

# Audiological Pattern Of Hearing Loss At Obafemi Awolowo University Teaching Hospital Complex Ile - Ife, Nigeria

J Eziyi, Y Amusa, O Akinpelu, A Adeniji, G Ogunniyi

## Citation

J Eziyi, Y Amusa, O Akinpelu, A Adeniji, G Ogunniyi. *Audiological Pattern Of Hearing Loss At Obafemi Awolowo University Teaching Hospital Complex Ile - Ife, Nigeria*. The Internet Journal of Otorhinolaryngology. 2008 Volume 8 Number 2.

## Abstract

**Objectives:** To determine the etiology, and pattern of hearing loss (HL) among patients seen in our clinic over an 18 months period.

**Methods:** Questionnaire was administered to one thousand first attendee patients with HL. They were examined clinically, followed by pure tone audiometry and tympanometry.

**Result:** There were 595 males and 405 females, ages between 1-100 years with a mean of  $35.2 \pm 22.68$  years. Over 80% of patients within the 1st decade of life, presented as deaf mutes, chronic discharging ear was the commonest cause of HL within the 2nd and 3rd decade, and presbycusis among 40yrs and above. Sensorineural HL (SNHL) was found in 51.5%, conductive HL (CHL) in 17.2%, and mixed HL 24.6%. Overall, 50% had severe to profound HL. Jergers Type A tympanogram was seen in 582(58.2%), type B in 366(36.6%), type C, As and Ad accounted for 52(5.2%). Bilateral SNHL of unknown causes were found in 412(41.2%), followed by infective diseases.

**Conclusion:** SNHL was the commonest type of HL in this study. Otosclerosis accounted for 3.2%. It may be commoner among Negroids than previously documented.

## INTRODUCTION

Sound constantly surrounds us and informs us about many objects in our environment. Its localization is one of the most important biological traits in man William<sup>1</sup>. Sound localization enables an animal to locate food, avoid predators, find a mate and to communicate<sup>1</sup>. Sounds from various sources are combined into one complex sound field and travels to the outer ear. The pinnae helped in funneling them toward the external auditory canal from where it reaches the tympanic membrane, it is then transmitted through the middle ear either by bone conduction, air conduction or across the middle ear cavity by means of the ossicular chain on to the fluids and the structures of the cochlear in the inner ear. The intricate motions and interactions of the various parts of the cochlear lead to the generation of electric potentials. This is then transmitted centrally toward the auditory cortex. Diseases of the external ear, the middle as well as any diseases affecting the cochlear, the auditory nerve and centrally the auditory cortex can result in deafness. In the United State of America, Census data showed that 3% of the population in the work force reports some hearing loss<sup>2</sup>. Hearing loss was found to occur

in both sexes, and it was found to be Sensorineural (SNHL) in 10 out of every 1000 children in the US. A Worldwide, SNHL occurs in 9-27 per 1000 children<sup>2,3,4</sup>. Conductive hearing loss results from any lesion that prevents sound transmission from the outside world to the cochlea, while SNHL result from the disruptions in transmission beyond the cochlea or damage to the eighth cranial (auditory) nerve. Mixed hearing loss has components of both conductive and sensorineural loss<sup>4</sup>. The objective of this study is to investigate the pattern of hearing loss, the severity (or degree), and the etiology among the first 1000 patients attending the audiology clinic for the first time at the Obafemi Awolowo University Teaching Hospital Complex Ile-Ife, Nigeria

## MATERIALS AND METHODS

The first 1000 patients that were seen at the audiology clinic of the OAUTHC Ile -Ife for the first time between December 2001-May 2003 were recruited for this study. Only patients who had hearing difficulty as one of the major complaints were admitted into this survey. A symptom questionnaire was administered to each patient. The

questionnaire sought information about the patient's demographic data, the work experience, the history of the hearing loss and the possible aetiology, especially the history of exposure to noise, ear infections, use of ototoxic drugs. Other information that was sought in the questionnaire are the history suggestive of birth asphyxia, Neonatal jaundice or infections and history of admission into intensive neonatal care unit in children. Other areas of interest were the past medical and surgical history. The patients were then clinically examined including otological examination and had pure tone audiometry and acoustic impedance measurements.

