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Hearing Impairment – Causes & Implications on Behavior & Learning

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IUCN
The World Conservation Union

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LIST OF ACRONYMS

APDIP	Asia Pacific Development Information Programme
ECK	Education Communication & Knowledge Management Group (IUCN)
IUCN	The World Conservation Union
PAD	Pakistan Association of the Deaf
SDNP	Sustainable Development Networking Programme, Pakistan
UNDP	United Nations Development Programme

PREFACE

There are several disorders, syndromes, infectious diseases, and adventitious conditions that may result in an individual being deaf. As a result of these various etiologies such individuals may exhibit a range of hearing losses. Sensory loss may range from mild impairment to total loss of the ability to hear. Due to the subtly and progressive nature of auditory impairments, it is paramount that individuals working with persons with deafness have an understanding of these various disorders in order to effectively observe and assess for sensory loss. By being aware of the possibility of auditory impairments and the characteristics associated with them, appropriate assessment, educational interventions and adaptations may be implemented in the classroom, home and community.

This document has been compiled under the Asia Pacific Development Information Programme funded ICT R&D Grant Project, "*ICT Assisted Learning Tools for the Deaf in Pakistan*", with a view to assist educators, related staff and parents to gain a better understanding of major causes of deafness and associated restorative interventions and their utility in enhancing the communication and learning of the deaf community. With insights on parameters of deaf community learning, the document will contribute in the development of Information & Communication Technology learning tools.

Chapter 1

HEARING IMPAIRMENT – A BRIEF INTRODUCTION

1.1 Definition and Classification

There are many definitions and classification systems of hearing impairment. By far the most common division is between deaf and hard of hearing. This would seem simple enough, except that different professionals define the two categories differently. The extreme points of view are represented by those with a physiological orientation versus those with an educational orientation.

Those maintaining a strictly physiological viewpoint are interested primarily in the measurable degree of hearing loss. Children who cannot hear sounds at or above a certain intensity (loudness) level are classified as "deaf;" others with a hearing loss are considered "hard of hearing". Hearing sensitivity is measure in decibels (units of relative loudness of sounds). Zero decibels (0 dB) designates the point at which the average person with normal hearing can detect the faintest sound. Each succeeding number of decibels indicates a certain degree of hearing loss. Those who maintain a physiological viewpoint generally consider people with hearing losses of about 90 dB or greater to be deaf and people with less to be hard of hearing.

People with an educational viewpoint are concerned with how much the hearing loss is likely to affect the child's ability to speak and develop language. Because of the close causal link between hearing loss and delay in language development, these professionals categorize primarily on the basis of spoken language abilities. Following is the most commonly accepted set of definitions reflecting this educational orientation:

- *Hearing impairment*: is generic term indicating a hearing disability that may range in severity from mild to profound; it includes the subsets of *deaf* and *hard of hearing*.
- A *deaf* person is one whose hearing disability precludes successful processing of linguistic information through audition, with or without a hearing aid.
- A person who is *hard of hearing* generally, with the use of a hearing aid, has residual hearing sufficient to enable successful processing of linguistic information through audition (Brill, MacNeil, & Newman, 1986).

Educators are extremely concerned about the *age of onset* of the hearing impairment. Again, the close relationship between hearing loss and language delay is the key here. The earlier the hearing loss occurs in a child's life, the more difficulty he or she will have developing the language of the hearing society. For this reason, professionals frequently use the terms congenitally deaf (those who were born deaf) and adventitiously deaf (those who acquire deafness at some time after birth).

Two other frequently used terms are even more specific in pinpointing language acquisition as critical: Prelingual deafness is "deafness present at birth, or occurring early in life at an age prior to the development of speech or language"; postlingual deafness is "deafness occurring at any age following the development of speech and language" (Brill et al. 1986). Experts differ regarding the dividing point between prelingual and postlingual deafness. Some believe it should be at about eighteen months, whereas others think it should be lower, at about twelve months or even six months (Meadow–Orlans, 1987).

