# Assessment of Satisfaction and Benefit with Hearing aids Procured under HDDU

Sanjay S.
Register No: 20AUD031

A Dissertation Submitted in Part-fulfillment
of Degree of Master of Science (Audiology)
University of Mysore

**ALL INDIA INSTITUTE OF SPEECH AND HEARING**
**MANASAGANGOTHRI, MYSURU-570006**

**AUGUST 2022**

## CERTIFICATE

This is to certify that this dissertation entitled **'Assessment of Satisfaction and Benefit with Hearing aids Procured under HDDU'** is the bonafide work submitted in part fulfillment for degree of Master of Science (Audiology) of the student Registration number: 20AUD031. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

Mysuru

August, 2022

**Dr. M. Pushpavathi**

**Director**

All India Institute of Speech and Hearing

Manasagangothri, Mysuru-570006

## CERTIFICATE

This is to certify that this dissertation entitled **'Assessment of Satisfaction and Benefit with Hearing aids procured under HDDU'** has been prepared under my supervision and guidance. It is also been certified that this dissertation has not been submitted earlier to any other University for the award of any other Diploma or Degree.

Mysuru

August, 2022

Dr. Sandeep M.

Guide
Department of Audiology
All India Institute of Speech and Hearing Manasagangothri,
Mysuru 570006

## DECLARATION

This is to certify that this dissertation entitled **'Assessment of Satisfaction and Benefit with Hearing aids procured under HDDU'** is the result of my own study under the guidance of Dr. Sandeep M., Professor of Audiology, All India Institute of Speech and Hearing, Mysuru, and has not been submitted to any other University for the award of any other Diploma or Degree.

Mysuru Registration No: 20AUD031

August, 2022

**ACKNOWLEDGENT**

I extend my gratitude to Sandeep sir for taking me as his dissertation student and helped me in improving to do any work with accuracy and high quality. I learned things to do in passion, to present the way how we are satisfied, developing interest in audiology and lot more….

I acknowledge Dr Pushpavathi M, Director of All India Institute of Speech and Hearing and Dr Prawin Kumar, HOD Dept. of Audiology, for providing a platform to conduct a dissertation study.

I thank my parents, my siblings, relatives and my coach L Manjappa, and my friends Nikhilesh, Vibha, Swarna, pooja, prakruthi, nethra, brundha, banumathi and jahnavi for their support. And I thank all the staffs of AIISH for providing and improving my skill and knowledge.

Special acknowledgements to my dissertation partners, seniors, juniors and my classmates.

*Thank all the people who have done good or bad and helped or not helped from my past or in my future.*

*- S Chakravarthy*

## TABLE OF CONTENTS

## LIST OF TABLES

# CHAPTER 1

# INTRODUCTION

Hearing loss is the fourth leading cause of disability globally. It is estimated that 1.57 billion people globally have hearing loss (as in 2019), accounting for one in five people (Haile et al., 2021). Prevalence estimates show that 466 million persons in the world (> 6.1% of the world's population) have disabling hearing loss, of whom, 432 million (93%) are adults and 34 million (7%) are children. The prevalence is particularly high in low and middle income countries (WHO, 2018). As per WHO, in India, there are approximately 63 million people, who are suffering from significant auditory impairment; this places the estimated prevalence at 6.3% in Indian population. Persons in rural areas and elderly are show to have higher prevalence of hearing loss in India (Verma et al., 2022). As per NSSO survey, currently there are 291 persons per one lakh population who are suffering from severe to profound hearing loss (Urban, State & Block., 2001).

Hearing loss in adults can be caused by ageing, exposure to excessive noise, or use of ototoxic drugs. It is typically sensorineural in nature and cannot be reversed with medication or surgery. Hearing loss is shown to adversely affect the individual's communication abilities, quality of life, cognitive functioning, work efficiency, social well being and emotional well-being. Additionally, in children, pre-lingual hearing loss can affect the child's ability to develop speech, scholastic performance and emotional development, if not effectively treated (Dobie & Van Hemel., 2004).

Hearing aids have been linked to positive outcomes, including improvement in an individual's quality of life (Chisolm et al., 2015). Despite this positive benefits, consultation for hearing impairment remains low at 61% (Schneider et al., 2010), and

hearing aid uptake and hearing aid use remain low at 33% and 25%, respectively (Hartley et al., 2010) in adults over the age of 50. Although no such estimates are made in India, at the outset it appears that due to low socioeconomic status and educational status, the percentage of persons seeking help will be lower than that of western countries.

