

# Epidemiological Profile of Hearing Deficiency in a Tertiary Care Hospital (2018-2021)

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Indranil Sen,<sup>1</sup> Anup Kumar Das,<sup>1</sup> Arijit Das<sup>2</sup>

## ABSTRACT

### Introduction

This study is an attempt to view the demographic profile of individuals presenting with hearing loss in a Tertiary Referral hospital with the help of available database of pure tone audiometry results over a three year period.

### Materials and Methods

It is a descriptive epidemiological study over a period of 3 years conducted in the Department of Otorhinolaryngology (ORL) of an tertiary care hospital from the available hospital records after obtaining due permission from the Institutional Ethics Committee and the hospital authority. The subjects presented with complaints of hearing loss were investigated with pure tone audiometry. Subjects below 10 years of age or with gross mental or physical disabilities were excluded. The results of pure tone audiometry done were analyzed followed by systematic analysis.

### Results

A total number of 3536 individuals inclusive of 1980 males and 1556 females were studied. Nearly, 570 individuals suffered B/L hearing loss (16%) which was again mostly Sensorineural. Sensorineural hearing loss was the most common hearing loss near about 52%. Mixed Hearing loss accounted for 13%. Conductive hearing loss accounted for 35%. Mild hearing loss (25-40dB) accounted for maximum bulk of the patients. The bulk of the population comprised of people in their middle age (30-60) and elderly (>60 years).

### Conclusion

The demographic profile of hearing loss in the population is the ground work for any comprehensive planning to resolve the issue. In our study the increased burden of mild to moderate sensorineural hearing loss as seen in the elderly population and increased prevalence of conductive hearing loss as seen in the young population shows us how respective management protocols can be instituted for the target populations.

### Keywords

Audiometry; Hearing Loss; Demography; Pure Tone

The ear is a unique organ that gives us the modality of hearing. The ear can be damaged by variety of factors such as different disease processes, trauma, excessive exposure to noise, effect of some drugs and aging process. All these factors lead to malfunction of ear resulting in some kind of hearing loss.

The health and quality of life is affected tremendously by hearing loss. The common ear diseases such as wax, infections of external auditory canal and infections of middle ear cleft such as acute otitis media, chronic otitis media, otitis media with effusion carries a significant proportion of causes that lead to deafness. All these

conditions can be diagnosed early and managed properly to reduce the overall burden of deafness throughout the globe.

The sense of hearing carries a very important role in the process of communication. Deafness is a cause of major morbidity the goes very often undiagnosed and

1 - College of Medicine and Sagore Dutta Hospital, West Bengal

2 - Salt Lake Sub-divisional Hospital, Kolkata

### Corresponding author:

Dr Indranil Sen

email: indranilsen.india@gmail.com

unreported even in a tertiary health care facility. This causes a major problem in the planning of future management of hearing loss because of non-availability of proper database in our health system. The purpose of our study is to analyze the demographic characteristics of individuals presenting with hearing loss in an tertiary referral hospital using the available database of pure tone audiometry results.

### Disease load of hearing loss estimated by WHO (2023)

Currently more than 1.5 billion people (nearly 20% of the global population) live with hearing loss.

Over 5% of the world's population – or 430 million people – require rehabilitation to address their disabling hearing loss (432 million adults and 34 million children).

It is estimated that by 2050 nearly 2.5 billion people are projected to have some degree of hearing loss and at least over 700 million people – or 1 in every 10 people – will have disabling hearing loss require hearing rehabilitation.

Over 1 billion young adults are at risk of permanent, avoidable hearing loss due to unsafe listening practices.

### Materials and Methods

The study was conducted in the Department of Otorhinolaryngology of a Tertiary care hospital over a period of three years (December 2018- November 2021). It was a retrospective, observational and descriptive study. The source of data was the hospital records, after obtaining due permission from the IEC and the hospital authority. Patients presented with hearing loss as a chief complaint were subjected to pure tone audiometry irrespective of the duration of their complaints and were included in the study group.

Children below the age of 10 years, individuals with gross physical and mental disabilities and the individuals clinically suspected to be malingering are excluded from the study.

The results of pure tone audiometry done during this period were analyzed systematically with appropriate statistical tools.

The study is designed to have a view on the demographic distribution of hearing loss among the individuals based on different parameters e.g., age, sex, type, severity of deafness.

