### About the Measure

<table>
<thead>
<tr>
<th><strong>Domain:</strong></th>
<th>Speech and Hearing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measure:</strong></td>
<td>Audiogram Hearing Test</td>
</tr>
<tr>
<td><strong>Definition:</strong></td>
<td>This measure is a hearing test to assess hearing sensitivity.</td>
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<tr>
<td><strong>Purpose:</strong></td>
<td>This measure is used to evaluate the auditory system of an individual and is capable of identifying hearing problems in any part of the auditory system.</td>
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### About the Protocol

| **Description of Protocol:** | The National Health and Nutrition Examination Survey (NHANES) 2008-2009 Audiometry protocol tests the examinee’s hearing threshold (in decibels, dB) at 7 frequencies in a sound-proof room. Examinees are asked a series of exclusionary questions, undergo an outer-ear examination (otoscopy) and then have the mobility of their eardrum tested (acoustic immittance). Pure tone signals are then presented to each ear through earphones and the intensity of the signals are varied until the level is identified at which the person is just able to hear the sound. |
| **Selection Rationale:** | The National Health and Nutrition Examination Survey (NHANES) 2008-2009 Audiometry protocol is one of the most widely used protocols to measure hearing sensitivity and was selected as the best practice methodology. |
| **Specific Instructions:** | An audiogram should be conducted in a sound-proof room or booth to permit accurate hearing threshold measurements. Although the 2009-2010 National Health and Nutrition Examination Survey (NHANES) will conduct pure tone audiometry on individuals ages 12-19 years and older than 70 years, previous versions of the National Health and Nutrition Examination Survey have performed this procedure on children as young as 4 years and adults of all ages. |
| **Protocol Text:** | The following is a summary version of the full National Health and Nutrition Examination Survey (NHANES) audiometry protocol. **This is not intended to replace the actual protocol.**

**Eligibility Criteria**
There are no conditions that would prevent an eligible, consenting examinee from completing the protocol.

**Preliminary Activities**
Examinees are asked to remove glasses, gum, earrings or anything else that may interfere with the headphones.
Examinees are asked to remove hearing aids. If hearing aids cannot be removed, the examinee skips the audiogram.

**Pre-Exam Questionnaire**
Examinees are asked about conditions that affect how the test is conducted or how
results are interpreted. These questions include whether the examinee:

- has tubes in either ear
- has a cold or earache
- has been exposed to loud noise in the last 24 hours, and
- hears better in one ear or the other

**Otoscopy**
The technician performs a visual inspection of the outer ear and records any abnormalities of the ear, the presence of excessive ear wax, perforation or inflammation of the ear drum, and whether the ear canal is collapsed.

**Acoustic Immittance**
For each ear, the technician uses the size and direction of the ear canal to properly select the cuff to seal the ear canal. The technician then places the typanometer probe in the examinee’s ear, ensures an airtight seal, and performs the test.

The result of the acoustic immittance test is a graph (tympanogram) which is evaluated based on smoothness and symmetry. The test should be repeated once if the tympanogram is flat or if the results are not clear.

**Audiometry**
The technician ensures that the respondent has removed hearing aids and anything that might interfere with the proper placement of the headphones. The technician fits the standard headphones (or inserts headphones if there are collapsed ear canals) over the examinee’s ears and makes sure that the examinee is seated so that they can be seen by the examiner during the test.

**Automated Protocol**
The pure tone audiometry test is controlled by a computer program.

**Manual Protocol**
The technician will control the frequency, stimulus level, test signals and make threshold determination under the following circumstances:

- Examinee cannot operate the response switch
- Examinee cannot “keep up with” the automated test
- Examinee records three false positives
- Examinee threshold exceeds 100 decibels

The technician can begin manual testing after the automated protocol has begun, but must complete the test using the manual protocol.

**Record the Audiometry Results**
The technician records which headphones were used, which ear was tested first, whether the test was performed manually, and the threshold (in decibels) for each ear at the following frequencies:

- 500 hertz
- 1000 hertz
- 2000 hertz
- 3000 hertz
- 4000 hertz
### Scoring Instructions:

<table>
<thead>
<tr>
<th>Decibel Range</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>0-25 dB</td>
<td>Normal hearing</td>
</tr>
<tr>
<td>26-40 dB</td>
<td>Mild hearing loss</td>
</tr>
<tr>
<td>41-55 dB</td>
<td>Moderate hearing loss</td>
</tr>
<tr>
<td>56-70 dB</td>
<td>Moderately severe hearing loss</td>
</tr>
<tr>
<td>71-90 dB</td>
<td>Severe hearing loss</td>
</tr>
<tr>
<td>91+ dB</td>
<td>Profound hearing loss</td>
</tr>
</tbody>
</table>

Please consult the American Speech-Language Hearing Association and National Institute for Occupational Safety and Health for the most current classification schemes.

### Participant:
Adolescents and adults, ages 12-19 years and older than 70 years

### Source:

### Language of Source:
English, Spanish

### Personnel and Training Required:
This protocol should be completed by a medical technician capable of performing a visual examination of the outer ear (otoscopy), testing the mobility of the eardrum (acoustic immittance) and performing the audiometry protocol.

### Equipment Needs:
A complete list of the equipment and supplies needed for audiometry can be found in Appendix A of the National Health and Nutrition Examination Survey Audiometry procedures manual.

### Protocol Type:
Clinical assessment

### Requirements:

<table>
<thead>
<tr>
<th>Requirements Category</th>
<th>Required (Yes/No):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major equipment</td>
<td>Yes</td>
</tr>
<tr>
<td>Specialized training</td>
<td>Yes</td>
</tr>
<tr>
<td>Specialized requirements for biospecimen collection</td>
<td>No</td>
</tr>
<tr>
<td>Average time of greater than 15 minutes in an unaffected individual</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Common Data Elements:
TBD by RTI staff
### General References:

None