**Audiometric and acoustic impedance measurements:** The diagnostic audiometer Interacoustics model AD28 was utilized. Pure tone audiometry using Hughson-Wetslake procedure was carried out on all patients at frequencies of 125, 250,500,750,1000,2000,4000,and 8000Hz. Children below the age of 4 years were screened using the Free field Screening methods. Impedance measurement was carried out using the Interacoustic Tympanometer model AT 22t. The impedance as well as the stapedial reflex was measured for all the patients at frequencies 500, 1000, 2000, 4000,Hz. These assessments were carried out in a soundproof audiology booth.

**Data Analysis:** The questionnaire of each patient was reviewed for the completeness of the information. The data was analyzed using SPSS version 10. The results were presented using the frequency and percentages.

**RESULTS**

One thousand patients were studied.

**Sex Distribution:** There were 595 males and 405 females.

**Age Distribution** Table I: showed the age distribution of the study population.. Deafness was found to be more prevalent in the third decade of life; this was closely followed by the sixth decade. The ninth and the tenth decades of life are seen less commonly presenting with deafness.

**Etiology of Hearing Loss** Table II: Showed the common etiologies of deafness as seen in the study population. Sensorineural hearing loss of unknown etiology was seen in 41.2%, Infective disorders was responsible for deafness in 14.6% of the population, Deaf mutism in 9.6%, Presbycusis in 9.0% while the least prevalence was found in patients with Sickle cell anaemia with 0.2%

**Impedance Measurements** in the study population Table III: Type A tympanogram was found in 58.2% of the patients, Type B was found in 36.6% Type As was found in 3.2% while Ossicular discontinuity as represented by type Ad was the least in 0.1% of the patients.

**Age specific prevalence of Sensorineural hearing Loss** Fig. 1: This showed the age specific prevalence of SNHL. The peak prevalence was in the third decade while the least was found in the 9<sup>th</sup> and the 10<sup>th</sup> decade of life.

**Severity of Hearing Loss** Fig. 2: This Bar chart showed that bilateral disease was common. About 50% of the patients had socially significant hearing loss requiring rehabilitation

**Types of Hearing Loss** Fig 3: This pie chart showed that SNHL was the most common type of hearing loss in Nigerians deaf population (51.5%), Mixed deafness was the second most common (24.6%), while conductive deafness was the least prevalent. It was found in 17.2%.

**Figure 1**

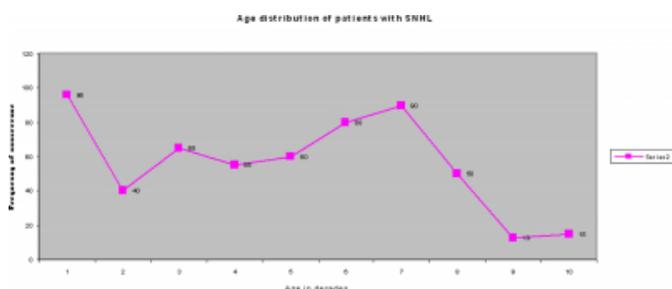
Table 1: Shows the age distribution of the patients presenting with hearing impairment at a Nigerian Audiology clinic.

Age in years	Frequency (percentage)
1-10	96 (9.6)
11-20	78 (7.8)
21-30	185 (18.5)
31-40	115 (11.5)
41-50	133 (13.3)
51-60	149 (14.9)
61-70	95 (9.5)
71-80	57 (5.7)
81-90	13 (1.3)
91-100	15 (1.5)
Missing	64 (6.4)
<b>Total</b>	<b>1000 (100)</b>

Mean age 35.2years.  
Std Dev. 22.68

**Figure 2**

Figure 1: This shows the age specific prevalence of SNHL in the study population.

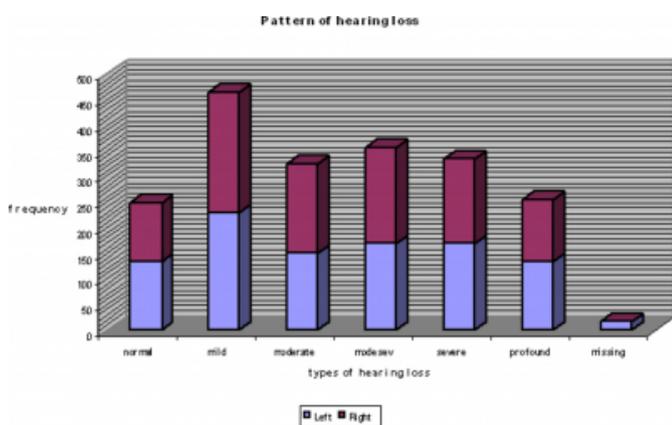


The peak prevalence was in the first decade of life, and there is a lesser second peak prevalence in the sixth decade of life.