### Results

**Table I: Age distribution and gender distribution of the patients in our population**

AGE IN YEARS	TOTAL PATIENTS IN THE AGE GROUP	PERCENTAGE OF TOTAL PATIENTS	MALES	FEMALES
10 to 20	371	10.49	211	160
21 to 30	559	15.80	319	240
31 to 40	796	22.51	445	351
41 to 50	651	18.41	356	295
51 to 60	676	19.11	355	321
61 to 70	342	9.67	189	153
71 to 80	126	3.56	74	52
81 to 90	15	0.42	9	6

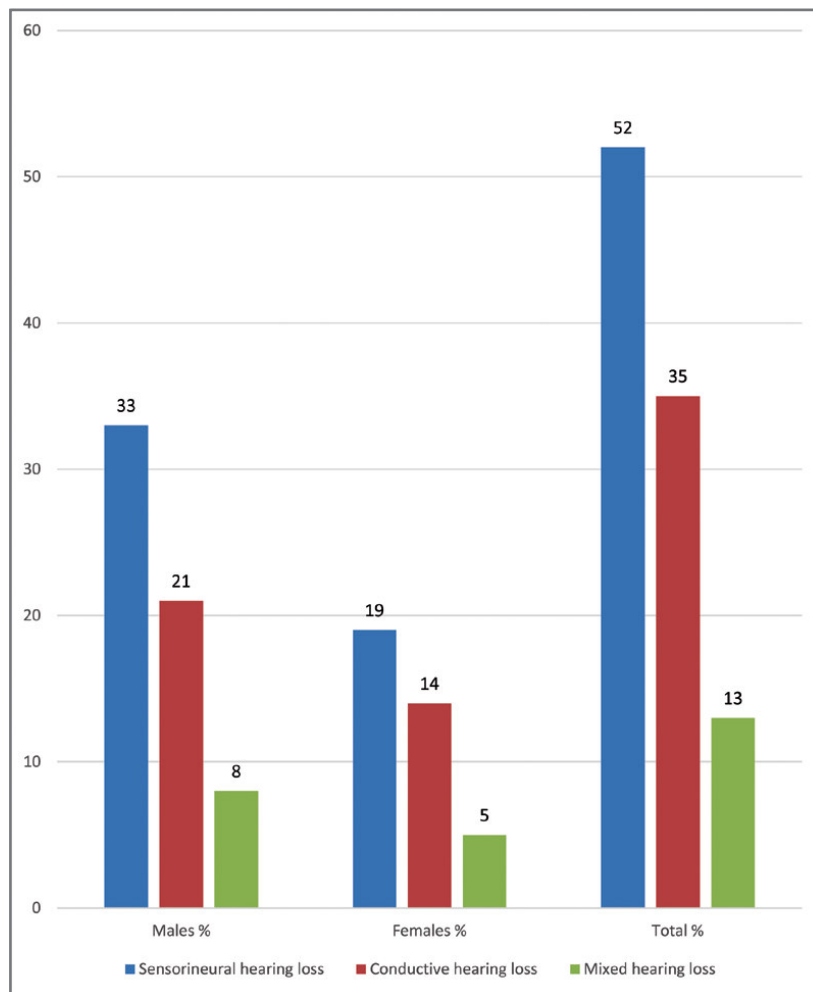


Fig. 1. Types of hearing loss with respect to gender

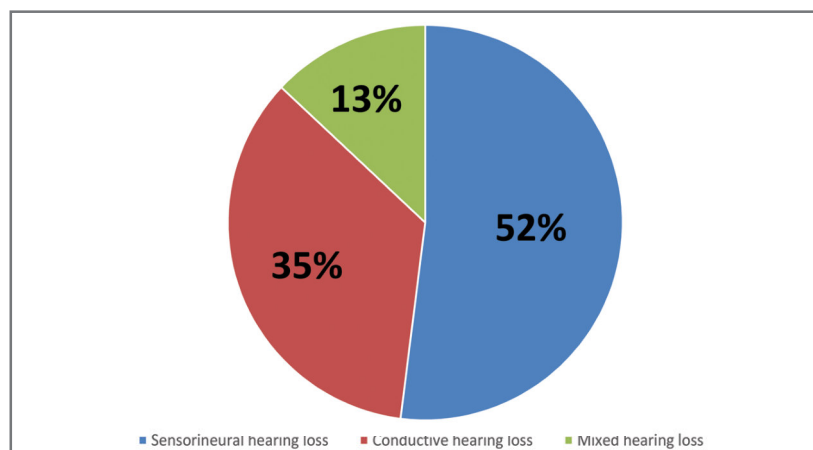


Fig. 2. Types of hearing loss with respect to total population in percentage

Table II: Age distribution and types of hearing loss prevalent in the concerned age group

