



Using a personal audio device in a noisy environment increases the risk of noise-induced hearing loss.  
MOROCCO

PHOTO: ADRIEN DELFORGE/UNSPLASH

## Preventing hearing loss



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### What do we mean by prevention?

Many organisations subdivide preventive measures into primary, secondary and tertiary prevention:

- **Primary prevention** refers to measures aimed at intervention before adverse health effects occur. Examples of primary prevention aimed at hearing loss would include immunisation programmes, reduction of harmful noise exposure and safe use of ototoxic medications.
- **Secondary prevention** measures aim to prevent disability by prompt detection and treatment, such as neonatal hearing screening programmes leading to early amplification, or treatment of chronic otitis media.
- **Tertiary prevention** measures aim to minimise the effects of existing disability by active rehabilitation, for example by fitting hearing aids or providing special education to minimise restrictions to communication.

In addition to these three categories, the notion of 'primordial prevention' is used to refer to actions aiming to prevent the occurrence of risk factors for a disease.

More recently, in 2021, the World Health Organization (WHO)'s *World Report on Hearing* placed prevention within the wider framework of a hearing capacity that evolves throughout the life course.<sup>1</sup> Each individual has their own baseline hearing capacity at birth, which evolves throughout their life in response to their exposure both to **causative factors** that

lead to hearing loss (genetic, biological, behavioural) and to **protective and preventive factors** that help preserve their hearing capacity. These two types of factors are illustrated in Table 1 on page 2 and in the box on page 3. The *World Report on Hearing* highlights that effective preventive actions against hearing loss can be implemented throughout the life course, whether they are public health measures supported by health workers or lifestyle changes made by individuals.

### Why should we spend money and resources to prevent hearing loss?

At present about half a billion people worldwide have hearing loss to such a degree that it has a negative influence on their daily life experience. With global population growth and improved life expectancy, the number of people with disabling hearing loss is estimated to rise to 509 million by 2030 and to over 700 million by 2050.<sup>2</sup> Although hearing loss is a massive global issue, it often seems as if measures to prevent hearing loss are not given the recognition that they deserve. This is an era when there are conflicting demands on healthcare resources, and 90% of those with moderate and profound hearing loss live in low- and middle-income countries (LMICs) where health needs are greater and resources scarcer.

However, there are in fact many reasons why we should expend money and resources on preventing hearing loss:

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TABLE 1 CAUSATIVE FACTORS THAT LEAD TO HEARING LOSS ACROSS THE LIFE COURSE<sup>i</sup>

<p><b>Prenatal period</b></p> <ul style="list-style-type: none"> <li>• Genetic factors</li> <li>• Intrauterine infections (toxoplasmosis, rubella, cytomegalovirus, Herpes simplex 1 and 2, HIV, syphilis, Zika, lymphocytic choriomeningitis virus)</li> </ul>	<p><b>Perinatal period</b></p> <ul style="list-style-type: none"> <li>• Hypoxia or birth asphyxia</li> <li>• Low birth weight</li> <li>• Hyperbilirubinemia</li> <li>• Other perinatal morbidities (cytomegalovirus, meningitis) and their management (ototoxic medication)</li> </ul>
<p><b>Childhood and adolescence</b></p> <ul style="list-style-type: none"> <li>• Otitis media</li> <li>• Meningitis, measles, mumps and other infections</li> </ul>	<p><b>Adulthood and older age</b></p> <ul style="list-style-type: none"> <li>• Chronic diseases</li> <li>• Otosclerosis</li> <li>• Smoking</li> <li>• Age-related sensorineural degeneration</li> </ul>
<p><b>Factors that can occur at any age</b></p> <ul style="list-style-type: none"> <li>• Impacted ear wax</li> <li>• Trauma to the ear or head</li> <li>• Loud sounds</li> <li>• Ototoxic medicines</li> <li>• Work-related ototoxic chemicals</li> <li>• Nutritional deficiencies (e.g. deficiencies in vitamin A, zinc, or iron)</li> <li>• Viral infections (HIV, Herpes simplex 1 and 2, Ebola, Lassa, West Nile virus)</li> <li>• Other ear conditions (such as Meniere's disease, vestibular schwannoma, and autoimmune diseases)</li> <li>• Non-modifiable risk factors (such as syndromes or genetic mutations associated with hearing loss)</li> </ul>	

<sup>i</sup>This table is extracted from Table 1.1 in: World Health Organization. *World Report on Hearing*. Geneva: WHO, 2021. 14–17.

**A large proportion of hearing loss is preventable**

Many causes of hearing loss are avoidable (see Table 1 on this page) and a large proportion of existing hearing loss can be prevented. Indeed, for children under the age of 15, WHO estimates that about 60% of hearing loss is preventable.<sup>3</sup> In adults, the most common causes of hearing loss – exposure to loud noise or ototoxic chemicals – are preventable.

