***HandsON Learn***

# ***Deafness and Hearing loss***

## ***Key facts***

* **By 2050, nearly 2.5 billion people are projected to have some degree of hearing loss, and at least 700 million will require hearing rehabilitation.**
* **Over 1 billion young adults are at risk of permanent, avoidable hearing loss due to unsafe listening practices.**
* **An annual additional investment of less than US$ 1.40 per person is needed to scale up ear and hearing care services globally.**
* **Over a 10-year period, this promises a return of nearly US$ 16 for every US dollar invested.**

## ***Overview***

**Over 5% of the world’s population – or 430 million people – require rehabilitation to address their disabling hearing loss (including 34 million children). It is estimated that by 2050 over 700 million people – or 1 in every 10 people – will have disabling hearing loss.**

**Disabling hearing loss refers to hearing loss greater than 35 decibels (dB) in the better hearing ear. Nearly 80% of people with disabling hearing loss live in low- and middle-income countries. The prevalence of hearing loss increases with age, among those older than 60 years, over 25% are affected by disabling hearing loss.**

## ***Hearing loss and deafness***

**A person who is not able to hear as well as someone with normal hearing – hearing thresholds of 20 dB or better in both ears – is said to have hearing loss. Hearing loss may be mild, moderate, severe or profound. It can affect one ear or both ears and leads to difficulty in hearing conversational speech or loud sounds.**

**Hard of hearing refers to people with hearing loss ranging from mild to severe. People who are hard of hearing usually communicate through spoken language and can benefit from hearing aids, cochlear implants, and other assistive devices as well as captioning.**

**Deaf people mostly have profound hearing loss, which implies very little or no hearing. They often use sign language for communication.**

## ***Causes of hearing loss and deafness***

**Although these factors can be encountered at different periods across the life span, individuals are most susceptible to their effects during critical periods in life.**

### **Prenatal period**

* **genetic factors including hereditary and non-hereditary hearing loss**
* **intrauterine infections – such as rubella and cytomegalovirus infection.**

### **Perinatal period**

* **birth asphyxia (a lack of oxygen at the time of birth**
* **hyperbilirubinemia (severe jaundice in the neonatal period)**
* **low-birth weight**
* **other perinatal morbidities and their management.**

### **Childhood and adolescence**

* **chronic ear infections (chronic suppurative otitis media)**
* **collection of fluid in the ear (chronic nonsuppurative otitis media)**
* **meningitis and other infections.**

### **Adulthood and older age**

* **chronic diseases**
* **smoking**
* **otosclerosis**
* **age-related sensorineural degeneration**
* **sudden sensorineural hearing loss.**

### **Factors across the life span**

* **cerumen impaction (impacted ear wax)**
* **trauma to the ear or head**
* **loud noise/loud sounds**
* **ototoxic medicines**
* **work related ototoxic chemicals**
* **nutritional deficiencies**
* **viral infections and other ear conditions**
* **delayed onset or progressive genetic hearing loss.**

## ***The impact of unaddressed hearing loss***

**When unaddressed, hearing loss impacts many aspects of life at individual level:**

* **communication and speech;**
* **cognition;**
* **social isolation, loneliness and stigma;**
* **impact on society and economy;effects on years lived with disability (YDLs) and disability adjusted life years (DALYs); and**
* **education and employment: In developing countries, children with hearing loss and deafness often do not receive schooling. Adults with hearing loss also have a much higher unemployment rate. Among those who are employed, a higher percentage of people with hearing loss are in the lower grades of employment compared with the general workforce.**

**WHO estimates that unaddressed hearing loss poses an annual global cost of US$ 980 billion. This includes health sector costs (excluding the cost of hearing devices), costs of educational support, loss of productivity and societal costs. Of these costs, 57% are attributed to low- and middle-income countries.**

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## ***Prevention***

**Many of the causes that lead to hearing loss can be avoided through public health strategies and clinical interventions implemented across the life course.**

**Prevention of hearing loss is essential throughout the life course, from prenatal and perinatal periods to older age. In children, nearly 60% of hearing loss is due to avoidable causes that can be prevented through implementation of public health measures. Likewise, most common causes of hearing loss in adults, such as exposure to loud sounds and ototoxic medicines, are preventable.**