AGE RANGE IN YEARS		CONDUCTIVE HEARING LOSS	SENSORINEURAL HEARING LOSS	MIXED HEARING LOSS
10 to 20	371	368	0	3
21 to 30	559	298	203	58
31 to 40	796	281	384	131
41 to 50	651	124	395	132
51 to 60	676	135	458	83
61 to 70	342	21	293	28
71 to 80	126	10	94	22
81 to 90	15	1	12	2
	Total : 3536	1238	1839	459

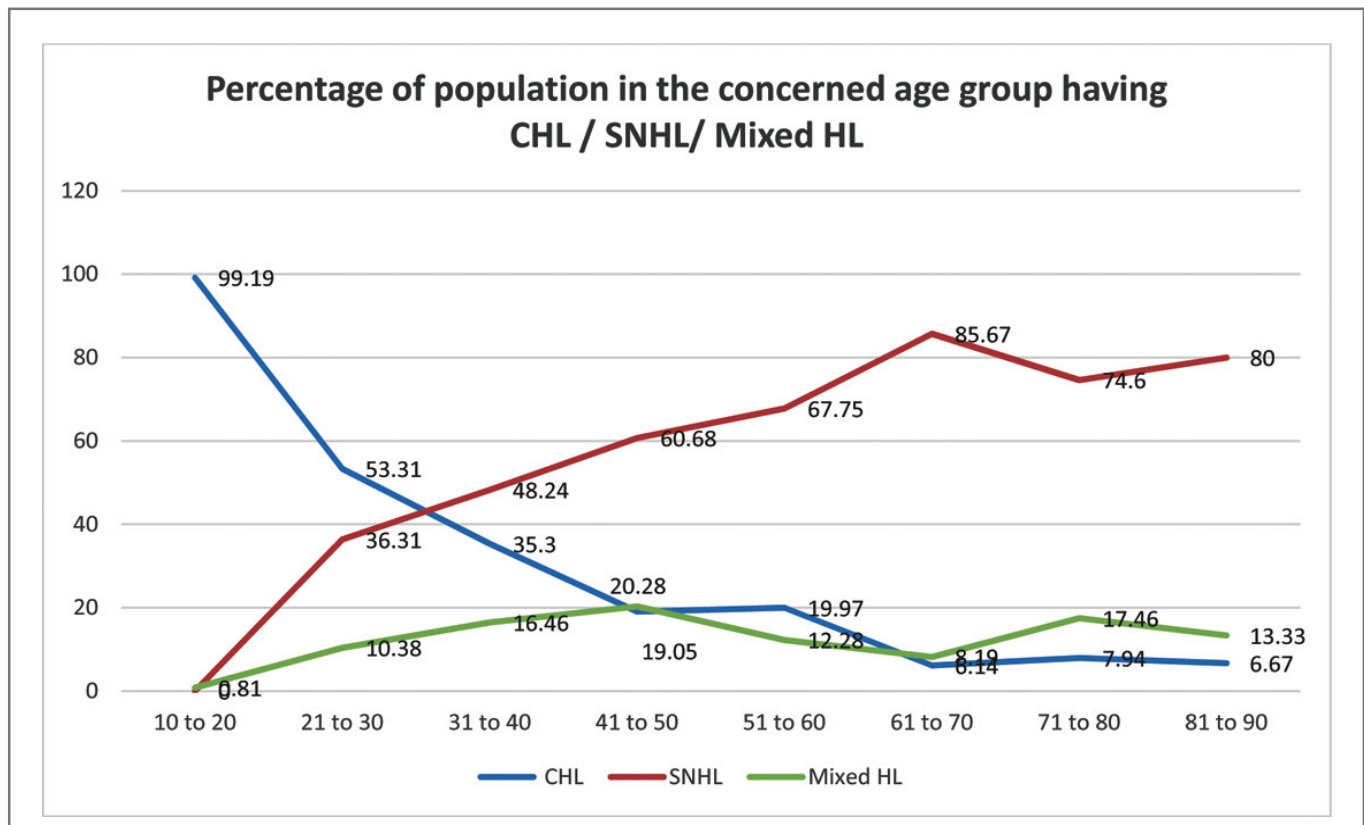
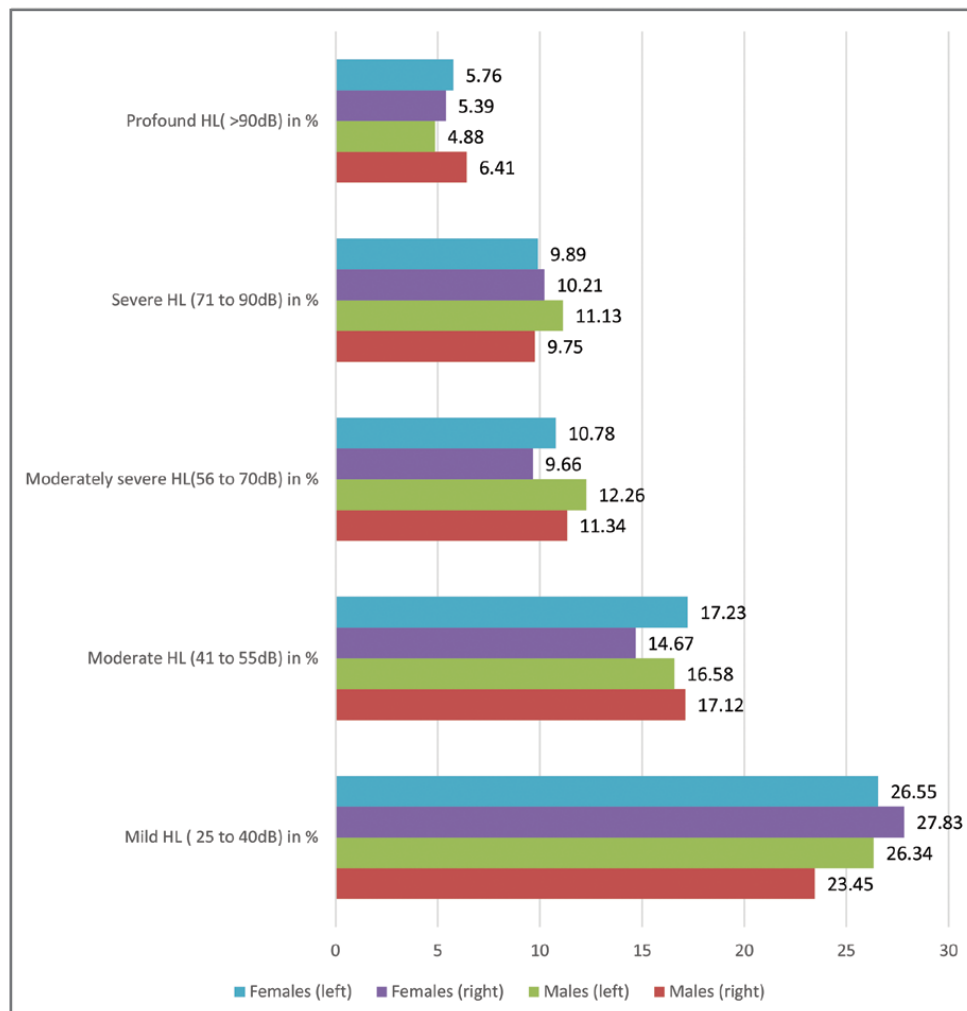