Mean dB Loss 63.3 56.1 St Dev. ± 28.11db

**Figure 3**

Figure 2: This figure shows the severity of the hearing loss in the study population. Socially significant hearing loss was occurred in about 50% of the population. Normal hearing constitute 12% of the population, majority of them had wax impaction.



**Figure 4**

Table 2: Etiology of Hearing loss

Causes	Frequency	Percentage
Bilateral SNHL	412	41.2
Infective disorders	146	14.6
Deaf mutism	96	9.6
Presbycusis	90	9.0
Wax	67	6.7
Noise Induced	50	5.0
Menieres	44	4.4
Otosclerosis	32	3.2
Diabetes	16	1.6
Tumors	10	1.0
Trauma	10	1.0
Vascular problem	10	1.0
Ototoxicity	5	0.5
Chronic renal failure	5	0.5
Sickle cell	2	0.2
Total	1000	100.0

**Figure 5**

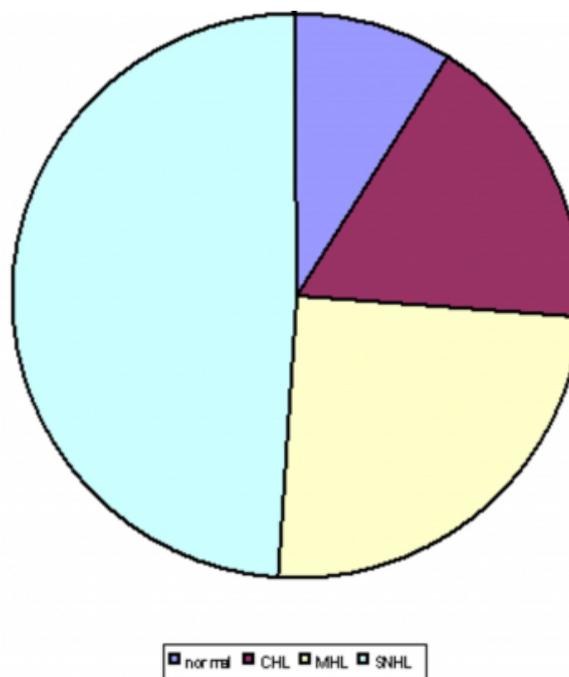
Table 3

Types of tympanogram	Frequency (%)		Average (%)
	Right	Left	
A	579 (57.9)	585 (58.5)	582(58.2)
Ad	1 (0.1)	1 (0.1)	1(0.1)
As	30 (3.0)	34 (3.4)	32 (3.2)
B	367 (36.7)	365 (36.5)	366(36.6)
C	23 (2.3)	15 (1.5)	19(1.9)
Total	1000 (100.0)	1000 (100.0)	1000(100.0)

The summary of the acoustic impedance findings according to Jergers classification.

**Figure 6**

Figure 3: This showed that SNHL was the most common type of hearing loss in Nigerians deaf population.



Types of hearing loss: Normal=normal hearing  
 CHL= Conductive hearing loss  
 MHL= Mixed Hearing loss  
 SNHL= Sensorineural hearing loss

**DISCUSSION**

Hearing loss is more prevalent than many congenital abnormalities and all pediatrics cancers and other numerous medical conditions, combined yet clinicians pay very little attention to it.

