

# OPEN ACCESS GUIDE TO AUDIOLOGY AND HEARING AIDS FOR OTOLARYNGOLOGISTS



## COMMUNITY EAR AND HEARING CARE

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*Community Ear and Hearing Care* is a community-based approach to address ear diseases and hearing loss, through strengthening care at all levels within the health system, with a focus on the primary level. Globally, 360 million people live with hearing loss, most of whom are in the low- and middle-income countries of the world. The pattern of hearing loss and its causative diseases may vary in different parts of the world. Countries also vary greatly with respect to resources available to address ear diseases and hearing loss. Epidemiological data, human resources, infrastructure, political will and financial strength differ from one place to another. In order to provide care and deliver services effectively, strategies to address hearing loss and its causative ear diseases should follow a holistic and participatory approach. The strategies must take into consideration the epidemiological profile, available resources, existing policies, as well as perceptions and attitudes of the community within which they are to be implemented.

### Current scenario

#### *Hearing loss prevalence and its public health relevance*

Highest prevalence of hearing loss (in adults and children) is seen in South Asia and Asia-Pacific followed closely by Sub-Saharan Africa, Latin America and Caribbean, Central/Eastern Europe and Central Asia. High-income countries account for only 11% of the total burden of hearing loss.

In 2012 WHO estimated the number of Disability Adjusted Life Years (DALYs) and Years lived with Disability (YLD) attributable to hearing loss. The analysis reveals that hearing loss is accountable for over 22 million DALYs. It is the eighth

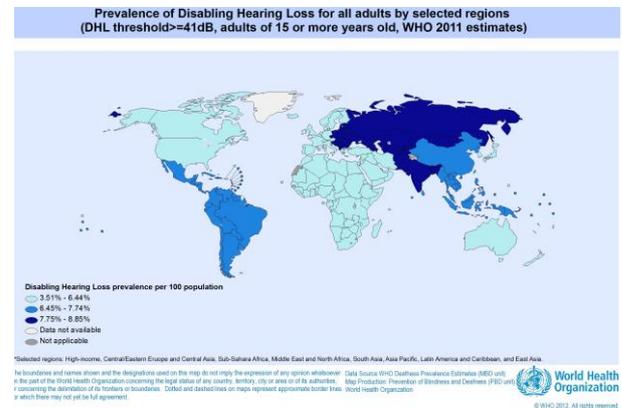


Figure 1

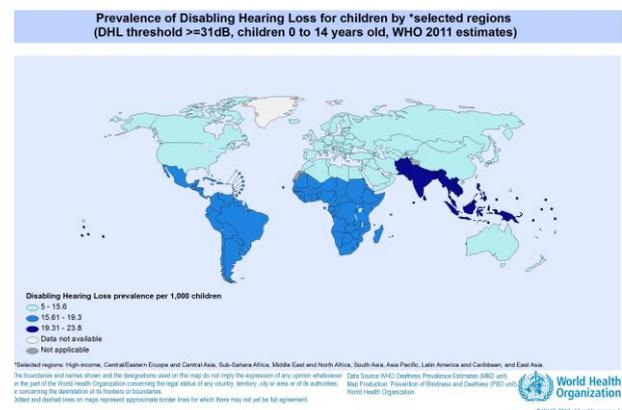


Figure 2

leading cause of YLD, accounting for 3% of the global burden <sup>1</sup>.

Hearing impairment can limit a person's participation in daily life, limit opportunities for employment, cause spiritual, social, and emotional problems and, it can retard child language and educational development early in life <sup>2</sup>.

Economic burden of disease studies are lacking in developing countries, but the economic impact of hearing loss has been shown to be significant in developed countries <sup>3</sup>. For example in the United States of America, severe-to-profound hearing loss is expected to cost society an additional \$297,000 over the lifetime of an individual (averaged across the age of onset) <sup>4</sup>. The largest component of this was reduced work

productivity (67%). Another analysis performed in Europe, using a "quality of life" approach revealed that hearing impairment of all grades cost Europe 284 billion euros for the year 2004<sup>5</sup>. Given the fact that reduced work productivity and not medical costs account for most of the costs, these results may be relevant for the developing world as well.