Fig. 3 Trends in different types of hearing loss across different age groups

**Table III: Distribution of different degrees of hearing loss and their distribution in the right or left ear among males and females**

GENDER AND SIDE	MILD HL (25 to 40dB) in %	MODERATE HL (41 to 55dB) in %	MODERATELY SEVERE HL (56 to 70dB) in %	SEVERE HL (71 to 90dB) in %	PROFOUND HL(>90dB) in %
Males (right)	23.45	17.12	11.34	9.75	6.41
Males (left)	26.34	16.58	12.26	11.13	4.88
Females (right)	27.83	14.67	9.66	10.21	5.39
Females (left)	26.55	17.23	10.78	9.89	5.76



**Fig. 4 Distribution of different degrees of hearing loss in the right or left ear among males and females**

## Discussion

Any public policy is focused on sound epidemiological research of a disease burden: in this case, the types of hearing loss profile in the general population of patients coming to ENT OPD with complain of hearing loss at an Tertiary Referral hospital for a period of 3 years.

Many common ear diseases contribute to this increase in the disease burden of hearing loss, which if managed early with efficient planning and treatment protocols in place might significantly reduce the burden of hearing loss in the long term in the general population attending ENT OPD for symptomatic hearing loss.

In our study, the maximum number of individuals belonged to the age group of 31-40, followed by 51-60 years and 41-50 years (Table I).