Several studies have shown that a large proportion of people who could benefit from hearing aids do not have them (Popelka et al., 1998). In addition, not all adults provided with hearing aids use them, wear them regularly, or are satisfied with them. Surveys conducted in the United Kingdom, Australia, Finland, Denmark, and the United States revealed that about 1% to 40% of hearing aids dispensed are never or rarely used (Dillon et al., 1999; Smeeth et al., 2002).

In the recent years, best practices for assessing the hearing handicap, benefit with hearing aid, and satisfaction with hearing aid has been modified significantly. Despite the fact that the available tools vary in their approaches, all assess the user's self-perception and the impact of a hearing aid in their daily lives. To evaluate these effects, some tools are available in the form of questionnaires of satisfaction and benefit. User satisfaction can be defined as one of the areas of self-assessment, and can be measured based on any physical, social, psychological and financial changes resulting from the acquisition and use of hearing aids (Kochkin et al., 2007). Therefore, it is important to examine factors influencing success with hearing aids so that appropriately targeted intervention approaches can be developed for those who are not regular hearing aid users in the long term.

All India Institute of Speech and Hearing (AIISH), under the Ministry of Health and family welfare, Government of India is a premier institute in the country

known to render clinical services, train speech and hearing professionals, conduct research, and educate the public on issues related to communication disorders. For persons with hearing difficulties, the institute offers detailed audiological assessment and management services. With the objective to promote affordability of hearing devices, AIISH has been successfully running a dedicated unit named Hearing Device Dispensing Unit (HDDU) since 2006. Through this, a wide array of hearing aids and assistive listening devices are dispensed at a subsidized costs for the patient. The discount on a device varies based on the type, technology, model and make of the hearing aid. A total of 12 hearing aid manufacturers/authorized dealers (the number may vary with time) have signed Memorandum of Understanding with the institute and they offer a range of discounts for their products dispensed under the scheme, called the dealer's price. Additionally the institute charges 5% of the dealer's price as administrative charges. The total of dealer's price and administrative charges makes the price for the device under the scheme. Overall, the patients get a discount up to 55% on Maximum Retail Price of the device.

Additionally, AIISH financially supports patients who are below poverty line (BPL) through the client welfare fund (CWF). Through this scheme, 40% of the assistive devices are funded, while the rest would be borne by the patient. Through CWF the support is provided even to hearing aids and the eligible patients will have to bear only 60% of the cost of the hearing aid under HDDU. Bhagyashree (2021) showed that more than 2000 individuals with hearing loss benefit from this scheme every year and majority of the elderly beneficiaries prefer monaural fitting in spite of having bilateral hearing loss.

## 1.1 Justification of the Study

Although there are exponential progress in the technology of hearing aids, the hearing uptake by the needy ultimately depends on their perceived satisfaction and benefit. Although there is no agreed definition of success with hearing aids, it could reasonably be argued that a successful outcome is one in which a person with hearing impairment (HI) wears the hearing aids on a regularly and reports benefit from them.

Several survey questionnaires are available to evaluate the problems associated with hearing aid use, such as, the Hearing Aid Users Questionnaire (HAUQ: Dillon et al., 1999), Satisfaction with Amplification in Daily Life (SADL: Cox & Alexander 1999), Hearing Aid Skills and Knowledge (HASK: Saunders et al. 2018), and the Hearing Aid Skills and Knowledge Inventory (HASKI: Bennett et al., 2018). These questionnaires are meant to identify the factors that determine the satisfaction and to understand whether the fitting has been effective, providing auditory, social and emotional benefits for persons using it. However, none of them are comprehensive to probe, listening related, product related as well as dispenser related factors.

In order to facilitate early rehabilitation, AIISH through its HDDU scheme, dispenses hearing aids of all technologies at a discounted cost to its patients. The motto of the unit is to provide better technology, better listening at affordable cost to the persons with hearing loss. More than 2000 persons are known to benefit every year through this unit. At the outset, it appears that the scheme is beneficial to the society. However, it needs to be verified with scientific data. It is important to study whether the persons using hearing aid procured from HDDU are satisfied with the features of the device, performance of the device, cost of the device and the

professional service provided. Hence the present study was taken up. The study can help to determine the factors in which the patients are satisfied and the factors in which the patients are not satisfied thereby help in fine-tuning the scheme.