**Effective strategies for reducing hearing loss at different stages of the life course include:**

* **immunization;**
* **good maternal and childcare practices;**
* **genetic counselling;**
* **identification and management of common ear conditions;**
* **occupational hearing conservation programmes for noise and chemical exposure;**
* **safe listening strategies for the reduction of exposure to loud sounds in recreational settings; and**
* **rational use of medicines to prevent ototoxic hearing loss.**

## ***Identification and management***

**Early identification of hearing loss and ear diseases is key to effective management.**

**This requires systematic screening for detection of hearing loss and related ear diseases in those who are most at risk. This includes:**

* **newborn babies and infants**
* **pre-school and school-age children**
* **people exposed to noise or chemicals at work**
* **people receiving ototoxic medicines**
* **older adults.**

**Hearing assessment and ear examination can be conducted in clinical and community settings. Tools such as the** [**hearWHO app**](https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/hearwho) **and other technology-based solutions make it possible to screen for ear diseases and hearing loss with limited training and resources.**

**Once hearing loss is identified, it is essential that it is addressed as early as possible and in an appropriate manner, to mitigate any adverse impact.**

## ***Rehabilitation for hearing loss***

**Rehabilitation helps people with hearing loss to function at their optimum, which means they can be as independent as possible in everyday activities. Specifically, rehabilitation helps them to participate in education, work, recreation and meaningful roles, e.g. in their families or communities–throughout their lives. Interventions for rehabilitation for people with hearing loss include:**

* **the provision of, and training in the use of, hearing technologies (e.g. hearing aids, cochlear implants and middle ear implants);**
* **speech and language therapy to enhance perceptive skills and develop communication and linguistic abilities; training in the use of sign language and other means of sensory substitution (e.g. speech reading, use of print on palm, Tadoma, signed communication);**
* **the provision of hearing assistive technology, and services (e.g. frequency modulation and loop systems, alerting devices, telecommunication devices, captioning services and sign language interpretation); and**
* **counselling, training and support to enhance engagement in education, work and community life.**

***Project Concept:*** An online learning app for the deaf and mute for providing educational courses on topics such as Basic Science, Basic Maths, Basic English and Basic History etc.

There are approximately 63 million people who are suffering from Significant Auditory Impairment. The deaf and mute people in India do not have a lot of resources for learning and education therefore our app provides simple and easy learning in Sign language.

***Problem statement***

### **1. Lack of Specialized Institutions**

* **Limited Availability:** There are not enough schools specifically designed for deaf and mute students, especially in rural areas.

**2. Communication Barriers**

* **Sign Language Proficiency:** A shortage of teachers proficient in sign language hampers effective communication.
* **Cultural Stigma:** There is often a stigma surrounding disability, leading to social isolation and a lack of support from peers and educators.

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### **3. Financial Constraints**

* **High Costs:** Specialized education can be expensive, and many families struggle to afford it.
* **Resource Allocation**: Government funding for special education programs is often inadequate, impacting the quality of education.

### **4. Awareness and Attitudinal Issues**

* **Societal Awareness**: There is a general lack of awareness about the rights and needs of deaf and mute individuals, leading to discrimination.
* **Parental Attitudes**: Some parents may have limited understanding of how to support their deaf or mute children, affecting their education and self-esteem.

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### **5. Limited Access to Technology**

* **Assistive Devices**: There is often a lack of access to hearing aids or other assistive technologies that could enhance learning.

### **6. Transition to Higher Education and Employment**

* **Limited Opportunities**: There are fewer pathways for deaf and mute individuals to pursue higher education or vocational training.

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### **7. Policy Implementation Gaps**

* **Legislative Framework**: While there are laws supporting the rights of disabled individuals, the implementation of these policies is often weak.
* **Monitoring and Evaluation**: There is insufficient monitoring of educational programs aimed at deaf and mute students, resulting in a lack of accountability

***Solutions:***

### **1. Accessibility Challenges**

* **Sign Language Integration:**
  + **Solution:** Partner with linguists, educators, and native signers to create comprehensive sign language modules for the app. Use videos, animations, and even AI-driven sign recognition. Include multiple sign languages to accommodate different regions.
  + **AI Integration:** Explore advancements in AI-powered sign language recognition and translation tools to allow real-time interaction.
  + **Crowdsourcing Content:** Allow the community to contribute content, much like user-generated subtitles, which can be peer-reviewed for accuracy.
* **Video Quality and Clarity:**
  + **Solution:** Invest in high-definition video content with clear lighting and close-up views of hand gestures and facial expressions. Prioritize optimizing video compression to maintain quality without needing heavy bandwidth.
* **Speech-to-Text Accuracy:**
  + **Solution:** Use advanced speech-to-text APIs with high accuracy. To improve accessibility, offer correction options where users can manually adjust the text if the automated transcription is inaccurate. Continually update the app with feedback to refine accuracy.
* **Reading Level Variability:**
  + **Solution:** Provide content at various literacy levels. Simplify text or offer visuals and animations to explain concepts. Incorporate video content in sign language for users with low reading comprehension.