Guleria<sup>1</sup> et al conducted a cross sectional study on a population in an urban area in which the maximum number of individuals i.e. 29.4% were in the age group of 31-45 years. This finding is in correlation to the results of our study which further reinforces the fact that our study at a referral hospital catering to vast population may be extrapolated to the demographic profile of the general population.

With the increase in life expectancy along with dietary and lifestyle changes; exposure to above threshold/chronic noise, ototoxic chemicals and drugs, there has been consequent rise in deafness in the elderly above > 75 years of age. Deafness due to old age is 8 times more common in USA.

In the study conducted by Guleria<sup>1</sup> et al nearly 60% of the male population was found to be suffering from hearing loss.

Prevalence of hear loss in males was found to be greater in a study conducted by Kalpana<sup>3</sup> et al. Also, in the USA prevalence of hearing impairment predominantly affected male population.<sup>6</sup>

Also, in the study conducted by Asghari<sup>4</sup> et al, the prevalence of hearing impairment had no significant association with gender.

In our study, nearly 62 % of the male population suffered from some form of hearing loss reflecting a

similar demographic trend similar to Guleria et al's results. Of this 33% was SNHL, 21% CHL and 8% Mixed hearing loss. (Figure 1)

In our Study, 52% of the population had Sensorineural Hearing Loss, 35% of the population had Conductive hearing loss, 13 % of the population had Mixed Conductive Hearing Loss. (Figure 2)

As far as laterality of hearing impairment is concerned, Guleria et al's study shows no significant correlation on involvement of right or left sided but B/L impairment has been more commonly encountered than U/L hearing loss.

In our study among the 3536 individuals inclusive of 1958 males and 1578 females, nearly, 570 individuals suffered B/L hearing loss (16%) which was again mostly sensorineural.

Sensorineural Hearing Loss was prevalent in the study conducted by Guleria et al while Kalpana et al's study predominantly reflected conductive hearing Loss component in her results. This may be due to the reason that Kalpana et al<sup>3</sup> predominantly included young school going children in her study while Guleria et al took the general population in consideration.

In our study, we found conductive deafness greatest in the individuals in the age group of 10 to 20 amounting to 368 individuals. Sensorineural hearing loss was highest in the age range of 51-60 amounting to 458 individual, mixed hearing loss was greatest in the age range from 41-50 amounting to 132 individuals (Table II and Figure 3).

In our study, there was mild hearing loss in male population of 23.4 % on right and 26.4 % on left, in female population 27.8% on right and 26.5% on left respectively. There was moderate hearing loss in male population of 17.1% in right ear and 16.5% in left ear, in female population of 14.6% in right ear and 17.2% in left ear (Table III and Figure 4). So mild hearing loss was most prevalent irrespective of side. These findings are having similar trends to the study conducted by Guleria et al whose findings also showed mild to moderate degree of hearing loss predominating across the population.

Similar trends were also found in a Korean study among their population by Hong et al.<sup>5</sup>

Asghari<sup>4</sup> et al performed his study on the Iranian population showing similar trends of prevalence in mild to moderate hearing loss with increasing grade of hearing loss with age.

Aung<sup>7</sup> et al conducted a study among the population in Myanmar in a textile industry in 2020 to show occupational hazards reflected in the form of SNHL and found a high prevalence of hearing loss of about 58.4% in population above 35 years of age which also shows trends similar to our study showing maximum SNHL occurring among the working population of 31- 60 years.

Xin<sup>8</sup> ye et al conducted another study in 2020 obtaining data from China Health and Retirement Longitudinal Study (CHARLS), which focused on the middle-aged population of  $\geq 45$  years which showed 30.32, 38.30 and 31.38% of the survey population having moderate, severe, and profound hearing impairment, respectively. Our study showed greatest prevalence of mild hearing loss in the population followed by moderate hearing loss and severe to profound hearing loss showing similar trends of degree of hearing loss patterns.

However, some limitations of the present study was also taken into consideration. The profile of individual parameters taken in our study like age, gender and type of deafness often does not reflect the actual burden of the disease in the general population as it represents the portion of the population attending the ENT OPD of a referral hospital. The actual disease burden might be much more making this demographic profile a representation of the tip of the ice berg of disease.

## Conclusion

The demographic profile of hearing loss in the population is the ground work for any comprehensive planning to resolve the issue. The age-related profiling of types of hearing loss provides useful insights into the treatment planning of age-based tailor-made treatment options and better patient management. Also, the different degrees of hearing loss in different age groups in population makes us aware of the target group of population needing hearing rehabilitation and hearing aids to alleviate the quality of life.

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