## 1.2 Aim of the Study

To understand the perceived satisfaction and benefit of the beneficiaries of HDDU, and thereby assess the need to revise the scheme.

## 1.3 Objectives of the Study

1. To develop a questionnaire to assess the perceived satisfaction and benefit with the hearing aids.

2. To assess the perceived satisfaction and benefit with hearing aids procured from HDDU, in various listening related, product related, dispenser related factors.

# CHAPTER 2

# REVIEW OF LITERATURE

Hearing aid fitting process according to Valente and Kaplan (1998) involves six significant stages: assessment, treatment planning, selection, verification, orientation, and validation. The assessment stage is essential to determine the type and degree of hearing loss. It will help determine the candidacy for amplification and plan the intervention program. During the treatment planning stage, the audiologist, client, and family/caregivers review the findings of the assessment stage and identify areas of difficulty and need. At the selection stage, hearing aids are selected based on their physical and electroacoustic characteristics. During the verification stage, the audiologist determines that the hearing aids meet a set of standardized measures that include basic electroacoustics, cosmetic appeal, comfortable fit, and real-ear electroacoustic performance. During the orientation stage, the audiologist counsels the client/ or their family members on the use and care of the hearing aids. In this stage the candidacy for assistive listening devices is also explored. Finally, during the validation stage, the audiologist determines the impact of the intervention on the perceived disability, in other words the hearing aid benefit. Providing just amplification does not assure benefit. The benefit has to be ensured. Various hearing aid outcome measures have been developed over the past couple of decades to assess the benefit with hearing aids.

## 2.1 Validation Procedures used to Assess the benefit with Hearing Aids

There are two types of validation measures: objective outcome measures and subjective outcome measures. According to Cox and Alexander (1991), objective outcome measures of hearing aid benefit are conducted in a laboratory or clinical

setting, limiting the generalization of those findings to more realistic listening environments. These primarily include speech perception tests such as Connected speech test by Cox, Alexander and Gilmore (1987), Speech in noise test by Fikret-Pasa, (1993), Hearing in noise test by Nilsson, Soli and Sullivan (1994), and Quick speech in noise test by Killion, Niquette, Gudmundsen, Revit and Banerjee (2004).

Functional gain is another method of validating the hearing aid benefit. It refers to the difference between behavioral sound field thresholds in aided and unaided conditions. There are several possible error sources in using functional gain measurements. 1) Errors in estimating aided and unaided thresholds 2) The internal noise of a hearing aid that can produce masking effects during measurements of aided thresholds and 3) participation of the non-test ear, if not plugged adequately during testing (Valente, Dunn & Roeser, 2000).

On the contrary, the hearing aid benefit and satisfaction can be subjectively measured through self-report questionnaires. In these questionnaires, persons using hearing aids will indicate their level of satisfaction or perceivd benefit from the device. The outcome of the questionnaires are useful for determining real-world benefits of hearing aid performance (Taylor, 2007), as perceived by the hearing aid users.

The questionnaires can assess the perceived benefit as well as perceived satisfaction. The perceived benefit refers to the reduction in disability or handicap, perceived by the person with the use of hearing aids. Whereas, the perceived satisfaction refers to how satisfied the person feels with the rehabilitation process. Satisfaction need not be performance-driven and therefore differs from the benefit. For example, a patient can have a significant degree of benefit as measured on aided

and unaided tests, but report dissatisfaction as measured on a satisfaction scale (Taylor, 2007). Self-report measures that assess benefit and satisfaction can be grouped into various classes such as, measures that directly assess benefit of rehabilitation, measures of hearing aid use, and measures of satisfaction (Dillon, 2001). These are meant to reflect the treatment efficacy directly. Some of the popular assessment tools for measuring hearing aid benefit and satisfaction in adults include the Abbreviated profile of hearing aid benefit (APHAB; Cox & Alexander, 1995), the Client oriented scale of improvement (COSI; Dillon, James, & Ginis, 1997), the Glasgow hearing aid benefit profile (GHABP; Gatehouse, 1999), and the Hearing aid performance inventory (HAPI: Walden, 1984)

The self-report outcome measures are a valuable method of determining the real-world benefits of hearing aid performance. Oliver (1997) defined satisfaction as a pleasurable fulfillment in that the consumer feels that their needs, desires, and goals have been fulfilled pleasantly. Satisfaction is thus an emotional and pleasurable experience that confirms that something right has happened and provides a driving force to sustain the effort that yields this feeling. Tse and Wilton (1988) defined consumer satisfaction as "the consumer's response to the evolution of the perceived discrepancy between prior expectations and the actual performance of the product as perceived after its consumption."