### **2. User Interface (UI) and Design**

* **Visual-First Design:**
  + **Solution:** Implement a visually intuitive interface using simple icons, animations, and visual feedback. Use color contrast for readability and avoid audio-based cues. Prioritize easy-to-navigate menus with visual representations of each option.
* **Consistent User Experience:**
  + **Solution:** Conduct extensive user testing across different devices and operating systems, focusing on ease of use and visual clarity. Offer a customizable UI for users to adjust the layout, color schemes, and text sizes to suit their preferences.
* **Gestural Inputs:**
  + **Solution:** Integrate custom gesture-based controls to navigate the app, while ensuring they don’t conflict with common mobile gestures. Collaborate with the deaf and mute communities to design user-friendly gestures that feel natural.

### **3. Content and Curriculum Development**

* **Custom Content Creation:**
  + **Solution:** Work with deaf educators and native signers to develop tailored content. Modular content creation allows for easy updates and localization, accommodating different sign languages and cultural contexts.
  + **Use Multimedia:** Supplement text and sign language videos with illustrations, animations, and interactive content to make learning more engaging.
* **Cultural Sensitivity:**
  + **Solution:** Engage with deaf communities during the app design process. Ensure that the app's content respects and embraces the cultural diversity and perspectives of deaf and mute users by including real-life stories and culturally relevant examples.

### **4. Technical and Resource Constraints**

* **Machine Learning and AI Limitations:**
  + **Solution:** Collaborate with AI researchers and developers to refine and train machine learning models specific to sign language recognition. Include feedback mechanisms in the app so users can report errors, helping improve accuracy over time.
  + **Use Pre-Trained Models:** Leverage existing models from AI research and adapt them to specific sign languages. Open-source AI projects can also be valuable resources.
* **Offline Functionality:**
  + **Solution:** Allow users to download lesson modules and videos for offline use. Compress files intelligently and use data-efficient encoding techniques to provide quality content without excessive data usage.

### **5. Privacy and Security Concerns**

* **Data Privacy:**
  + **Solution:** Ensure that the app complies with global data privacy standards (e.g., GDPR, HIPAA). Use encryption for all personal data and video files. Provide clear consent forms for video recordings, if used, and allow users to control what data they share.
* **Vulnerability to Hacking:**
  + **Solution:** Employ strong encryption protocols and regularly update the app to patch vulnerabilities. Implement two-factor authentication (2FA) and secure payment methods for in-app purchases. Educate users about safe practices when using the app.

### **6. Market and Financial Threats**

* **Limited Market Size:**
  + **Solution:** Expand the app's target audience by including additional features such as educational tools for non-deaf family members, friends, and interpreters. Partner with schools, organizations, and governments to scale the app’s usage within special education.

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### ***Potential Impact***

1. **Global Population with Hearing Loss:**
   * Over 1.5 billion people globally experience some form of hearing loss, with around 430 million requiring rehabilitation​  
     [World Health Organization (WHO)](https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss)​  
     [World Health Organization](https://cdn.who.int/media/docs/default-source/documents/health-topics/deafness-and-hearing-loss/world-report-on-hearing/wrh-executive-summary.en.pdf).
   * Many of these individuals rely on sign language as their primary mode of communication, especially those with severe or profound hearing loss.
2. **Deaf and Mute Population:**
   * While precise global data on individuals who are both deaf and mute is limited, it is estimated that millions belong to this category. These individuals would directly benefit from an app that simplifies learning and enhances access to sign language resources.
3. **Family and Caregivers:**
   * Beyond the deaf and mute individuals, their families, educators, and caregivers would benefit greatly. Learning sign language bridges communication gaps and fosters inclusivity.
4. **Sign Language Learning Needs:**
   * Many people, including professionals in healthcare, education, and customer service, seek to learn sign language to support inclusivity. An online app would make learning accessible, flexible, and scalable.
5. **Global Accessibility Issues:**
   * In many countries, resources for learning sign language are limited. An app can overcome geographic and economic barriers by providing affordable and universally available learning tools.

