

# Now Hear This . . .



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## Hearing Loss: The Numbers Part II

In the Fall 2004 newsletter, we reported that 1.4 million Michigan residents reported having hearing loss and 420,000 Michigan residents reported telling or being told by a health care provider their hearing loss was work-related. Only 200,000 of the 1.4 million individuals with hearing loss reported using a hearing aid. Hearing loss was more common in men than women (23% vs. 15%), whites than blacks (20% vs. 8%), those with less education versus those with more education (didn't complete high school (23%) vs. college graduate (14%)), and those with less income versus those with more income (<20,000/year (22%) vs. >50,000 (15%)). These results were from the Behavioral Risk Factor Surveillance System (BRFS), an annual random telephone survey of adults conducted in Michigan and Nationwide, although the hearing loss questions were only asked in Michigan.

Individuals who reported hearing loss were asked when their hearing loss began. See Table I. Most hearing loss began in adulthood. Only 19% of hearing loss was reported to begin before the age of 20. There is active testing for hearing loss in children in school. More preventive activity is needed to address the majority of hearing loss that begins in adulthood.

**Table I. Age Distribution of When Hearing Loss First Developed, 2003 Michigan BRFS**

| Age   | n   | % ± 95% CI Limit |
|-------|-----|------------------|
| 0-9   | 54  | 8.9 ± 2.6        |
| 10-19 | 50  | 9.9 ± 3.0        |
| 20-29 | 75  | 14.2 ± 3.3       |
| 30-39 | 80  | 13.9 ± 3.1       |
| 40-49 | 106 | 16.6 ± 3.1       |
| 50-59 | 108 | 14.0 ± 2.8       |
| 60-69 | 91  | 10.9 ± 2.3       |
| 70+   | 108 | 11.6 ± 2.3       |

Certain conditions may increase the risk of hearing loss. There are conflicting results from studies on whether there is an interaction between noise and diabetes (1, 2). Data from the BRFS is shown in Table II.

| <b>Table II. Diabetes Among Those With and Without Hearing Loss By Self Reported Cause of Hearing Loss, Michigan 2003, BRFSS (% ± 95% Confidence Limit)</b> |                                  |                         |                                     |
|---|----------------------------------|-------------------------|-------------------------------------|
| <b>Age</b>  | <b>Diabetes and Hearing Loss</b> |                         | <b>Diabetes and No Hearing Loss</b> |
|   | <b>Work-Related</b>              | <b>Not Work-Related</b> |                                     |
| <b>All Ages</b>   | 17.4 ± 5.6                       | 12.6 ± 3.2              | 6.6 ± 1.0                           |
| <b>18-54</b>  | 11.1 ± 7.2                       | 8.7 ± 4.7               | 3.8 ± 0.9                           |
| <b>≥ 55</b>   | 23.4 ± 8.2                       | 15.5 ± 4.4              | 15.5 ± 2.7                          |

Diabetes was increased in individuals with hearing loss compared to those without for both work and non-work-related hearing in the age group <55 but was increased in the 55+ age only among those with work-related hearing loss. This data would suggest that at least in those >55, diabetes was a risk factor for noise-induced hearing loss and was a risk factor for hearing loss from all causes for those under 55.

Table III shows prevalence of ever smoked cigarettes by hearing status.

| <b>Table III. Ever Smoked Cigarettes Among Those With and Without Hearing Loss By Self Reported Cause of Hearing Loss, Michigan 2003, BRFSS</b> |                                     |                         |  |
|---|-------------------------------------|-------------------------|--|
| <b>Education</b>  | <b>Ever Smoked and Hearing Loss</b> |                         | <b>Ever Smoked and No Hearing Loss</b> |
|   | <b>Work-Related</b>                 | <b>Not Work-Related</b> |  |
| <b>All</b>  | 71.9                                | 56.6                    | 47.9                                   |
| <b>HS Grad or Less</b>  | 80.8                                | 58.3                    | 61.5                                   |
| <b>Some College or More</b>   | 62.2                                | 54.9                    | 40.5                                   |

The prevalence of ever smoked cigarettes is greater in those with work-related noise-induced hearing loss after controlling for education, which is associated with both the prevalence of smoking and the prevalence of exposure to noise at work. This is consistent with other studies that smoking is a risk factor for hearing loss (3-5).