### ***What needs to be addressed?***

The most common conditions that lead to hearing loss may vary from place to place. Major causes may include:

- ***Chronic ear infections:*** This is a common concern and prevalence may range from 1 to 46% in different areas.<sup>6</sup> This wide variation is on account of the varied risk factors such as poor living conditions, inadequate antibiotic treatment, frequent upper respiratory infections and poor access to medical care.<sup>6</sup> Besides hearing loss, the condition is also relevant due to its morbidity and potential mortality. In a one-year period (1990), it was responsible for as many as 28,000 deaths across the world.<sup>8</sup>
- ***Otitis media with effusion:*** The reported frequency of this condition in literature varies from 0.1% to over 18% in children of school going age group (Rao 2002, Williams 2009).<sup>9,10</sup> Overall, otitis media is reported to be the commonest reason for an illness-related medical visit and it is estimated that in 1990, a total of 24.5 million clinic visits made in the USA were due to otitis media, imposing an annual burden of \$3-4 billion annually in United States alone.<sup>11</sup>
- ***Antenatal and perinatal factors*** may lead to as many as 1-5 out of every 1000 children being born with hearing loss (WHO report).<sup>12</sup> These include vaccine-preventable infectious diseases such as

rubella (antenatal), bacterial meningitis, mumps, measles and other infections such as toxoplasmosis and cytomegalovirus infections. Low birth weight due to small for date babies or malnourishment is also a key concern. Perinatal events such as birth asphyxia, hyperbilirubinemia and use of ototoxic medications can lead to prelingual deafness<sup>6</sup>. Genetic aetiology including syndromic and non-syndromic conditions may be responsible for as much as 50% of congenital hearing loss.<sup>14</sup>

- ***Noise induced hearing loss*** is a widely prevalent but under-reported clinical entity. Occupational noise induced hearing loss is one of the most compensated workplace injuries<sup>7</sup>. While workplace exposure has been traditionally recognised as a cause of hearing loss, there is increasing concern about noise exposure in recreational settings. WHO estimates that over a billion persons between 12 to 35 years of age are at risk of developing hearing loss due to exposure to loud sounds for prolonged periods of time through use of personal audio devices as well as in recreational settings such as discotheques, clubs, bars, sporting events *etc*<sup>8</sup>. This poses a new and unique challenge as the sensorineural hearing loss caused by noise is irreversible, while also being completely preventable through good listening practices.
- ***Ototoxic hearing loss:*** Many medications including commonly used aminoglycosides such as gentamycin, neomycin and macrolides such as erythromycin, aspirin, furosemide and others may lead to irreversible hearing loss. Of key concern are medicines used for management of multidrug resistant tuberculosis such as Kanamycin, Amikacin and Streptomycin and anti-

malarial treatment including quinine <sup>9</sup>. Available literature suggests that the incidence of ototoxicity in patients treated for multidrug resistant tuberculosis varies from less than 10% to as high as 50% <sup>10</sup>.

- **Presbycusis:** Age related hearing loss affects as many as one-third of individuals over the age of 65 years, the prevalence in this age group being five times as high as those below 65 years. Untreated hearing loss affects communication and can contribute to social isolation, loss of autonomy and is often associated with anxiety, depression and cognitive decline <sup>11</sup>. It leads to a diminished functional status and can make the difference between independence and the need for formal support services <sup>12</sup>.
- **Other causes:** Hearing loss can be caused by a variety of other acquired and genetic factors such as wax impaction, traumatic perforations, otosclerosis, hereditary hearing loss and adult onset progressive sensorineural hearing loss.

***Key considerations when determining the ear and hearing care priorities from a public health perspective include:***

- **Prevalence:** Conditions with high prevalence in any community would form natural priorities due to the widespread need for interventions.
- **Impact:** Hearing loss' effects on the individual and society, such as its effect on communication, education, livelihood, social and economic out-comes. Certain conditions, such as early onset childhood hearing loss, may have a lower prevalence compared to other ear problems. However, they have a strong impact on the life and family of the individual and hence need to be

considered when deciding priorities.

- **Preventability:** Conditions, which are preventable through simple interventions, could possibly be prioritised and targeted first. For example, prevention of the congenital rubella syndrome and meningitis-related deafness is possible through immunisation against these diseases.
- **Existing and available modalities for identification and management:** When ascertaining targets and possible actions, it is important to consider whether evidence-based management options are available to address that condition.

**What are the key challenges?**

***Lack of data on hearing loss***

Across the world there is a paucity of population-based epidemiological data that documents the prevalence, profile, distribution, causes and trends in hearing loss and ear diseases. The impact of hearing loss on the individual, society and country is also not well documented. Information on the economic impact of hearing loss and potential benefits that could be gained from its prevention and early management is scarce and often only available in high-income countries.