The following hearing threshold classifications are common: mild (26–54 dB), moderate (55–69 dB,) severe (70–89 dB) and profound (90 dB and above). These levels of severity according to loss of hearing sensitivity cut across the broad classifications of "deaf" and "hard of hearing". The broader classifications are not directly dependent on hearing sensitivity. Instead, they stress the degree to which speech and language are affected.

Table – 1.1 gives general examples of the effects various degree of hearing loss may have on language development.

Table – 1.1
Relationship of Degree of Impairment to Understanding of Language and Speech

	Average of the Speech Frequencies in Better Ear	**Effect of Hearing Loss on Understanding of Language and Speech**
Slight	27 – 40 dB	- May have difficulty hearing faint or distant speech. - May experience some difficulty with language arts subjects.
Mild	41 – 55 dB	- Understands conversational speech at a distance of 3–5 feet (face to face). - May miss as much as 50 percent of class discussions if voices are faint or not in line of vision. - Will have limited vocabulary.
Marked	56 – 70 dB	- Conversation must be loud to be understood. - Will have increased difficulty in group discussions. - Is likely to have defective speech. - Is likely to be deficient in language usage and comprehension. - Will have limited vocabulary.
Severe	71 – 90 dB	- May hear loud voices about 1 foot from the ear. - May be able to identify environmental sounds. - May be able to discriminate vowels but not all consonants. - Speech and language defective and likely to deteriorate.
Extreme	90 dB or above	- May hear some loud sounds but is aware of vibrations more than tonal patterns. - Relies on vision rather than hearing as primary avenue for communication. - Speech and language defective and likely to deteriorate.

1.2 Causes of Hearing Loss

Some causes of hearing loss are presented in Table 1.2. The cause is unknown in about half the people with hearing impairments. Sensorineural hearing losses are caused by viruses like rubella and meningitis for about 14 percent of the people with hearing impairments. Heredity and genetic factors account for about 13 percent of hearing impairments. Knowing the cause of a hearing problem helps teachers and other professionals decide on appropriate treatments. For example, children who are deaf at birth must be taught to communicate differently from children whose hearing loss is acquired after they have learned to talk.

Table – 1.2
Some Causes of Hearing Impairments

Maternal rubella (5 percent)
German measles contracted by a pregnant woman; depending on when illness Occurs typically results in sensorineural hearing loss

Meningitis (9 percent)
Disease that affects the central nervous system; typically results in sensorineural hearing loss

Otitis media (3 percent)
Infection of the middle ear and accumulation of fluid behind the ear drum; Typically results in conductive hearing loss.

Heredity (13 percent)
More than 150 types of genetic deafness

Other causes at birth (22 percent)
High fever, infections, trauma, birth complications, pre-maturity

Cause unknown (48 percent)

1.3 Characteristics Of Hearing Loss

The causes for hearing loss and the effects it has are simply too varied to lend credence to a typical case. People with hearing impairments have different learning styles and abilities. They do have one characteristic in common: Their ability to hear is limited and this disability may be reflected in other cognitive, academic, physical, behavioral, and communication characteristics.

a) **Cognitive:** There is considerable debate about the extent to which cognitive development is limited by hearing impairments. The environment of people who are deaf or hard of hearing is often qualitatively different from that of people who can hear. Much of what we think of as intelligence is developed through hearing and using language. It has been argued that people with hearing impairments do not think in an abstract way and that their intellectual functioning is limited. Moores (1987) puts the theories about the cognitive functioning of deaf students into perspective:

> *The available evidence suggests that the condition of deafness imposes no limitations on the cognitive capabilities of individuals. There is no evidence to suggest that deaf persons think in more "concrete" ways than the hearing or that their intellectual functioning is in any way less sophisticated. As a group, deaf people function within the normal range of intelligence, and deaf*

> *individuals exhibit the same wide variability as the hearing population … The great difficulty encountered by deaf children in academic subject matter is most likely not caused by cognitive deficiencies. In fact, it is safe to say that educators of the deaf have not capitalized on the cognitive strengths of deaf children in the academic environment.*

