

A Bayesian Approach to Estimating Prevalence of Hearing Loss in Post-9/11 Veterans Using VA Health Care

Kelly M. Reavis^{1,2}, Garnett P. McMillan¹, Leah Barger^{3,4}, James A. Henry^{1,5}, Jonathan M. Snowden², Brandon Smith¹, Wendy Helt¹, and Kathleen F. Carlson^{1,2,6}

¹VA RR&D, National Center for Rehabilitative Auditory Research, VA Portland Health Care System, Portland, Oregon, ²OHSU-PSU School of Public Health, Oregon Health & Science University, Portland, Oregon, ³The Geneva Foundation, Tacoma, WA, ⁴Defense Health Agency, Hearing Center of Excellence, JBSA-Lackland, ⁵Department of Otolaryngology, Oregon Health & Science University, Portland, Oregon, ⁶VA HSR&D, Center to Improve Veteran Involvement in Care, VA Portland Health Care System, Portland, Oregon



Objective

Our objective is to estimate the prevalence of mild, moderate, and severe hearing loss among Veterans who have recently separated from the military and who use the Veterans Affairs (VA) health care system for their health care. This estimate is critical for audiology service resource allocation and planning. Estimation of the burden of hearing loss requires measurement of hearing thresholds. However, because not all Veterans are tested, comprehensive data are not readily available. To overcome this gap, we leveraged VA healthcare data linked to primary data collected from Veterans and employed a novel technique to estimate the prevalence of hearing loss.

Methods

Target Population: military Veterans recently separated from service who use VA health care for their primary or mental health care

VA Administrative Study Sample¹ (n = 475,305)

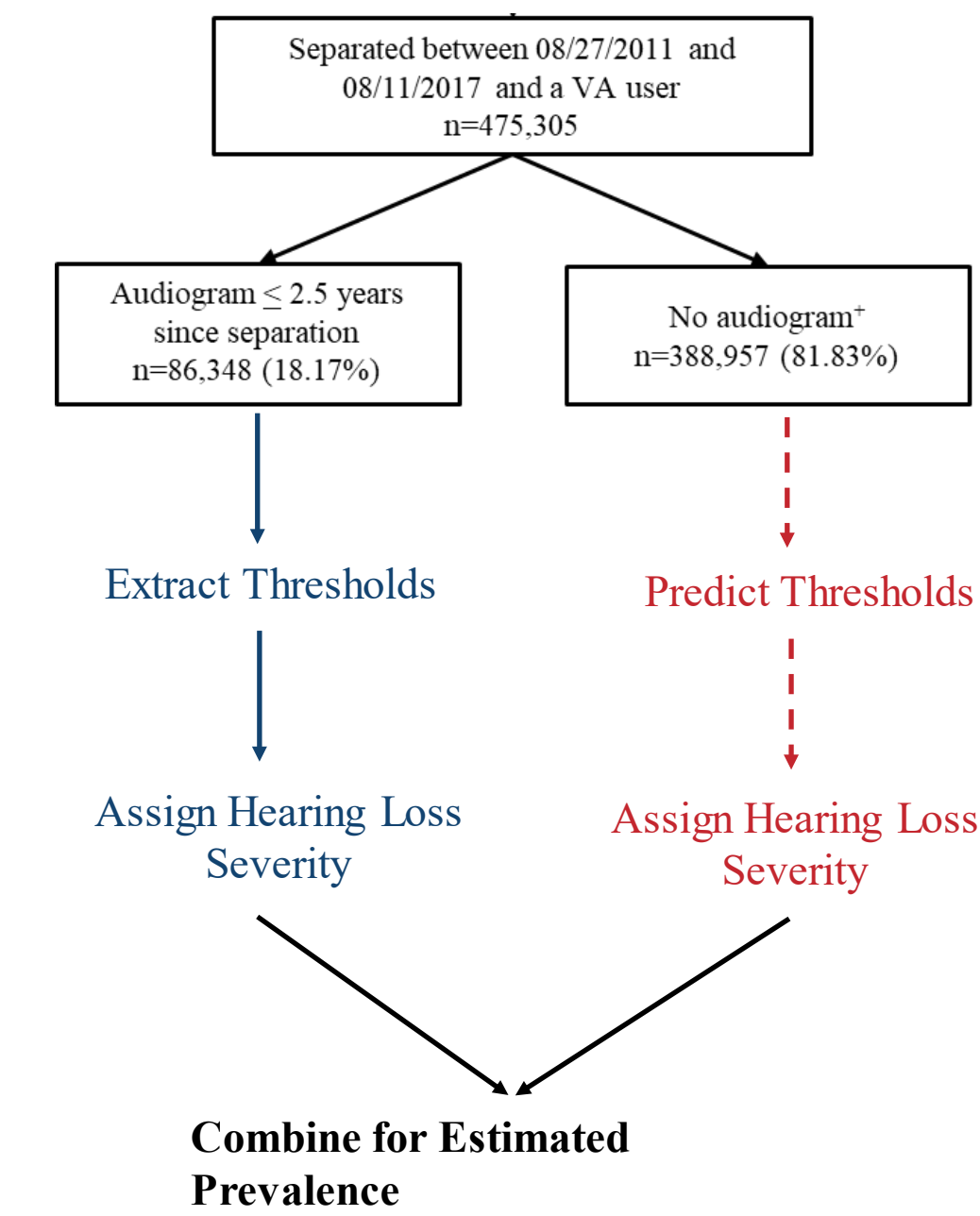
- Separated from the military between August 2011 and August 2017
- Classified as having hearing test (audiogram) or not