The prevalence of high cholesterol was elevated in those with hearing loss at a younger age, but not for those with work-related hearing loss ≥55 years of age (See Table IV).

| <b>Table IV. High Cholesterol Among Those With and Without Hearing Loss By Self Reported Cause of Hearing Loss, Michigan 2003, BRFSS (% ± 95% Confidence Limit)</b> |  |                         |   |
|---|--|-------------------------|---|
| <b>Age</b>  | <b>High Cholesterol and Hearing Loss</b> |                         | <b>High Cholesterol and No Hearing Loss</b> |
|   | <b>Work-Related</b>                      | <b>Not Work-Related</b> |   |
| <b>All Ages</b>   | 50.2 ± 8.5                               | 51.1 ± 5.5              | 34.8 ± 2.2                                  |
| <b>18-54</b>  | 45.4 ± 14.1                              | 35.9 ± 9.0              | 28.3 ± 2.7                                  |
| <b>≥ 55</b>   | 53.4 ± 10.1                              | 61.9 ± 6.1              | 50.2 ± 3.7                                  |

This data would suggest that an effect from the interaction of atherosclerosis and noise is true in younger, but not older individuals. This difference by age has not been reported in the literature (6).

Finally, Table V shows the relationship between high blood pressure and hearing loss. Interpretation of this table is more complicated. Since all the data presented in the tables in this newsletter are cross-sectional one does not know which came first, the hearing loss or the risk factor. For high cholesterol, diabetes and cigarette smoking there is no suggestion that noise or hearing loss causes the risk factor. However, for high blood pressure there is an extensive literature that noise can cause high blood pressure (7).

| <b>Table V. High Blood Pressure Among Those With and Without Hearing Loss By Self Reported Cause of Hearing Loss, Michigan 2003, BRFSS (% ± 95% Confidence Limit)</b> |   |                         |  |
|---|---|-------------------------|--|
| <b>Age</b>  | <b>High Blood Pressure and Hearing Loss</b> |                         | <b>High Blood Pressure and No Hearing Loss</b> |
|   | <b>Work-Related</b>                         | <b>Not Work-Related</b> |  |
| <b>All Ages</b>   | 37.9 ± 7.6                                  | 42.6 ± 5.1              | 23.8 ± 1.8                                     |
| <b>18-54</b>  | 22.9 ± 10.6                                 | 23.9 ± 7.6              | 15.2 ± 1.8                                     |
| <b>≥ 55</b>   | 52.3 ± 9.9                                  | 58.2 ± 5.9              | 50.9 ± 3.6                                     |

This data does not support an association that noise exposure causes high blood pressure. The data in the younger age group is more suggestive that like the other risk factors for atherosclerosis, high blood pressure increases the risk of hearing loss.

The presence of risk factors for atherosclerosis may explain why some individuals and not others develop hearing loss when exposed to similar levels of noise. Interference of cochlear blood supply by atherosclerosis may be the underlying mechanism for the association between diabetes, smoking, high cholesterol, and high blood pressure. For high cholesterol and high blood pressure the association was stronger in those under 55, suggesting the risk of these factors for hearing loss is greater when atherosclerosis occurs at a younger age. Whatever the importance of these risk factors, noise exposure remains the causal factor of primary concern.

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*Now Hear This...*

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**Address service requested.**

In this issue:  
Hearing Loss: The Numbers—Part II

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**Michigan Law Requires the**

**Reporting of Known or Suspected**

**Occupational NIHL**

Reporting can be done by:

**Internet**

www.chm.msu.edu/ocm

**E-Mail**

ODREPORT@ht.msu.edu

**FAX**

517-432-3606

**Telephone**

1-800-446-7805

**Mail**

MIOSHA-MTS Division  
P.O. Box 30649

Lansing, MI 48909-8149

**Suggested Criteria for Reporting  
Occupational NIHL**

1. A history of significant exposure to noise at work; AND
  2. A STS of 10 dB or more in either ear at an average of 2000, 3000 & 4000 Hz. And the employee's total hearing level is 25 dB or more at the same three frequencies. OR
  3. A fixed loss.\*
- \*Suggested definitions: a 25 dB or greater loss in either ear at an average of: 500, 1000 & 2000 Hz; or 1000, 2000 & 3000 Hz; or 3000, 4000 & 6000 Hz; or a 15 dB or greater loss in either ear at an average of 3000 & 4000 Hz.

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