Paul and Jackson (1993) believe that differences in the cognitive performance of students who are deaf and of their hearing peers are more due to inadequate development of a conventional language system than to limited intellectual ability.

b) **Academic:** The severity of the hearing loss, the age of its onset, the socioeconomic status of the child's family, and the hearing status of the child's parents are related to the academic success experienced by students with hearing impairments. Children and young adults who have mild hearing losses generally perform better academically than those with severe losses. Students who are deaf from birth tend to have more difficulty acquiring academic skills than those who hear, then later lose their hearing. Students with hearing impairments from families of high socioeconomic status and those who have hearing parents tend to experience fewer academic difficulties than students from families of low socioeconomic status or those whose parents are hearing impaired.

We cannot make firm generalizations about the ways in which students who are deaf and hard of hearing function academically. They do not perform as well as hearing students on standardized tests of reading and writing, and research suggests that children who are deaf have much more difficulty acquiring writing skills than they do acquiring reading skills. But research also suggests that the functional reading ability of students who are deaf is higher than that implied by the scores they earn on standardized achievement tests (Luetke Stahlman & Luckner, 1991). Nevertheless, differences in language ability that result from deafness affect a student's ability to perform in traditional academic areas (Paul & Jackson, 1993).

c) **Physical**: Few physical characteristics are specific to those who are deaf or hard of hearing. The widespread belief that the individual compensates for deficiencies in one sense by developing extraordinary abilities in another is unfounded. People who are deaf or hard of hearing have senses of sight, smell, taste and touch like their peers who do not have hearing impairments.

A characteristic that does differentiate people with hearing impairments from their neighbors and peers is their functional hearing. *Functional hearing* refers to a person's ability to understand information presented orally and is related to how a person might be taught. For example, a person with a moderate functional hearing loss might not be able to profit from a normal classroom presentation and would require some instructional adaptation to be successful.

d) **Behavioral**: Generalizations about the social, emotional, and behavioral functioning of students who are deaf or hard hearing are based on the performance of these students on standardized tests. But most of these tests are inappropriate for use with this group. Moores (1987) describes two perspectives on the social, emotional, and behavioral functioning of those who are deaf or hard of hearing: One is that people with hearing impairments are deviant and evidence many problems; the other is that people with hearing impairment are different and need access to services that encourage their optimal development. Based on a review of the research on the social and emotional functioning of people who are deaf, he concludes that:

> *the evidence suggests that the social–emotional adjustment of the deaf is similar to that of the hearing, with great individual variation. Most deaf individuals cope with the reality of deafness as a life –long condition and lead normal, productive lives. This fact supports the contention that deafness itself has no direct impact, either negative or positive, on the development of a mentally healthy individual.*

Recent evidence suggests that those who are deaf prefer to be with others who are deaf, that

adults who are deaf tend to cluster in groups, socialize, and marry. There has been much discussion of *deaf culture*, a concept implying that people who are deaf experience and design their lives differently from the hearing people with whom they share the planet (Humphries, 1993). Accordingly, many people who are deaf see the experiences and signed language of deaf communities as the most important factors in their lives. People who are deaf teach one another how to function in society as well as how to get along with others. Sometimes, parents who are deaf want their children to be born deaf so they can share the culture.

Teachers need to be aware of deaf culture because it means that many children who are deaf add a dimension to the diverse backgrounds they bring to the classroom. But the extent of exposure to deaf culture will vary from student.

There is considerable debate about the importance of deaf culture and the effect on social development of integrating people who are deaf and hearing individuals. Most of the research supports integration. But, as with other disabilities, a continuing need exists to focus on critical factors, such as the qualifications, perceptions, attitudes, and demands of teachers as well as the content of the curriculum, within the integrated setting (Paul & Jackson, 1993).

e) Communication: Learning to speak is difficult if you can't hear. Paul and Jackson (1993) argue that "most deaf students have not learned either to speak or sign language at a highly competent level despite the advent and proliferation of signed systems . . .". Largely as a result of this inadequate development of a primary form of language many students who are deaf experience difficulties in developing language and literacy skills needed for effective communication.