Noise Outcomes in Service members Epidemiology (NOISE) Study Sample² (n = 476)

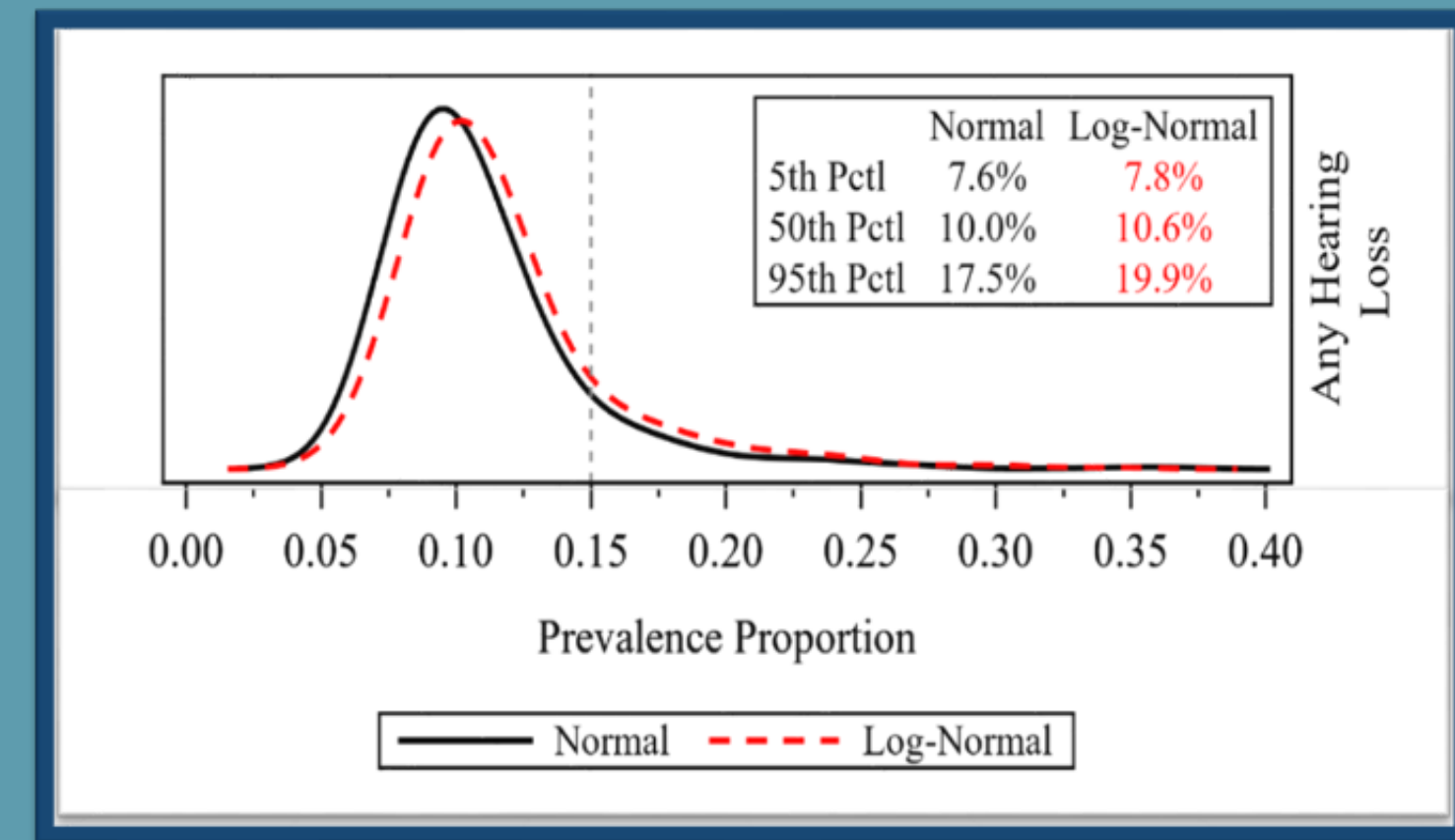
- Primary sample of Veterans at baseline in a prospective cohort study conducted within the VA Portland Health Care System
- Informed the model used to predict the hearing levels of the VA-user sample without an audiogram

