Prevalence of Hearing Loss by Severity in the United States

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Objectives. To estimate the age- and severity-specific prevalence of hearing impairment in the United States.

Methods. We conducted cross-sectional analyses of 2001 through 2010 data from the National Health and Nutrition Examination Survey on 9648 individuals aged 12 years or older. Hearing loss was defined as mild (> 25 dB through 40 dB), moderate (> 40 dB through 60 dB), severe (> 60 dB through 80 dB), or profound (> 80 dB).

Results. An estimated 25.4 million, 10.7 million, 1.8 million, and 0.4 million US residents aged 12 years or older, respectively, have mild, moderate, severe, and profound better-ear hearing loss. Older individuals displayed a higher prevalence of hearing loss and more severe levels of loss. Across most ages, the prevalence was higher among Hispanic and non-Hispanic Whites than among non-Hispanic Blacks and was higher among men than women.

Conclusions. Hearing loss directly affects 23% of Americans aged 12 years or older. The majority of these individuals have mild hearing loss; however, moderate loss is more prevalent than mild loss among individuals aged 80 years or older.

Public Health Implications. Our estimates can inform national public health initiatives on hearing loss and help guide policy recommendations currently being discussed at the Institute of Medicine and the White House. (*Am J Public Health.* 2016;106:1820–1822. doi:10.2105/AJPH.2016.303299)

Current initiatives of the Institute of Medicine[1] and the President's Council of Advisors on Science and Technology[2] are addressing hearing loss as a key public health issue given its potential impact on the cognitive, social, and physical functioning of adults.[3,4] However, existing estimates[5] of hearing loss prevalence are outdated, do not reflect current population estimates, and do not include estimates according to hearing loss severity. Updated information by hearing loss severity is important for informing policy decisions. We sought to estimate the number of people in the United States who have a hearing impairment by severity and age using audiometric data and the most currently available population estimates.

METHODS

We analyzed data from the 2001 to 2010 cycles of the National Health and Nutritional Examination Survey, an ongoing biannual epidemiological survey of a representative sample of the US noninstitutionalized population. Air-conduction pure-tone audiometry tests performed in a sound-attenuating booth (measured in decibel hearing level) were administered to a random half sample of all participants aged 20 to 69 years from 2001 to 2004, all participants aged 70 years or older in the 2005–2006 and 2009–2010 cycles, and all participants aged 12 to 19 years in the 2005–2006, 2007–2008, and 2009–2010 cycles.

The same standardized protocol for audiometric testing was followed in all cycles. Individuals were excluded if threshold data were missing for one ear or there was a difference of more than 10 decibels in a 1-kilohertz retest of the same ear. If participants did not hear the stimulus at the highest level tested (120 dB), a threshold of 125 decibels was assigned, providing a conservative estimate of their hearing and allowing an average threshold to be calculated.

A 4-frequency (0.5 kHz, 1 kHz, 2 kHz, 4 kHz) pure-tone-average threshold was calculated for each ear. World Health Organization criteria were used to classify the severity of hearing loss in each ear as mild (> 25 dB through 40 dB), moderate (> 40 dB through 60 dB), severe (> 60 dB through 80 dB), or profound (> 80 dB). In instances in which the hearing loss severity classification differed between the 2 ears, bilateral hearing loss severity was based on the better ear (i.e., mild bilateral loss was defined as one ear having mild loss and the other ear having mild or greater loss).

We estimated prevalence of hearing loss by severity over age decades. Overall hearing loss prevalence was estimated according to age decade, gender, and self-reported race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, other; Table A, available as a supplement to the online version of this article at http://www.ajph.org). We used 2015 US population estimates to estimate the number of people with hearing loss.[6] To account for the complex sampling design, we employed sample weights in accordance with National Center for Health Statistics guidelines.[7] Analyses were conducted in Stata version 12 (StataCorp LP, College Station, TX).

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RESULTS

Table 1 displays the prevalence of, and number of individuals with, hearing loss by severity and age. Across the ages of 12 through 79 years, the most prevalent type of hearing loss was mild (> 25 dB through 40 dB). Only in the oldest age bracket (> 80 years) did the prevalence of moderate hearing loss (41% in at least 1 ear, 38% bilateral) exceed that of mild loss (31% in at least 1 ear, 36% bilateral).

We estimate that 6.6 million (2.5%) Americans aged 12 years or older have severe to profound hearing loss in at least 1 ear, with three quarters of these individuals (5.0 million) being older than 60 years. Overall, we estimate that 38.2 million (14.3%) Americans aged 12 years or older have bilateral hearing loss and that 60.7 million (22.7%) have hearing loss in at least 1 ear.

In our sample, the prevalence of hearing loss was higher among older than younger individuals, and, among those aged 40 years or older, the prevalence was significantly higher among men than women ($P < .01$; Table A). The prevalence of hearing loss among Hispanics and non-Hispanic Whites was higher than the prevalence among non-Hispanic Blacks across almost all ages (Table A).

DISCUSSION

In the United States, nearly 1 in 4 individuals aged 12 years or older have hearing loss in at least 1 ear, and 1 in 7 have bilateral hearing loss. Hearing loss is more prevalent among older adults, with two thirds of individuals aged 70 years or older having bilateral hearing loss and almost three quarters having hearing loss in at least 1 ear. Hearing loss is more prevalent among men than women; one third of men aged 40 years or older are estimated to have hearing loss, compared with one fifth of women. In addition, hearing loss is less prevalent among non-Hispanic Black individuals than among individuals from other racial/ethnic groups.

A limitation of our study is that the prevalence estimates for some age and severity subcategories might be imprecise because of the small number of affected individuals in the analytic cohort. However, this limitation would not affect our overall prevalence estimates combining aggregated data across all individuals.