### ***Conclusion***

By targeting not just the deaf and mute community but also their support network, an online sign language app could potentially benefit hundreds of millions of people worldwide. This initiative would promote inclusivity, better communication, and empowerment for the deaf and hard-of-hearing community.

### ***About "Hands On Learn"***

At **Hands On Learn**, we believe that communication is a bridge that connects lives, and sign language is one of the most empowering tools to make that connection. Our platform offers a dual approach to learning—an **innovative app** and an **offline center**—to ensure that everyone, from beginners to advanced learners, can access high-quality resources.

### ***Key Features of the App***

1. **Interactive Learning Modules**: Learn sign language through video tutorials, interactive quizzes, and engaging exercises.
2. **Personalized Progress Tracking**: Monitor your learning journey and celebrate milestones.
3. **Sign Dictionary**: Quickly look up signs for daily conversations.
4. **Community Engagement**: Connect with other learners and native signers through forums.
5. **Offline Access**: Download lessons and practice anytime, anywhere.

### ***The Offline Learning Center***

* **Personalized Attention**: Get hands-on learning from certified instructors in a supportive environment.
* **Workshops and Events**: Participate in immersive experiences, such as cultural programs and sign language awareness drives.
* **Community Building**: Meet and interact with other learners and members of the deaf community.

### ***Why This Dual Approach?***

1. **Accessibility**: The app ensures learning is available anytime, while the offline center caters to those who prefer face-to-face interaction.
2. **Practical Experience**: Offline centers offer real-life practice scenarios that complement digital learning.
3. **Inclusivity**: By creating spaces online and offline, you are reaching a broader audience and catering to diverse needs.

### ***Our Vision***

"Hands On Learn" aims to break down communication barriers, promote inclusivity, and empower individuals and communities through the beauty of sign language. Together, the app and offline center provide a holistic learning experience that goes beyond education—it’s about building connections and understanding.

### ***Call to Action***

💡 **Learn. Connect. Empower.** Start your journey with **Hands On Learn** today! Download the app or visit our offline center to make communication truly universal.

This approach highlights the thoughtfulness and depth of your project, ensuring it resonates with your audience!

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### ***About "HandsON Learn"***

"At *HandsON Learn*, we believe that communication is a right, not a privilege. Our app is designed to help individuals learn sign language with ease, whether they are part of the deaf and mute community, their families, or anyone who wants to promote inclusivity. With interactive lessons, real-life scenarios, and engaging exercises, we aim to make sign language accessible to everyone."

### ***Features Worth Highlighting***

* **User-Friendly Interface**: Ensures accessibility for all age groups and learning levels.
* **Interactive Learning**: Offers video tutorials, quizzes, and games to make learning fun.
* **Progress Tracking**: Helps users monitor their growth and stay motivated.
* **Inclusive Resources**: Caters to beginners, professionals, and family members looking to connect with the deaf and mute community.

### ***Seeking Feedback***

"We value your thoughts! Your feedback on 'Hands On Learn' will help us improve and create an even better experience for learners. Whether it's about the app's functionality, the learning material, or your overall experience, we’d love to hear from you."

### ***Call to Action***

Encourage users to leave their feedback directly on your app store page, social media, or within the app. Example:  
💬 "Tell us how 'Hands On Learn' has impacted your journey toward inclusivity. Your input helps us shape the future of sign language education!"

***Revenue system***

**Core Features for Free:** Offer basic lessons and tools at no cost to attract a larger user base. This could include a limited number of lessons, basic sign language dictionaries, and simple interactive learning exercises.

**Premium Subscription:** Charge for advanced features, including:

* **Advanced Lessons:** More in-depth courses on specific topics, languages, or skills.
* **Personalized Learning Paths:** Tailored lessons based on user progress and preferences.
* **Offline Access:** The ability to download lessons and videos for use without an internet connection.
* **Exclusive Content:** Premium video tutorials, expert-led classes, or community forums.

**Price Range:** Subscription could be monthly or annual, with pricing between Rs.1999 and Rs.2499 per month, depending on the region and level of service. Offer different tiers to cater to various budget.