Why is more evidence needed globally on the burden of hearing loss and how can we get it?

Andrew Smith, Daksha Patel, Joanna Anderson
OUTLINE of presentation

• Why is more evidence needed?
• Lack of available data
• Problems with gathering data
• Possible solutions
WHY IS MORE EVIDENCE NEEDED?

To...

• RAISE & INCREASE AWARENESS for resource allocation
• PREDICT NEEDS
• DETERMINE PRIORITIES FOR ACTION
• SELECT STRATEGIES FOR PREVENTION
• USE in
  – burden of disease measurement
  – cost-effectiveness analysis
Recent WHO findings:-

- Only 30 / 76 countries had epidemiological data on prevalence of hearing loss [WHO Country assessment report, 2013].

- Only 32 / 76 had developed a national or subnational plan for hearing loss.

- Planning should start with a thorough situation analysis [WHO meeting, 2015].

(WHO situation analysis tool is now being developed).
Example of the use of evidence

SURVEYS OF DISABLING HEARING IMPAIRMENT IN 3 NIGERIAN STATES

KATSINA 7.6%

BENUE 6.1%

AKWA IBOM 4.4%
The meningitis belt in sub-Saharan Africa
WHO GLOBAL ESTIMATES 2012

360 million persons (5.3%) have disabling (moderate or worse) hearing impairment

328 million of these are adults

32 million of these are children.

15% (1,019 million) of the world population have any level of hearing loss (mild or worse)

>80% live in low & middle income countries
GLOBAL NUMBERS WITH DISABLING HEARING LOSS
all ages, by World Bank Regions (WHO 2012)

MILLIONS OF PEOPLE

<table>
<thead>
<tr>
<th>Region</th>
<th>Millions of People</th>
</tr>
</thead>
<tbody>
<tr>
<td>High income</td>
<td>37.8</td>
</tr>
<tr>
<td>Ct E Europ/Ct Asia</td>
<td>31.1</td>
</tr>
<tr>
<td>S-Saharan Africa</td>
<td>36.8</td>
</tr>
<tr>
<td>Mid E, N Africa</td>
<td>11.2</td>
</tr>
<tr>
<td>S Asia</td>
<td>37.4</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>30.6</td>
</tr>
<tr>
<td>Lat Amer, Carib</td>
<td></td>
</tr>
<tr>
<td>E Asia</td>
<td>74.6</td>
</tr>
</tbody>
</table>
### Top 14 causes of global YLDs in 1990 and 2013

*From: Vos et al. Lancet 8 June 2015*

<table>
<thead>
<tr>
<th>Mean YLDs (×1000)</th>
<th>1990 leading causes</th>
<th>2013 leading causes</th>
<th>Mean YLDs (×1000)</th>
<th>Median change</th>
</tr>
</thead>
<tbody>
<tr>
<td>46,068</td>
<td>1 Low back pain</td>
<td>1 Low back pain</td>
<td>72,318</td>
<td>57%</td>
</tr>
<tr>
<td>40,079</td>
<td>2 Iron-deficiency anaemia</td>
<td>2 Major depression</td>
<td>51,784</td>
<td>53%</td>
</tr>
<tr>
<td>33,711</td>
<td>3 Major depression</td>
<td>3 Iron-deficiency anaemia</td>
<td>36,663</td>
<td>-9%</td>
</tr>
<tr>
<td>22,294</td>
<td>4 Neck pain</td>
<td>4 Neck pain</td>
<td>34,348</td>
<td>54%</td>
</tr>
<tr>
<td><strong>21,633</strong></td>
<td>5 Other hearing loss</td>
<td>5 Other hearing loss</td>
<td><strong>32,580</strong></td>
<td><strong>51%</strong></td>
</tr>
<tr>
<td>19,805</td>
<td>6 Migraine</td>
<td>6 Migraine</td>
<td>28,898</td>
<td>46%</td>
</tr>
<tr>
<td>17,180</td>
<td>7 Anxiety disorders</td>
<td>7 Diabetes</td>
<td>29,518</td>
<td>136%</td>
</tr>
<tr>
<td>15,151</td>
<td>8 COPD</td>
<td>8 COPD</td>
<td>26,131</td>
<td>72%</td>
</tr>
<tr>
<td>12,672</td>
<td>9 Other musculoskeletal</td>
<td>9 Anxiety disorders</td>
<td>24,356</td>
<td>42%</td>
</tr>
<tr>
<td>12,533</td>
<td>10 Diabetes</td>
<td>10 Other musculoskeletal</td>
<td>22,644</td>
<td>79%</td>
</tr>
<tr>
<td><strong>10,337</strong></td>
<td>11 Falls</td>
<td>11 Schizophrenia</td>
<td>15,204</td>
<td>52%</td>
</tr>
<tr>
<td>9,995</td>
<td>12 Schizophrenia</td>
<td>12 Falls</td>
<td>12,818</td>
<td>23%</td>
</tr>
<tr>
<td>8,048</td>
<td>13 Asthma</td>
<td>13 Osteoarthritis</td>
<td>12,811</td>
<td>75%</td>
</tr>
<tr>
<td>7,831</td>
<td>14 Refraction and accommodation</td>
<td>14 Refraction and accommodation</td>
<td>11,257</td>
<td>44%</td>
</tr>
</tbody>
</table>
OUTLINE of presentation