Epidemiological data serves two important purposes:

- It is an important tool for advocacy with policymakers and also within the communities.
- It provides essential information required for planning effective hearing care strategies. This information is an integral and essential part of a situation analysis, which forms the initial step in planning any community hearing care programme and helps in the identifi-

cation of priorities and appropriate allocation of resources.

The lack of such information is a crucial hurdle in the development and implementation of hearing care strategies.

### *Scarcity of trained human resources*

Human resources for ear and hearing care are unequally distributed across the world. In 2014 WHO released a report that concluded that human resources for hearing care were least available in those parts of the world where they are most required; 64% of the countries from the WHO region of Africa reported availability of less than 1 ENT specialist per million population and 81% have less than 1 audiologist per million <sup>13</sup>.

While there are countries with as many as 178 ENT specialists per million population, the ratio may be as low as 0.2 per million population in others <sup>14</sup>. The availability of audiologists, speech therapists and teachers for persons with hearing loss shows even greater variability and some countries may not have any audiologist or therapist.

Goulios and Patuzzi <sup>16</sup> assessed the distribution of key personnel involved in hearing care with respect to the economic profile of countries. The analysis revealed that the number of ENT specialists and audiologists per million populations is proportionate to the development status of the countries, as depicted below:

It is also relevant that educational facilities for development of the required cadres of human resources are variable across the world with significant gaps in the low- and middle-income countries of the world.

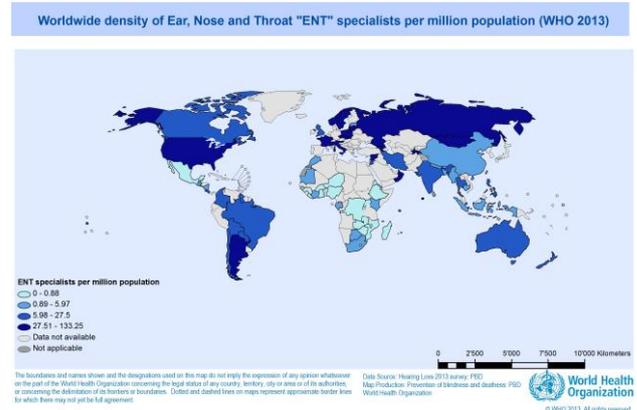


Figure 3

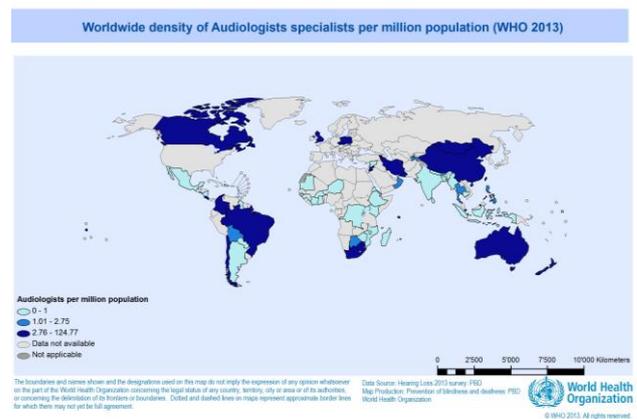


Figure 4

Income level	ENT specialists available (per million persons)	Audiologists available (per million persons)
Low-income	0-4	0-1
Lower-middle-income	2-24	0-40
Upper-middle-income	12-93	1-182
High-income	9-178	4-89

Table 1<sup>15</sup>: Estimated numbers (per million persons) of hearing health care professionals, according to income level (Based on the table with estimated numbers of hearing health care professionals for low, middle and high income countries <sup>16</sup>)

