized US population) reporting MS as a cause for limitation of activity, according to the National Health Interview Survey, 1982 through 1996 (▲ = women, ◆ = men, ■ = total).

specific estimates were based on a 1976 survey of health care providers.<sup>2,3</sup> Our overall prevalence estimate of 85/100,000 population was higher than the 1976 estimate of 58/100,000 population; however, it is lower than the estimate 102 to 139/100,000, which was based on a revision of the 1976 data.<sup>2,3</sup> Alternative adjustments to the 1976 survey data result in prevalence estimates that are close to our estimate of approximately 211,000 people with MS in the United States.<sup>5</sup>

In agreement with previous studies,<sup>1,2</sup> a higher prevalence was observed among women and among

those aged 40 to 59 years. These data also demonstrated an increasing trend over time in the numbers of women reporting MS as a cause for limitation of activity. This indication of increasing MS prevalence among women in the United States is consistent with recently observed increases in MS incidence.<sup>6,7</sup> In addition to changes in incidence, prevalence trends could be affected by diagnostic changes or treatments resulting in prolonged duration of disease. Men with MS may have poorer prognosis for disability and death and greater utilization of health care services than women,<sup>8,9</sup> but it is uncertain how these potential differences would influence prevalence trends. The observed variation in race/ethnicity-specific figures is in agreement with previous reports of a higher prevalence among white persons.<sup>2</sup> The estimates by geographic region agree with previous observations of a latitude gradient for MS, with the lowest prevalence in the South.<sup>2</sup>

Several limitations exist in the use of NHIS data to estimate chronic disease prevalence. First, proxy responses were used for family members who were not present at the time of the interview. Based on the 1976 survey, approximately 14% of participants with MS would be unaware of their diagnosis and unlikely to report the disease in a health interview.<sup>2</sup> Second, no medical records or laboratory results are available to confirm case diagnosis, so it must be assumed that MS cases identified from the NHIS could include definite, probable, and possible cases. Third, recent health care provider visits may not capture all respondents with MS who did not report the condition as a cause for limitation of activity.<sup>8,10</sup>

Finally, the age-, race/ethnicity-, and region-specific prevalence estimates in this study are based on self-reports of MS from all participants, regardless of whether or not they were specifically asked about the condition. NCHS does not recommend combining those who were specifically asked about a

**Table** Estimated number of persons (per 100,000 civilian, noninstitutionalized US population) with MS by age, race/ethnicity, and sex, based on the National Health Interview Survey, 1989 through 1994

Variable	Men	Women	Total
<b>Race/ethnicity</b>			
White	54 ± 4	137 ± 8	96 ± 5
Black/African American	25 ± 8*	68 ± 15	48 ± 9
All other races/ethnicities	19 ± 10*	67 ± 19	43 ± 11
<b>Age group, y</b>			
<30	5 ± 2*	25 ± 5	15 ± 2
30–39	58 ± 11	145 ± 17	102 ± 11
40–49	110 ± 17	305 ± 27	209 ± 16
50–59	123 ± 20	237 ± 26	182 ± 16
60–69	98 ± 18	190 ± 26	148 ± 17
70+	33 ± 12*	105 ± 19	76 ± 12
Total	48 ± 4	123 ± 7	87 ± 4†

Values are expressed as estimated no. of persons ± SEM.

\* Estimate is unstable. Standard error/estimate >0.30.

† This overall estimate differs slightly from the prevalence estimate of 85/100,000 presented in the text, because the table data is based on all reports of MS among those surveyed, not only those that were specifically asked about the condition.

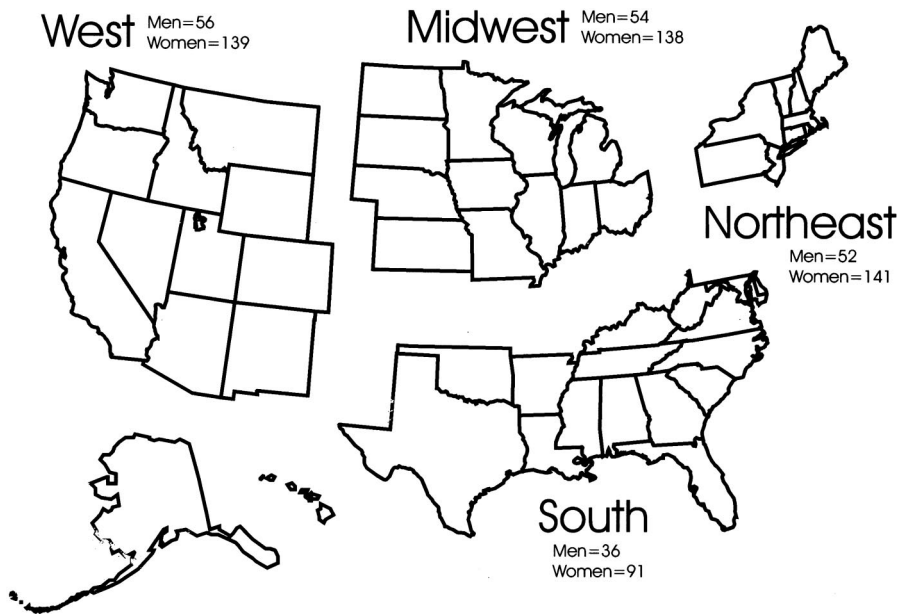


Figure 2. Estimated number of persons (per 100,000 civilian, noninstitutionalized U.S. population) with MS, by sex and geographic region, based on the National Health Interview Survey, 1989 through 1994.

condition and those who self-reported for other reasons, because individuals in the two groups have different opportunities for reporting the condition.<sup>4</sup> The reporting of MS among those specifically asked about the disease and others was proportionally similar, thus we do not expect this to be a major limitation. Indeed, for the years 1989 through 1994, our overall prevalence estimate based on those specifically asked about MS (approximately 211,000 people) was comparable to the estimate that was obtained when all reports of MS were included (approximately 217,000 people).

When conducting an assessment of a reported disease cluster, investigators must first determine whether or not an excess has occurred. The statistics presented here may be useful for assessing a suspected cluster of MS, assuming that appropriate consideration is given to the limitations discussed above.

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