• Why is more evidence needed?

• Lack of available data
Global and regional hearing impairment prevalence: an analysis of 42 studies in 29 countries

Gretchen Stevens¹*, Seth Flaxman¹*, Emma Brunskill², Maya Mascarenhas³, Colin D. Mathers¹*, and Mariel Finucane⁴ on behalf of the Global Burden of Disease Hearing Loss Expert Group* (Co-ordinator: Andrew Smith)

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3 Department of Epidemiology and Biostatistics, University of California, San Francisco, CA, USA
4 Department of Global Health and Population, Harvard School of Public Health, Boston, MA, USA
Key conclusions from Stevens et al, 2011

- Estimates of hearing impairment uncertain because so few population-based surveys measure hearing impairment adequately (42 eligible out of 3000 assessed)

- Repeated cross-sectional, population-based surveys are urgently needed to determine trends, particularly in regions with highest prevalences.
Changes in WHO global estimates of disabling hearing impairment 1985 - 2012

- **More developed/High income countries**
- **Less developed/LMI countries**
- **TOTAL**

PROPOSED GBD HEARING LEVELS (Stevens et al, 2011)
### Cause-specific data lacking for LMI countries

<table>
<thead>
<tr>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inherited causes</td>
<td>Excessive noise</td>
<td>Nutritional</td>
</tr>
<tr>
<td>Chronic otitis media</td>
<td>Ototoxic drugs</td>
<td>Trauma</td>
</tr>
<tr>
<td>Ageing (presbyacausis)</td>
<td>Ante- &amp; perinatal problems</td>
<td>Toxic chemicals</td>
</tr>
<tr>
<td></td>
<td>Meningitis measles, mumps</td>
<td>Menière’s disease</td>
</tr>
<tr>
<td></td>
<td>Foreign bodies, wax</td>
<td>Tumours</td>
</tr>
</tbody>
</table>

**WHO priority for action**
OUTLINE of presentation

• Why is more evidence needed?
• Lack of available data
• Problems with gathering data
Problems in studies collecting hearing data in LMI countries

- Lack of sound-proof test sites – increases false-positives
- Ambient noise not measured
- Standard test methods or standard levels of severity often not used or methods not reported
- Poor epidemiological quality -
  - not population-based
  - sample size too small
  - sample not randomly selected
  - response rate <80%
- Cause-specific data not collected
- Lack of funds to do hearing surveys
Progress of Population-based Surveys using The WHO Ear And Hearing Disorders Survey Software
(with % prevalence of disabling hearing impairment)

Countries which have completed surveys:
- MADAGASCAR: Tana Province 6.9%
- NIGERIA: 3 Regions 4.4, 6.1, 7.6%
- CHINA: Jiangsu 5.3%, Sechuan 4.9%, Guizhou 6.1%, Jilin 4.5%
- ECUADOR: Adults 6.4%, Children 1.7%
- BRAZIL: Canoas (part) 6.8%
- OMAN: National (with blindness) 2.1%

Countries where surveys are in progress:
- VIETNAM: Northern: 7.8%, Southern: 4.7%

4 SEARO surveys (4.6 - 8.8%)
Measuring the size of the problem in Madagascar –

No survey without service
OUTLINE of presentation

• Why is more evidence needed?
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WHAT KIND OF EVIDENCE DO WE NEED?

Study Design
- Population-based random sample – not clinic-based
- All ages
- Sample to estimate prevalence with appropriate precision
- Response rate > 80%
- Standardised protocol for time/place comparisons
- Accurate data on size, causes, needs, impact

Study methodology
- High coverage, High response
- Rapid assessment methods
- Quick assessment technology (e.g. smartphones)
- Simple data entry & analysis tool
- Automated and distance analysis
Forthcoming WHO Expert Group

• Review protocol - design, planning and sampling.
• Look at smart-phone based testing possibilities
• Develop rapid assessment survey method
• Update complete survey protocol.
• Update analysis software.

1st meeting in November in London