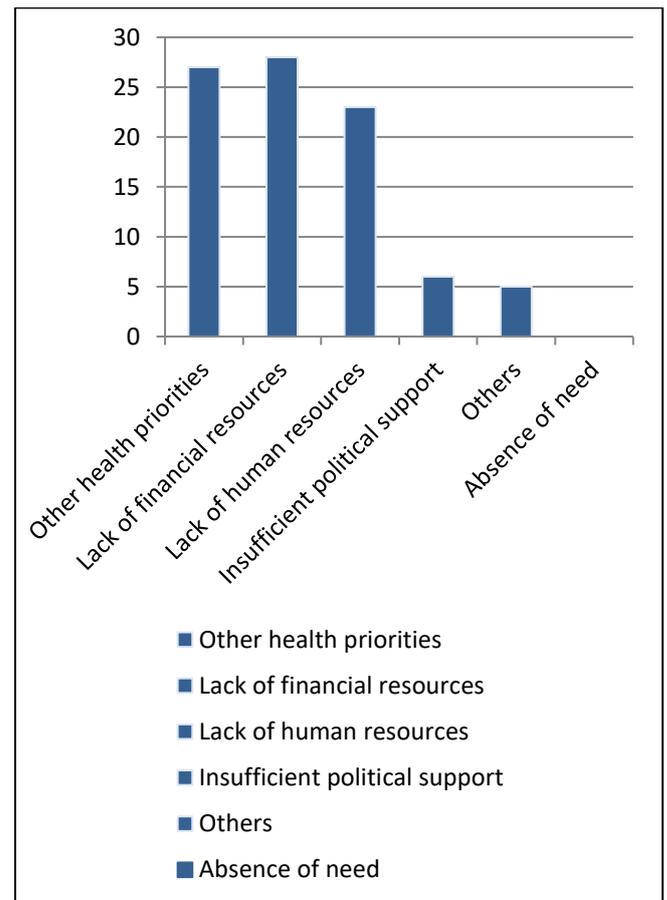
### ***Lack of awareness***

Perhaps the most relevant challenge is the lack of awareness about hearing loss and ear diseases and their potential impact on the individual, society and country. The fact that many of the causes which lead to deafness or hearing loss can be prevented and others can be effectively managed through medical, surgical or rehabilitative means is not well known. The lack of information can be found at all levels within the society. Parents, teachers and health workers often have poor knowledge and incorrect information in this regard. Beliefs such as hearing loss being due to a curse are rampant.<sup>16</sup> Serious ear diseases and their symptoms such as acute ear pain or ear discharge are often ignored or treated with home remedies<sup>17, 18, 19, 20</sup>. There is overall complacency towards hearing loss among parents, teachers and health workers, who are the people most likely to interact with children affected by these conditions. Moreover, hearing loss as well as the use of traditional hearing aids continues to be associated with stigma which can impact an individual's social and family life<sup>21, 22, 23</sup>. The lack of knowledge about the potential impact of hearing loss on communication as well as on economic outcomes could be a reason why this is often not prioritized by policy makers at national and international levels.

### ***Other health priorities***

A WHO survey enquired into the reasons for lack of national policies for hearing care. Analysis of responses received showed that not a single country identified 'lack of need' as a reason for not prioritising hearing care.<sup>22</sup> However, stress on other and more critical health care issues may be a reason why hearing loss, despite being the commonest sensory disability, does not get the required attention. Other high priority issues vie for and often receive more

attention and resources as compared to hearing loss which is considered to be low-impact and therefore, less important. Lack of financial resources and political will are often cited as reasons for lack of implementation of hearing care strategies in places that are in need of them.



*Figure 5: Factors reported to have prevented the development of a national plan*

### ***Complexity of interventions***

Modalities for diagnosis and management of hearing loss are now standardised and well established. However, many of these interventions are complex and need to be supported by suitable infrastructure. For instance, while hearing aids and cochlear implants are available and effective, these cannot be fitted in a vacuum, without the development of support systems, which

may be resource intensive. Surgical interventions for ear diseases are easily undertaken, but only when trained human resources and equipment are available.

### **Why address hearing loss now?**

While there are many challenges to promotion of ear and hearing care, there are also a number of opportunities in this regard.

***Prevention is possible:*** Many cases of ear diseases and hearing loss can be prevented or reversed through primary prevention, early identification and suitable treatment. Intervention modalities for various ear conditions are available and standardized. Transfer of this knowledge and skill is possible due to availability of strong evidence and newer communication channels, such as telecommunication and Internet.

***Improved hearing technology:*** The constant emergence of newer and improved technologies for management of ear diseases and rehabilitation of persons with hearing loss gives us great hope. Advances in technology have also made available scientific e-tools, which may provide an estimate of hearing loss prevalence in places where financial resources and time for detailed surveys are lacking.<sup>24</sup>

***Improved communication:*** With the growth and popularity of web-based communication and its increasing availability, it is now possible to convey uniform messages in most of the world. These channels can be used for training, transfer of technology as well as technical support.