**Preventing hearing loss is very cost-effective**

There is good evidence that strategies to prevent hearing loss are very cost-effective.<sup>4</sup> At an individual level, the burden of hearing loss is expressed in many ways, including potential difficulties with communication, stigmatisation, reduced employment opportunities and social isolation. When the costs over a lifetime at both individual and societal levels are taken into account, the financial benefits of preventing hearing loss and its effects are massive: the impact of unaddressed hearing loss on health, education and productivity

is estimated to cost over 980 billion US dollars annually worldwide.<sup>5</sup>

In addition, many initiatives to improve population health often prevent hearing loss in parallel. For example, mass immunisation programmes contribute to preventing hearing loss although this is not their primary aim (see page 4 of this issue): it is estimated that over 19% of childhood hearing loss could be prevented through immunisation against rubella and meningitis alone.<sup>6</sup>

**There are many ways to contribute to the prevention of hearing loss**

WHO's *World Report on Hearing* lists the following as 'effective strategies for reducing hearing loss':<sup>7</sup>

- Immunisation
- Good maternal and childcare practices
- Genetic counselling
- Occupational hearing conservation programmes for noise and chemical exposure
- Safe listening strategies for the reduction of exposure to loud sounds in recreational settings



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- Rational use of medicines to prevent ototoxic hearing loss
- Identification and management of common ear conditions.

These strategies span an unusually broad area of intervention and most of them are not expensive. This is because preventable hearing loss can occur throughout our lifespan and is caused by a number of avoidable causes. It follows that the scope for effective preventive action is particularly wide.

The variety of measures to prevent hearing loss is shown in Table 2 using the six levels for strategy development described in Larry Cohen's 'Spectrum of prevention', which is a useful framework for developing a comprehensive approach to prevention.<sup>8</sup>

### Health personnel who are not specialised in EHC can play a key role in preventing hearing loss

Particularly in LMICs, there are insufficient numbers of personnel trained in ear and hearing care (EHC). However, when it comes to preventing hearing loss, much can be done by personnel who are not specialised in EHC. In fact, in WHO's list of seven effective strategies for reducing hearing loss, only two – 'identification and management of

### WHAT INDIVIDUALS CAN DO TO MAINTAIN THEIR HEARING CAPACITY THROUGHOUT THEIR LIVES<sup>ii</sup>

The most relevant protective and preventive actions that can be undertaken by individuals across the life course are:

- Maternal nutrition
- Maternal hygiene
- Breastfeeding
- Good ear hygiene
- Avoidance of tobacco
- Good nutrition across the lifespan
- Protection against head or ear injury (e.g. helmets)
- Healthy lifestyle
- Immunisation
- Avoidance of loud sounds

<sup>ii</sup>This box is extracted from Table 1.2 in: World Health Organization. World Report on Hearing. Geneva: WHO, 2021. 30–32.

common ear conditions' and 'occupational hearing conservation programmes' – need to be carried out by personnel with at least some training in EHC.

Generic healthcare providers are often, through no fault of their own, poorly educated in hearing loss and ear disease. This issue of *Community Ear and Hearing Health* aims to show the many ways in which they can help prevent hearing loss and help usher in a time when preventive measures effectively reduce the huge burden of disease caused by hearing loss.

**TABLE 2 THE SPECTRUM OF PREVENTION: A FRAMEWORK FOR A COMPREHENSIVE APPROACH TO PREVENTION<sup>iii</sup>**

Levels of prevention	Examples relating to the prevention of hearing loss <sup>iv</sup>
<b>1. Strengthening individual knowledge and skills</b> <i>Enhancing individual capacity</i>	<ul style="list-style-type: none"> <li>• Personal awareness of the harmful effects of excessive noise from personal audio devices such as smartphones and noisy entertainment venues</li> <li>• Awareness of the importance of hearing in maximising opportunities for education and employment</li> </ul>
<b>2. Promoting community education</b> <i>Reaching groups with information and resources</i>	<ul style="list-style-type: none"> <li>• Awareness programmes for promoting ear and hearing care within the community (e.g. importance of basic ear care and positive effects of good nutrition<sup>9</sup> and hygiene)</li> <li>• Awareness programmes alerting people to the harmful effects of loud noise</li> </ul>
<b>3. Educating providers</b> <i>Informing providers who influence others</i>	<ul style="list-style-type: none"> <li>• Training of primary care health workers and physicians in the relevance of ear diseases and the need for early intervention</li> <li>• Educating healthcare workers on the potential dangers of misuse of ototoxic medicines</li> <li>• Educating maternal and child health providers on the importance of good antenatal care in preventing hearing loss</li> </ul>
<b>4. Fostering coalitions and networks</b> <i>Convening groups and individuals for greater impact</i>	<ul style="list-style-type: none"> <li>• Encouraging the formation of support groups (local, regional and national) for people with hearing loss and their families</li> </ul>
<b>5. Changing organisational practices</b> <i>Adopting regulations and shaping norms</i>	<ul style="list-style-type: none"> <li>• Implementation of early intervention programmes such as neonatal and school hearing screening, leading to prompt diagnosis and rehabilitation</li> <li>• Optimisation of educational provision within a local context so that children with hearing loss are not neglected</li> <li>• Encourage noisy industries to have workplace hearing screening programmes</li> </ul>
<b>6. Influencing policy and legislation</b> <i>Developing strategies to change laws and policies</i>	<ul style="list-style-type: none"> <li>• Formal and legally enforced limits to occupational noise exposure</li> <li>• Limiting environmental noise, which has been recognised as having harmful effects on the overall burden of disease<sup>10</sup></li> <li>• National immunisation programmes</li> <li>• National drug regulatory mechanisms to restrict the sale and use of ototoxic medicines</li> </ul>

<sup>iii</sup>This is based on the framework presented in: Cohen L and Swift S. The spectrum of prevention: developing a comprehensive approach to injury prevention.<sup>8</sup>

<sup>iv</sup>It is important to appreciate that some preventative measures fall into more than one level.

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