Chapter 2

EDUCATING THE HEARING IMPAIRED

2.1 Impediments in Communication and Learning

As stated earlier, communication problems can seriously interfere with interpersonal relationships for students with hearing impairments who receive all or part of their education in general education classrooms. Their inability to communicate with other students can delay their language development. Moreover, deaf communicate in ways that are different from those around them can inhibit their social interaction and development.

Interaction is essential to language development and much of language development and communication skills come from the interactions of young children and their parents or other caregivers. The hearing parents of children who are deaf interact differently with their children than the hearing parents of children who are who are hard of hearing. Children who are deaf are often passive participants in communication, as their parents or caregivers bombard them with language stimulation and dominate the communication process. As a result, the vocabulary and syntax of children who are deaf grow slowly.

For teachers, it is useful to know the onset of hearing impairments. Children born deaf or those seriously hard of hearing are at a significant disadvantage in learning language. Some possible signs of hearing impairments are presented in Table 2.1; some general tips for teachers of students with hearing impairments are presented in Table 2.2.

Table: 2.1
Top Ten List of Potential Signs of Hearing Impairments

1. Student experiences difficulties following oral presentations and directions.
2. Student watches lips of teachers or other speakers very closely.
3. Student turns head and learns toward speakers.
4. Student uses limited vocabulary
5. Student uses speech sounds poorly.
6. Student shows delayed language development.
7. Student often does not respond when called from behind.
8. Student is generally inattentive during oral presentations.
9. Student constantly turns volume up on radio or television.
10. Student complains of earaches, has frequent colds or ear infections, or has ear discharge.

Table: 2.2
Top Ten List of Tips for Teachers of Students with Hearing Impairments

1. Reduce distance between student and speaker as much as possible.
2. Speak slowly and stress clear articulation rather than loudness when speaking.
3. Student turns head and learns toward speakers.
4. Seat student near center of desk arrangements and away from distracting sounds.
5. Use face-to-face contact as much as possible.
6. Use complete sentences to provide additional context during conversations or instructional presentations.
7. Use visual cues when referring to objects in the classroom and during instructional presentation.
8. Have classmates take notes during oral presentations for student to transcribe after the lesson.
9. Encourage independent activities and teach social skills.
10. Be sure hearing aid is turned on and functioning properly.

2.2 Assistive Interventions

Profiting from oral communication is a key concern for students who are deaf or hard of hearing. Many people with hearing impairments rely on interpreters to help them communicate. Generally, they interpret in educational settings as well as for other activities such as conferences, workshops, phone calls, and presentations, or they serve as resources for others interested in interpreting (Luetke–Stahlman & Luckner, 1991). Oral communication, sign systems, total communication, cued speech, assistive listening, and telecommunication devices also help people overcome communication problems caused by hearing impairments (see Table 2.3).

Table: 2.3
Interventions to Assist Students with Hearing Impairments

Oral Communication – An approach in which people with hearing impairments are taught to use speaking and residual hearing as their only means of communicating
Sign Language – An approach in which people with hearing impairments are taught to use manual gestures and body movements as their only means of communicating
Total Communication – An approach in which people with hearing impairments are taught to use oral and sign methods simultaneously as their means of communicating
Cued Speech – An Approach in which people with hearing impairments are taught to use visual cues provided by a speaker to decode what is being said
Assistive Listening Devices – Hearing aids, FM transmission and amplification devices, ad audio loops are special types of equipment that help people with hearing impairments make better use of their residual hearing.
Telecommunication Devices – Keyboards with screens or printers connected to telephones take advantage of vision to improve communication for people with hearing impairments; computer fax / modems and electronic mail are recent developments in this rapidly changing area.

Oral communication methods emphasize the development and use of skills in the areas of speech, speech reading, and residual hearing. Proponents of this method believe that the goal of education is the development of skills that foster full participation in mainstream (that is, hearing) society.