***Prioritisation of disability:*** There is an increasing focus on all types of disabilities, with the ratification of the *United Nations Convention on Rights of Persons with Disability (UNCRPD)* as well as the *World Health Assembly Resolution on Disabili-*

*ties* in 2014. This focus can be utilized as a starting point for advocacy. It also raises the need to address the issue of hearing care in a holistic manner, considering all its dimensions (education, employment, social) and not just focusing on the medical aspects.

***Establishment of strong programmes in other domains:*** Many areas of health, which were not prioritised earlier, are now being highlighted, such as ageing and assistive devices. As countries focus on these issues, it is essential that hearing care be integrated within the overall strategies being developed.

***Availability of WHO programmes:*** The restart of the WHO programme for Prevention of Deafness and Hearing Loss (<http://www.who.int/pbd/deafness/en/>) in 2012 is an opportunity whereby this channel can be used to gain access to the global health policymaking process. Advocacy through WHO can be effective in reaching many countries across the world. Other relevant WHO programmes include Disability and Rehabilitation, Assistive Technology and Devices, Immunization, Ageing and Life Course and Occupational Health.

### **What principles can guide the development of ear and hearing care?**

***Raising awareness and service provision:*** Any effort to promote ear and hearing care at global, regional, national or community level should be built around these two key pillars. Both aspects must be strengthened in tandem. Raising awareness is essential to make the community and health professionals aware of the importance of hearing as well as the significance of prevention and management of hearing loss. At the same time, this must be accompanied by development or strengthening of services

for effective identification and management of ear diseases and hearing loss. Raising awareness without enhanced service provision would raise a demand within the society which cannot be met by the health system and hence cause disenchantment among those in need for such services. On the other hand, establishing prevention programmes and services such as ear surgery, hearing aid provision, sign language training, etc. without making the community aware about their need and relevance would lead to low utilization of these services and, hence a low impact of the strategies.

Where services such as hearing aid fitting are made available, it is essential that the myths surrounding hearing loss, use of hearing aids and its attached stigma be dispelled in order to ensure that these devices are used. Moreover, it is only when such awareness is raised that persons with hearing loss can be empowered to seek education, gain livelihood and become fully integrated within their societies.

***Setting up a community ear and hearing care programme:*** Planning and providing for services is the first step in dealing with ear diseases and hearing loss. Development of services must be multi-dimensional and consider all aspects of ear and hearing care and not only the medical and surgical aspects. The planning process must take into consideration:

- Profile of hearing loss and identified priorities.
- Existing resources i.e. human resources, training mechanisms, existing infrastructure and financial capacity.
- Available opportunities within the health system *i.e.* other health care programmes with overlapping mandates. These should be kept in mind in order to identify those interventions, which can be readily implemented.
- Education, livelihood and social sup-

port. These aspects should be given due consideration in order to ensure provision of holistic services.

- Ethnic, cultural and political context: it is essential to consider all interventions from a cultural viewpoint and ensure that they will be acceptable within the communities for which they are intended.
- Evidence-based approaches should be used for provision of services, wherever possible.
- All stakeholders should be involved in the planning of such services, including different programmes within departments of health, non-health sectors, professionals, academics, public health experts, associations of deaf and hard of hearing, parents' groups and other relevant groups.

### **Main components of a community ear and hearing care programme**

***Raise awareness:*** Efforts to raise awareness must focus on all sections of society with targeted messages. Some of the target groups for information, education and communication (IEC) activities and messages can include:

- ***Policymakers:*** Prevalence and impact of hearing loss, burden of preventable and treatable ear diseases and cost-benefit issues.
- ***Health professionals:*** Importance of early identification, advances in diagnostic techniques and hearing device technologies, prevention of hearing loss through management of ear diseases and risks with ototoxic medicines.
- ***Community level health care providers:*** Language milestones and their relevance, how to suspect and refer a child with hearing loss, knowledge of common ear diseases, healthy ear and hearing care habits.
- ***Parents:*** Healthy ear and hearing care

habits, language milestones and their relevance, impact and management of hearing loss and awareness of common ear diseases.

- **Teachers:** Healthy ear and hearing care habits, when to suspect hearing loss in a child, importance of managing ear diseases and hearing loss.
- **Adolescents:** Importance of hearing, healthy ear and hearing care habits and safe listening habits.
- **Workers:** Awareness of risks with occupational exposure to noise and prevention of hearing loss, healthy ear and hearing care habits.