National Research Council (1999) stated that satisfaction is necessary for a customer to be loyal, although not sufficient. Customer satisfaction and loyalty directly affect customer retention with reference to hearing aid users: the users who are satisfied with hearing aids are likely to regularly wear the device and make the best out of the device. In the past, several questionnaires have been developed to

assess the satisfaction with hearing aids in persons with hearing loss. Table 2.1 shows the list of questionnaires developed in the earlier studies that assess satisfaction and benefit.

*Table 2.1: Questionnaires that assess satisfaction and benefit with hearing aids*

| Questionnaire | Developers |
|---|---|
| Hearing Aid Performance Inventory (HAPI) | Walden, Demorest & Hepler (1984) |
| Profile of Hearing Aid Performance (PHAP) | Cox & Gilmore (1990) |
| Profile of Hearing Aid Benefit (PHAB) | Cox, Gilmore &Alexander (1991) |
| Shortened Hearing Aid Performance Inventory (SHAPI) | Schum, Dillon (1992,1994) |
| Satisfaction with Amplification in Daily Life (SADL) | Cox & Alexander (1999) |
| Abbreviated Profile of Hearing Aid Benefit (APHAB) | Cox & Alexander (1995) |
| Client oriented scale of improvement (COSI) | Dillon, James & Ginis (1997) |
| Profile of aided loudness (PAL) | Mueller and Palmer (1998) |
| Glasgow hearing aid benefit profile (GHABP) | Gatehouse (1999) |
| International outcome inventory–Hearing aids (IOI-HA) | Cox et al.,(2000) |
| Hearing Aid User's Questionnaire (HAUQ) | Forster & Tomlin (1988) |

## 2.2 Relationship between Subjective and Objective Measures of Hearing Aid Benefit

Cox et al. (2003) reported the following to justify the need for self-assessment of hearing aid satisfaction and benefit: 1) even the healthcare systems are evolving to be consumer-driven, in which systems the consumer decides what treatment is selected and when it is complete. In this model, self-report outcome and satisfaction data is the primary quality index of service efficacy. 2) self reported data can reflect certain domains of real life experiences, not reflected in laboratory

measurements.

Mendel (2007) compared the subjective and objective outcome measures in individuals who showed aided benefit with hearing aid. Although both types of measures showed improvement with hearing aids, there was no significant correlation among the two types of measures. This suggests that the two types of measures do not reflect the same attributes of aided benefit.

Newman and Sandridge (1998) compared 25 hearing aid users with sensorineural hearing loss fitted with hearing aids. The pre-and post-fitting performance and acceptance were compared using speech in noise test (SPIN) and self-report (Abbreviated profile of hearing aid benefit; Hearing handicap inventory for the elderly/adults; Knowles hearing aid satisfaction survey; preference ratings). The SPIN test revealed that hearing aids resulted in considerably greater word recognition scores, whereas the self-reported measures revealed less satisfaction. Similarly, Young et al. (2020) showed that better audiometric outcomes with hearing aid fitting did not always result in higher subjective satisfaction.

### 2.3 Factors that determine Satisfaction and Benefit with Hearing Aids

Kochkin (2002) analysed customer satisfaction data of 10 years and reported only limited satisfaction with hearing aids in terms of listening, as measured by subjective satisfaction questionnaire. However, customers were highly satisfied about the services provided by dispensing professionals, comfort of hearing aid, and feedback from the device.

Kochkin (2010) listed the top ten factors related to overall customer satisfaction with hearing aids in rank order. The factors that correlated well with

overall hearing aid satisfaction are: clarity of sound, value (performance of the hearing aid relative to price), natural sounding, reliability of the hearing aid, richness or fidelity of sound, use in noisy situations, ability to hear in small groups, comfort with loud sounds and sound of voice. The implication was that the increased improvements in these areas will drive improvements in overall satisfaction. The attributes in which the consumer was highly dissatisfied were: use in noisy situations, wind noise, comfort with loud sounds, ability to hear soft sounds, and the feedback.