The prevalence of hearing loss in the Nigerian community is not known and there is an incomplete knowledge of the causes and natural history of ear diseases and deafness. The prevailing level of poverty in the community and the non-availability of diagnostic facilities and hearing Aids had made management of these patients unrewarding. The age distribution of the study population showed that the third decade of life had the highest prevalence rate while the ninth and the tenth decade was found to have the lowest prevalence rate (Table I). Age specific prevalence rate of sensorineural hearing loss in this study population showed a high occurrence in the first decade of life.. High prevalence of childhood infections due to bacteria, viral, fungal, perinatal diseases and congenital malformation of the cochlea might contribute to this high prevalence. The second peak prevalence was found in adulthood. The prevalence of SNHL drops steadily by the second decade of life but rises steadily until it peaks again in the sixth decade of life Fig I. This could be due to the steady rise in the incidence of Cardiovascular, metabolic, and degenerative disorders that are common with aging <sup>5</sup>. More than 80% of the children in the 1<sup>st</sup> decade of life presented with deaf-mutism usually at the age of  $5 \pm 1.65$  years. The observed causes of this were found to be birth asphyxia, neonatal sepsis, meningitis, measles and prematurity. These causes were similar to the findings by several investigators in Africa over 2 decades ago <sup>6,7,8,9,10</sup>. These conditions are largely preventable with better Obstetric services, improved immunization and improvement in the socio-economic status of the people. Immunization with Haemophilus influenza type b (Hib) vaccine in the Gambia showed that it was effective in preventing meningitis and blood stream infections and 100% in preventing pneumonia <sup>11,12</sup>. Improvement in the socio-economic status and the living condition of the people in the then Soviet Union led to a significant fall in the prevalence of deaf-mutism <sup>13</sup>. It is hoped that an improvement in the social-economic status and living conditions of Nigerians will also witness a decline in the prevalence deaf-mutism in Nigerian children. In the adult population, some of the common identified causes of SNHL were: Presbycusis, chronic diseases like Diabetes mellitus, vascular lesions, tumors, trauma and chronic renal failure (Table II). This pattern agrees with the existing literature <sup>5</sup>.

### **MIXED HEARING LOSS**

This is the second largest type of hearing loss seen in this study. Some of the causes of this as noted are: Infections, Vascular causes, tumors and traumatic causes.

### **CONDUCTIVE HEARING LOSS**

Otitis media was found to be the most common cause of conductive hearing loss in these patients. Chronic suppurative Otitis media (CSOM) was the most common with tympanic perforation, this agrees with the work of several workers <sup>14,15,16</sup>. There is a need for more studies into the bacteriology of and the associated risk factors for otitis media, such factors as nutritional status, personal hygiene, overcrowding, immunological factors in Nigeria. The high perforation rate in this patient might translate to better middle ear aeration, which has been established to protect against the formation of cholesteatoma. In a study of Otitis media in the Aborigine children a high perforation rate was found to be protective against the development of cholesteatoma <sup>16</sup>. Cholesteatoma was not diagnosed in any of our patient. Otosclerosis was found in 3.2% of the study population. Otosclerosis has been said to be rare in blacks <sup>17</sup>. It might be more common in the blacks than had been previously observed; there is a need for further study to confirm this in Nigerians.

Wax impaction was the cause of deafness in 6.7% of our patients. The deafness was cured after syringing hence the finding of normal hearing in those patients.

### **SEVERITY OF HEARING LOSS**

Pure tone Audiometric reports showed that about 12% of the screened population had normal hearing. Many of these patients had wax impaction at the time of presentation, which was syringed before the tests. Close to 50% of the population had a socially handicapping hearing loss (Fig 2). The significance of this is that a lot of our patients need definitive rehabilitative intervention with close to 10% being deaf mutes. These facilities are not however available in our community and our children with congenital or acquired bilateral severe SNHL are allowed to develop as a deaf-mute and are unable to achieve their full potential. This is unacceptable. There is therefore the need to provide facilities for screening of at risk children for hearing loss, and the development of manpower involved in rehabilitation of these patients. The political will power to set up a nationally coordinated deafness prevention programme in Nigeria is hereby emphasized.

### **TYMPANOMETRY**

Middle ear pathology was found in over 45% of the study population (Table III). Middle ear problem is therefore prevalent in our environment. Otitis media in one form or

the other is the most common. Otosclerosis was found as a cause of middle ear pathology in our environment. Otosclerosis has been said to be rare in blacks. The need to focus on developing manpower in middle ear surgery in our environment is hereby emphasized. Effort should be intensified to have a temporal bone dissection Laboratory in the country so as to develop more surgically and technically competent Otologic surgeons to cope with the needs of the patients.

## **CONCLUSION**

It is not known whether the pattern and the causes of hearing loss observed in this study is typical of other communities in Nigeria. Therefore there is a need for further investigations. The further research should focus on detailed study of the genetic of deafness, characteristics of these ear diseases that are found to be associated with hearing loss. The natural history, associated risk factors and management. There is also the need to develop audiological medicine and to provide early screening facilities for children as part of the national deafness prevention programme in Nigeria.