Many cases of ear diseases and hearing loss can be prevented simply by raising awareness about good ear and hearing care habits.

#### ***In a Box:***

- *Timely management of acute otitis media can reduce the prevalence of chronic otitis media. Parents have to be aware of this condition and the dangers of home remedies. Primary level health care providers must be familiar with this condition and able to provide suitable medical management or appropriate referral.*<sup>6</sup>
- *Noise-induced hearing loss can be addressed through raised awareness both in occupational and recreational settings.*<sup>25, 26</sup>
- *Ototoxic hearing loss can be reduced if health professionals are aware of this condition and take it into account when prescribing relevant medications such as aminoglycosides for both local and systemic use.*<sup>27</sup>

Tools for raising awareness should target all the key groups. Such tools may include:

- Posters
- Banners
- Handouts

- Flip charts
- Radio announcements
- TV clips
- Web-based messages
- Short message service (SMS)
- Press releases
- Person-to-person communication

Awareness tools can be developed through searching for validated materials, which are already available and can be easily adapted to suit the needs and cultural context of the place where they are to be used. Once developed or adapted, the tools must be tested in a representative sample of the target group prior to their wider application.

Person-to-person communication is an important and effective communication method, which should be effectively used. Health care workers at grass root level, teachers, parents and other community members may be effective in conveying key messages to the entire community. A powerful tool for important and effective communication is the use of role models. Persons with hearing loss who have coped effectively with the condition and reached their potential should be used as partners in such programmes. By sharing their struggles and successes, they can be strong proponents for the cause of ear and hearing care and help to motivate parents and people with hearing loss.

***Sensitisation and training:*** Trained professionals such as ENT specialists, audiologists, speech therapists and others should be sensitised to a public health approach towards ear diseases and hearing loss. Other health care providers such as general/family physicians and health care workers should undergo training in provision of ear and hearing care. Even in case of health care providers who are already trained, a refresher course to reorient them and provide information on IEC activities, referral systems and recent advances should be

held. It may be useful to also sensitize obstetricians and paediatricians, in order to promote early identification of hearing loss and prompt management of ear diseases in children. Other groups who may be included in the training programme include parents and teachers.

### ***In a Box:***

*In the National Programme for Prevention and Control of Deafness in India (NPPCD), seven levels of sensitisation/ training are included:*

- *Training of master trainers (ENT specialists, audiologists)*
- *Obstetricians and paediatricians*
- *General primary level physicians*
- *Primary level health workers*
- *Community health workers*
- *Teachers (5 teachers from each primary school)*
- *Parents (in each village, 5 parents of children with disability were identified)<sup>28</sup>*

In order to have a comprehensive and result-oriented training approach, it is important to identify the exact role of each level of manpower that are to be trained. The training materials and messages can thus be targeted towards the desired outcome.

***The WHO Primary Ear and Hearing Care manuals*** are useful tools and should be adapted to the local context and translated, where required. The training can follow a cascade pattern with training of master trainers being the initial step. They can then train the general physicians, who in turn can be responsible for training of health care workers, parents and teachers. Standardisation of training helps to ensure that the same level of skills is imparted and same messages conveyed in all trainings. The development of standardised materials is important for this.

### ***In a Box:***

*Steps in setting up a training programme:*

- *Identify manpower to be trained*
- *Agree on the role each level can play in provision of ear and hearing care*
- *Develop a training protocol (who will train whom, duration, objectives)*
- *Adapt and translate (if required) WHO PEHC training manuals ([http://www.who.int/pbd/deafness/activities/hearing\\_care/en/](http://www.who.int/pbd/deafness/activities/hearing_care/en/)) to suit the needs of the training programme*
- *Initiate the cascade training*
- *Ensure quality control*
- *Monitor, take feedback and evaluate*

While developing training programmes, it is also important to consider the formal certification courses for health workers and other care providers. It would be useful and less resource-intensive to include a module on ear and hearing care within such formal training courses.