PUBLIC HEALTH IMPLICATIONS

Our study provides current national estimates of the prevalence of, and number of

TABLE 1—Prevalence of and Numbers of Individuals With Hearing Loss, by Age and Severity: National Health and Nutrition Examination Survey, United States, 2001–2010

Hearing Loss Category and Age, y	Prevalence, % (95% CI)					Number With Hearing Loss (Millions)				
	Mild	Moderate	Severe	Profound	Overall	Mild	Moderate	Severe	Profound	Overall
Bilateral[a]										
12–19 y	0.14 (0.04, 0.24)	0.03[b] (0.00, 0.06)	. . .[c]	0.00[b] (0.00, 0.01)	0.18 (0.07, 0.28)	0.05	0.01	. . .[c]	<0.01	0.06
20–29 y	0.34[b] (0.00, 0.88)	0.07[b] (0.00, 0.20)	. . .[c]	. . .[c]	0.42[b] (0.00, 0.97)	0.15	0.03	. . .[c]	. . .[c]	0.18
30–39 y	1.01[b] (0.18, 1.84)	0.55[b] (0.00, 1.21)	0.08[b] (0.00, 0.25)	. . .[c]	1.64 (0.23, 3.06)	0.41	0.23	0.03	. . .[c]	0.68
40–49 y	6.05 (3.71, 8.40)	0.48[b] (0.00, 1.01)	. . .[c]	. . .[c]	6.53 (4.19, 8.88)	2.46	0.20	. . .[c]	. . .[c]	2.65
50–59 y	10.48 (7.34, 13.62)	2.13 (0.79, 3.46)	0.35[b] (0.00, 0.78)	0.34[b] (0.00, 0.99)	13.29 (9.76, 16.81)	4.57	0.93	0.15	0.15	5.80
60–69 y	19.94 (15.03, 24.84)	5.85 (3.53, 8.17)	0.76[b] (0.00, 1.70)	0.25[b] (0.00, 0.75)	26.80 (22.25, 31.35)	6.92	2.03	0.27	0.09	9.31
70–79 y	35.62 (31.03, 40.22)	15.83 (13.63, 18.04)	2.86 (1.60, 4.12)	0.30[b] (0.02, 0.59)	54.62 (49.27, 59.97)	6.84	3.04	0.55	0.06	10.49
≥80 y	36.02 (32.03, 40.01)	37.92 (33.40, 42.44)	6.97 (4.94, 9.01)	0.56[b] (0.01, 1.10)	81.47 (78.12, 84.82)	3.98	4.19	0.77	0.06	9.01
Total						25.39	10.66	1.77	0.35	38.17
Loss in at least 1 ear (unilateral and bilateral)										
12–19 y	1.18 (0.77, 1.59)	0.46 (0.18, 0.74)	0.31 (0.11, 0.51)	0.01[b] (0.00, 0.03)	1.96 (1.39, 2.54)	0.39	0.15	0.10	< 0.01	0.65
20–29 y	2.32 (0.92, 3.72)	0.62[b] (0.00, 1.75)	0.02[b] (0.00, 0.05)	0.26[b] (0.00, 0.65)	3.22 (1.38, 5.07)	1.02	0.28	0.01	0.11	1.42
30–39 y	3.50 (1.91, 5.09)	1.38 (0.15, 2.62)	0.30[b] (0.00, 0.76)	0.25[b] (0.00, 0.63)	5.43 (3.28, 7.58)	1.44	0.57	0.12	0.10	2.23
40–49 y	10.02 (7.41, 12.64)	2.00 (1.01, 3.00)	0.86[b] (0.00, 1.88)	0.06[b] (0.00, 0.19)	12.95 (9.85, 16.04)	4.07	0.81	0.35	0.03	5.25
50–59 y	21.30 (16.57, 26.02)	5.49 (3.35, 7.63)	0.82[b] (0.06, 1.57)	1.08[b] (0.06, 2.10)	28.69 (23.63, 33.74)	9.30	2.40	0.36	0.47	12.52
60–69 y	29.38 (24.46, 34.29)	12.12[b] (8.62, 15.62)	2.06 (0.61, 3.51)	1.30[b] (0.29, 2.31)	44.86 (40.79, 48.92)	10.20	4.21	0.72	0.45	15.58
70–79 y	37.51 (33.10, 41.92)	21.14 (17.88, 24.40)	7.47 (5.75, 9.19)	2.04 (1.06, 3.01)	68.15 (62.78, 73.53)	7.21	4.06	1.43	0.39	13.09
≥80 y	31.42 (26.75, 36.08)	40.83 (36.42, 45.24)	13.80 (11.13, 16.47)	4.24 (2.49, 5.99)	90.29 (87.20, 93.39)	3.47	4.51	1.53	0.47	9.98
Total						37.10	16.99	4.61	2.03	60.73

Note. CI = confidence interval. Hearing loss was defined as a pure-tone average (at 0.5, 1, 2, and 4 kHz) of above 25 dB hearing level. The sample size was n = 9648.

[a]Severity of bilateral loss is based on the better ear.

[b]The unweighted number of individuals in the category is < 10.

[c]No individuals with this hearing loss severity level were observed in the sample.

individuals with, hearing loss in the United States by severity and age. These estimates can inform ongoing national public health initiatives on hearing loss and can help guide policy recommendations currently being discussed at the Institute of Medicine and the White House. AJPH

CONTRIBUTORS

Both of the authors contributed to study concept and design, analysis and interpretation of data, and the drafting of the article.

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HUMAN PARTICIPANT PROTECTION

No protocol approval was needed for this study because no human participants were involved.

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