Study Design and Analysis: The analysis used cross-sectional data. Predictors of hearing loss severity included age, sex, and military service branch. We used Bayesian logic within a multilevel regression model with poststratification³ to estimate the prevalence of hearing loss.

Figure 1. Data collection and analysis plan



There is a high burden (1 in 10) of hearing loss among recently separated post-9/11 Veterans who use VA health care, with many cases being mild.



Mild hearing loss can create difficulties in everyday life. When hearing loss develops early in life, it can lead to reduced functioning and diminished quality of life in later years⁴.



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Results (cont.)

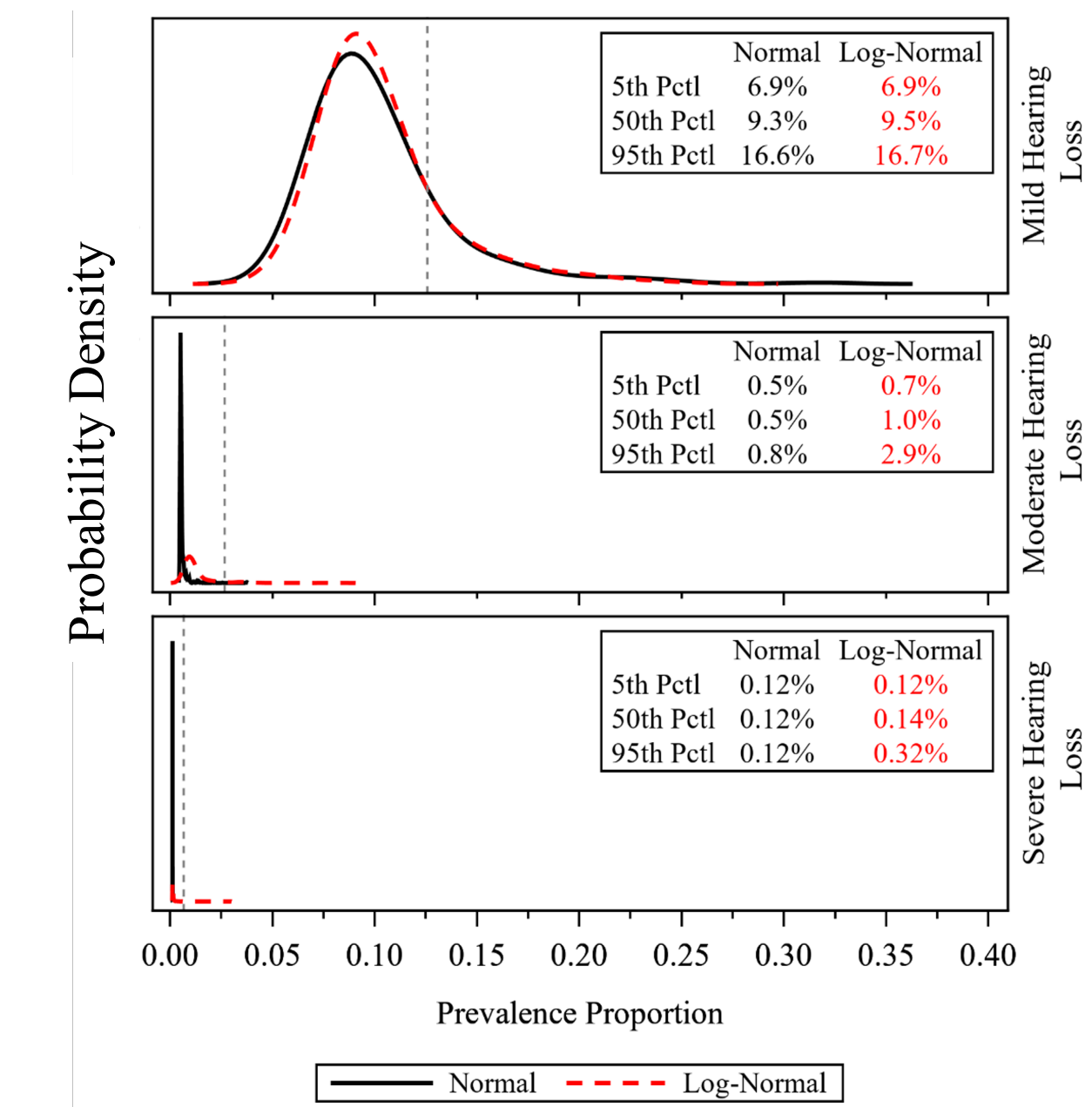


Figure 2. Estimated 6-year period prevalence (n=475,305). Probability density functions representing the range of prevalence values from the posterior predictive distribution (x-axis from 0.00 to 0.40). Normal (black) and Log-Normal (red) models are displayed. X-axis ranges from 0.00 to 0.40.

Conclusions

- High burden of hearing loss among recently separated post-9/11 Veterans who use VA health care.
- Most hearing loss was mild. Even mild hearing loss can create difficulties in everyday life.
- When hearing loss develops early in life, it can lead to reduced functioning and diminished quality of life in later years⁵.
- Structural interventions and secondary or tertiary prevention strategies are needed to mitigate the consequences of hearing loss.

References & Acknowledgements

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Results

Table 1. Estimated prevalence by level of hearing loss (n = 475,305)

	<i>Prevalence (90% Bayesian Confidence Intervals)</i>	<i>Estimated Counts^a</i>	<i>Measured Counts^b</i>	<i>Undiagnosed^c</i>
Any Hearing Loss	10.6% (7.8-19.9%)	50,382	13,743	72.7%
Mild Hearing Loss	9.5% (6.9-16.7%)	45,154	10,862	75.9%
Moderate Hearing Loss	1.0% (0.7-2.9%)	4,753	2,305	51.5%
Severe Hearing Loss	0.14% (0.1-0.3%)	665	576	13.4%

^a counts of mild, moderate, and severe hearing loss do not sum to 'any hearing loss' due to rounding errors

^b counts of Veterans with hearing loss as measured from VA sample with audiograms

^c percentage of Veterans likely undiagnosed hearing loss who use VA health care ((estimated – measured)/estimated)