With sign systems, people with hearing impairments express ideas using manual and non-manual body movements instead of speech. The manual aspects of this form of communication are displayed by shaping, moving, and positioning the hands. Non-manual movements include other parts of the body—eyes, eyebrows, cheeks, lips, tongue, and shoulders—in the language being used.

Here it would be interesting to relate the oral-aural controversy that has existed ever since sign language has. Sign Language was founded for the first time in the eighteenth century in Europe. A Frenchman by the name of Charles Michel de l'Epee (born 1712), intensely religious minded and a priest by profession came across two twin sisters in Paris who were deaf-mute. Feeling the religious zeal he was disturbed at the thought that their souls would be lost being unable to know of the way to salvation, and decided to undertake their instruction. He devised techniques of teaching the deaf inspired by the work of a Spanish book and later one from Amman. He gradually built his pupil base to include more deaf people and also train teachers. Steadily he set himself to expand and elaborate the sign language having conviction that signs the deaf made with their hands were the basis of a mother tongue for them, in much the same way that one's native language is for a hearing person. The refining and organization of a dictionary and grammar of signs is attributed to his efforts. In this detailed piece of work, meant for deaf as well as their teachers, the concentration remained on establishing a means of expression for the ideas not so easily pantomimed. His instruction methodology began with teaching manual alphabets to deaf pupils – spelling the word in writing –

making pupil finger spell the written text – pantomimic/ descriptive gestures for explanation – and teaching to write the word. He concluded through research that articulation and lip-reading, while entirely possible, were not worth the time and effort necessary to teach the deaf. In his opinion the deaf were capable of thought and reason only in the use of signs, he thus saw no purpose for speech as well. Lorenzo Hervas Panduro, a Spanish philologist seconded the work of Abbe de I Epee. His contribution to the field was a book published in Madrid in 1975 in two volumes covering the whole field of language for the deaf, in Spanish, both manual and oral. However, the long-drawn controversy between
oralism versus the sign language approaches has its roots in the theories of Samuel Heinicke and Abbe de I'Epee. Heinicke developed the idea of using the sense of sight, touch and taste to assist recall of sounds as a substitute for hearing. He remained loyally cogent on oral instruction for educational progress as opposed to the manual method of teaching. Finally the Zurich Academy stated that they felt that though de I'Epee's method adequately demonstrated results as opposed to the philosophy of oralism, neither man could claim a method that was 'natural', nor exclusively beneficial for teaching the deaf. This argument between oralists and manulists had its roots in the late eighteenth century and continues even till today1.

Proponents of total communication methods advocate the use of all modes of communication. In this approach, oral methods and sign systems are used simultaneously. Signs system that are used more prominently within total communication methods share three characteristics: They attempt to reproduce the words, word parts, and word order; they adapt signs from sign language systems; and they develop new signs as they are needed (Paul & Jackson, 1993).

Cued speech is another method that involves both oral communication and a sign system. In cued speech, eight hand shapes are used in four positions on or near the face to accompany and augment speech. Each hand shape represents a group of consonants or consonant blends, and each facial position represents a group of consonants or consonant blends, and each facial position represents a group of vowel sounds that are used as cues to assist listeners who are speech reading.

Assistive listening and telecommunication devices take advantage of residual hearing or other senses to enable people with hearing impairments to communicate better. Hearing aids are the most widely recognized and used assistive listening devices. They are worn in the ear, behind the ear, on the body, or in eyeglass frames. Classroom amplification systems are another form of assistive listening device in which a microphone is used to link teachers to students who wear a receiver that often doubles as a hearing aid.

Telecommunication devices are small keyboards with screens or printers that can be connected to telephones. Telecommunication devices for the deaf (TDDs) and text telephones enable people with hearing impairments to make and receive telephone calls. When a call is make using these devices, the incoming and outgoing conversation appears on the screen or printer. Computerize fax modems and regular fax machines enable people with hearing impairments to communicate without speaking or hearing by using the phone system at their home, school, or work.