## **CORRESPONDENCE TO**

AO Adeniji ORL unit, Dept of surgery, Obafemi Awolowo University Ile-Ife, Osun state Nigeria. e-mail: gbolaad@yahoo.com

## **References**

1. William A Yust: The world we hear an introduction. 2000 fourth Edition. Academic press. A Harcourt Science and Technology company 2000: chapter I 65-75
2. American Academy of pediatrics Joint Committee on Infant Hearing: Joint Committee on Infant Hearing 1994 Position Statement. Pediatrics 1995 Jan; 95(1): 152-6 (Medline)
3. Annual Survey of Hearing -Impaired Children and youth: Characteristics of deaf and Hard of hearing students in four

- special education program types. Annual Survey of Hearing-Impaired Children and Youth 1992-1993. Am Ann Deaf 1994; 139(2): 242.
4. Michael Lotke. Hearing Impairment. Eds; Orval Brown, Robert Konop, John E McClay, Paul D Petry, and Maureen Strafford, emedicine .2001:1-24. (<http://www.emedicine.com/ped/topic931.htm>)
5. Okeowo ; Sensorineural Hearing Loss in Okeowo's Companion to Ear, Nose and Throat Diseases in the Tropics. First Edition, University of Lagos Press, Akoka Yaba Lagos. Nigeria 2004; 34-37.
6. Obiako MN: Profound childhood deafness in Nigeria: a three year survey. Ear Hear 1987 April; 8(2): 74-7.
7. Mc Phersum B Holborow CA: a study of deafness in West African: the Gambian Hearing Health Protect Int. J. Pediatr. Otorhinolaryngoil 1985 Nov. 10(2): 115-35
8. Ibekwe AO. Febrile illness a major cause of profound childhood deafness in Nigeria. West Afr. J. Med. 1998 Jan - Mar: 17(1): 15-18
9. Viljoen PL, Deut GM, Sibanda AG, Seymount M., Chigumo R, Karikoga A, Beighton P. Childhood deafness in Zimbabwe. South Afric Med. J. 1988 Mar. 5: 73(5): 286-8
10. Salih MA, Khaleefa OH, Bushara M, Taha ZB, Musa ZA, Kamil L, Hofvancar Y, Olcan P. Long term seaquake if childhood acute bacterial meningitis in a developing country. A study from the Sudan Scand J. Infect Dis. 1991; 23(2): 175-82.
11. Wenger J., Hib vaccine introduced in the Gambia Afr. Health. 1997 Nov; 20(1): 13, 15.
12. Goelguebuer T, west TE, Wermenbol V, Cadbury AL, Milligan P, Upyd-Evans N, Adegbola RA, Mulhollant EK, Greenwood BM, Weber MW. Outcome of meningitis caused by streptococcus pneumoniae and Heamophilus influenzae type b in children in the Gambia. Trop. Med. Int. Health 2000 Mar; 5(3): 207-13
13. Likhachew AG: Deaf mutism: In Discuses of the ear, Nose and throat 1978; 102-105 Mir publishers.
14. Okafor BC. The chronic discharging ear in Nigeria. Journal of Laryngology and otology, 1984; 98: 113-119.
15. Brobby GW. The discharging ear in the tropics: a guide to the diagnosis and management in the district hospital. Tropical Doctor, 1992; 22: 10-13.
16. Mc Cafferty GJ, Lewis AN, Comman WB and Mills C. A Nine-year study of ear disease in Australian Aboriginal children. Journal of Laryngology and Otology Feb. 1998; 99: 117-125
17. Roland PS, Meyerhof WL: Otosclerosis. Head and Neck-Otolaryngology 1998; 11:2083-2097

**Author Information**

**J.A.E. Eziyi**

ORL Unit, Department of Surgery, Obafemi Awolowo University

**Y.B. Amusa**

ORL Unit, Department of Surgery, Obafemi Awolowo University

**O.V. Akinpelu**

ORL Unit, Department of Surgery, Obafemi Awolowo University

**A.O. Adeniji**

ORL Unit, Department of Surgery, Obafemi Awolowo University

**G.M. Ogunniyi**

ORL Unit, Department of Surgery, Obafemi Awolowo University