***Infrastructure development:*** The capacity of the health system to address ear and hearing problems needs to be strengthened in order to ensure diagnosis and management of ear diseases and hearing loss. This includes provision of suitable equipment, medications and devices within the health system. In order to develop the infrastructure the following steps can be undertaken:

- *Identify the health care facilities that can provide ear and hearing care services*
- *Agree on the nature of services to be provided there*
- *Identify the requirements for provision of those services, including additional human resources, if needed*
- *Develop specifications of required equipment and devices and their maintenance*
- *Procure and install equipment, as well as train users in the use of the equipment*

### ***In a Box:***

*For example: when it is planned to undertake hearing screening for infants born in a hospital, detailed planning of requirements has to be undertaken. The following equipment and human resource needs may be identified when planning an infant hearing screening programme*<sup>29</sup>

- *OAE/AABR machine*
- *Diagnostic auditory evoked potential system*
- *Hearing devices*
- *Trained nurses to undertake screening*
- *Trained person for ABR, fitting of hearing aids, counselling regarding sign language*
- *Quiet room/area in the maternity ward for screening*

Besides the health infrastructure, the overall capacity of the society to deal with hearing loss should be improved through provision of educational support, social support, sign language development, captioning services and others. Education is often the first and crucial step. It is important to ensure that identified/ rehabilitated children can gain access to educational services appropriate for them. These could be through special schools for children with hearing loss and through strengthening capacity of mainstream schools to include hearing impaired children.

### ***Development of priority programmes:***

- Infant hearing screening
- School screening
- Noise control
- Screening in elderly
- Hearing aid services
- Cochlear implantation
- Immunisation, such as rubella, meningitis, mumps and others, as relevant
- Sign language development

The items mentioned above are some

examples of specific programmes that can be part of the ear and hearing care strategy. Where possible, such programmes can be delivered as part of established services.

### ***In a Box:***

- *School ear and hearing check-up can be undertaken as a component of an integrated school health programme.*
- *Noise control is often integrated into occupational and environmental health strategies of countries.*

For launching such a programme, detailed planning with documented standard operating procedures (SOPs) and tools (materials, questionnaires, proformas) must be developed. The process of developing such priority programmes can be outlined as below:

- Agreement on which programmes should be implemented and where
- Identify needs (infrastructure equipment, human resources, financial resources) for the programme
- Identify the key person/s responsible
- Develop SOPs and tools (as above)
- Data management and monitoring

***Data management, monitoring and evaluation:*** Monitoring and evaluation are key aspects to study the day-to-day implementation of a strategy and to measure its effectiveness in achieving the identified targets. This must be implemented as part of any community ear and hearing care plan. The data that is generated as part the implementation must be managed suitably. The following steps can be taken:

- Develop indicators (process, output and outcome), including identification of sources of information
- Develop monitoring tools
- Identify persons responsible and mechanism for flow on information (who will collect, when and how)
- Determine periodicity of evaluation

(monthly, quarterly, annual, once in 5 years)

- Determine what to do with the information (publish as report, as scientific publication, advocacy materials, etc.)

**Research and development:** Depending on the overall objective and focus of the programme, basic epidemiological and operational research is important to enable the field of ear and hearing care to evolve.

### World Health Organisation's outlook

In 2012, the *World Health Organization* restarted its programme for prevention of deafness and hearing loss. The programme derives its mandate from the World Health Assembly resolution of 1995 which requested member states to develop and implement public health programmes to prevent, identify, treat and rehabilitate hearing loss and its major causes.

Vision of the WHO programme for prevention of deafness and hearing loss (WHO PDH) is of a world in which no person lives with hearing loss due to preventable causes and those with unavoidable hearing loss can achieve their full potential through rehabilitation, education and empowerment.

The overall aim of the programme is to establish community-based, sustainable and inclusive programmes for prevention and management of hearing loss, integrated within the primary health care systems of Member States.

#### ***The main objectives of the programme are:***

1. Generate and use evidence to advocate for increased political and financial commitment of Member States (MS) and other stakeholders for hearing care.
2. Support development and implement-

tation of national hearing care strategies, plans and policies, within the framework of primary health care.

3. Develop suitable tools for promoting hearing care in WHO MS.
4. Strengthen multisectoral engagement and effective partnerships for improved hearing care.

#### ***Key activities carried out by WHO PDH include:***

- Evidence-based advocacy which is effective in raising awareness about and increasing commitment towards hearing loss amongst all stakeholders
- Provision of technical support to Member States for *ear and hearing care* through:
  - Development of evidence-based technical tools
  - Provision of technical assistance in planning, implementation and monitoring of ear and hearing care strategies integrated with the country's health system
- Development of strong partnerships through establishment of networks and engagement with all stakeholders in the field of *ear and hearing care*

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