Among the three basic forms of communication systems—oral, sign, and total—no clear evidence has emerged to support the used of one method over the others (Paul & Jackson, 1993). Cued speech is used by a small percentage of students with hearing impairments, mostly from upper–middle–class families (Luetke–Stahlman & Luckner, 1991). Assistive listening devices are widely used, and advances in technology have made them lighter, smaller, and more sophisticated. Telecommunication devices have helped to break down long–standing barriers to communication for people with hearing impairments in employment and social interaction settings.

1 Refer to Annexure A for 'The History of Sign Language"

2.3 A Local Perspective

In Pakistan the Deaf are often provided only minimal educational facilities which results in overcrowded classrooms in existing institutions (student to teacher ratios are upwards of 30:1 in some classrooms), and substandard levels of basic educational achievement by the students. To compound the situation, deaf educators in Pakistan are generally not equipped with proper training for their profession and there are relatively few who are capable of utilizing sign language to communicate, or of using a proper teaching methodology.

Largely in Pakistan education of Deaf is facing the controversy between oral-aural methods of communication and teaching. While certain schools have adopted sign language use, others focus on total communication method. Adding to this basic problem is the lack of proper specialized schools for deaf because of which deaf attend main stream schools; absence of an appropriate syllabus; hampered promulgation of syllabus designed by Special Education Department; lack of staff expertise to effectively employ sign language as part of instruction medium. This may be attributed to the lack of knowledge of Pakistan Sign Language (PSL) itself.

To address the special learning needs of the deaf community, Government has taken several steps not only towards rehabilitating them but also in the localization of Pakistan sign language as a representative medium of deaf communication and instruction. To meet the unique educational and other needs of special persons, mobilization of resources and specialized services, books and instructional material in appropriate media, as well as special equipment and technology is of great importance. Besides the print and other audio and video mediums, a fairly new development is the bend towards Information and Communication technologies (ICTs) for education purposes in classrooms. Presently though, lack of designated technology and absence of a system of staff development, the approach is in its very nascent stage. The project titled “Information & Communication Technologies Assisted Learning Tool for The Deaf In Pakistan” is a pioneering activity in Pakistan, which will offer both challenges and encouragement to educators who are committed to fostering learning in the deaf. Reinforced by its acceptability, it is hoped the endeavour finds its way to development of further technology-based solutions customized to derive maximum learning benefits for the deaf of the country.

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ANNEXURE

Sustainable Development Networking Programme, Pakistan

The Sustainable Development Networking Programme (SDNP) Pakistan is a part of the Education, Communication and Knowledge Management Group of IUCN - The World Conservation Union's Pakistan Programme. Formerly a global programme of UNDP, SDNP has been working since 1992 to promote access to information on sustainable human development among different sectors of society. It has been the pioneer of email and offline Internet in Pakistan, but lately its focus has been on developing knowledge management systems to strengthen development information services in Pakistan.

Apart from launching the Pakistan Development Gateway (PDG), SDNP has trained more than 260 organizations from the development sector to set up, maintain and update their websites, contributing significantly to the local content about Pakistan on the Web. This training in Web publishing has also been conducted in Urdu and Sindhi. More than 160 information rich Pakistani websites - related to both Government and NGO sectors – have been set up as a result of this activity. Other initiatives undertaken by SDNP include the creation of district websites and cyber community centres, promotion of open software like Linux, special training for women in Information and Communication Technologies (ICTs), work on District Management Information System (DMIS), and development of information gateways on the themes of water and northern areas of Pakistan.

IUCN – The World Conservation Union

IUCN - The World Conservation Union was founded in 1948 and brings together 79 states, 113 government agencies, 754 NGOs, 36 affiliates, and some 10,000 scientists and experts from 181 countries in a unique worldwide partnership. Its mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. Within the framework of global conventions IUCN has helped over 75 countries to prepare and implement national conservation and biodiversity strategies. IUCN has approximately 1000 staff, most of whom are located in its 42 regional and country offices while 100 work at its Headquarters in Gland, Switzerland.

In Pakistan, the Union seeks to fulfill this mission by empowering communities to participate in the implementation of the National Conservation Strategy.

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