Korkmaz et al. (2016) attempted to explore the factors that determine satisfaction with the hearing aids. They found that satisfaction decreased with advanced age and increased with increasing years of hearing aid use. The gender, employment, laterality (monaural vs binaural), and education were not found to be influencing factors. On the contrary, there are studies (Hickson et al., 1986; Gatehouse, 1994; Norman et al., 1994) that have shown no significant relationship between age and satisfaction.

Hosford-Dunn and Halpern (2001) measured the relation between degree of hearing loss and the hours of hearing aid use per day and satisfaction. The average hearing level at 0.5, 1, 2, and 4 kHz was 35, 42, 53, and 66 dB, respectively. They found that those with more hearing loss reported a higher hearing aid use per day and greater satisfaction levels. They also found that bilateral hearing aids substantially enhanced patient satisfaction. Kochkin (1992) and Bhat et al. (2015) also found that individuals with moderately severe and severe hearing loss were more satisfied than those with mild hearing loss. On the contrary, Turan, Unsal and Kurtaran (2019) found that as the degree of hearing loss increased, the average satisfaction score decreased, with severe hearing loss having the lowest satisfaction. They had used

APHAB questionnaire and assessed 301 subjects with varying degrees of hearing loss, including unilateral or bilateral hearing aid users.

The studies that have compared monaural versus binaural fitting (Kochkin, 1992; Turan et al., 2019) have unequivocally found that the satisfaction is higher in binaural fitting. Whereas, comparison between conventional BTEs and RIC (receiver in the canal) hearing aids have revealed contradictory findings: Kochkin (1992) found conventional BTE users to be more satisfied than RIC users, while Kochkin (2011) showed higher overall satisfaction with RIC hearing aids compared to conventional BTE aids. In terms of product-specific satisfaction rating, RIC aids were shown to be superior in visibility and warranty, but were rated lower in ease of adjusting volume in them. For the sound quality and signal processing, RIC aids were rated higher than conventional BTE aids and the difference was reported to be more in cell phones and telephone conversations, and classroom listening.

Bhat et al. (2015) used Client Oriented Scale of Improvement (COSI) to assess satisfaction with hearing aids in 733 participants, after four months of hearing aid use. They found that the participants were highly satisfied with the benefit from hearing aid. Almost half of the participants had no concerns with their hearing aids. Those with mild hearing loss were less satisfied with their hearing aids than the others and those with severe hearing loss wore their hearing aids for longer duration each day than the others. This suggests that the satisfaction improves with hearing aid use. Uriarte et al. (2016) also found that more experience with hearing aids is associated with higher satisfaction. Munro and Lutman (2016) followed up 32 first-time hearing aid users for a duration of six months and measured hearing aid use and satisfaction using the Glasgow Hearing Aid Benefit Profile (GHABP) every month.

They found a statistically significant gradual increase in satisfaction scores during the first three months post-fitting, which was more evident in the ones who showed higher satisfaction in the first month.

A longitudinal study by Vestergaard (2006) aimed to study the changes in self-report outcomes over time and the relationships between different subjective measures of benefit and satisfaction. Following the hearing aid fitting, 25 hearing aid users were given four outcome inventories (GHABP, IOI-HA, SADL, & HAPQ), and assessments were conducted one week, four weeks, and thirteen weeks later. The findings revealed that, among first-time users who used their hearing aids for more than four hours per day, self-reported outcomes improved on several scales over 13 weeks.

Apart from listening and product related factors, studies have also investigated the role of Audiologist in determining satisfaction. Uriarte et al. (2016) conducted two studies addressing the role of the hearing aid professional. A positive correlation was observed between satisfaction with hearing aids (as measured with the SADL) and satisfaction with the practitioner. Kirkwood (2005) surveyed dispensers and asked their views on what factors determine a client's satisfaction with hearing aids. Of the 674 dispensing professionals interviewed, only 6% of them perceived the hearing aids as the most crucial factor leading to a successful fitting; 39% regarded the counseling skills of the dispenser as the most relevant. Twenty-six percent of the dispensers selected the dispenser's fitting/programming skills as the most important.

## 2.4 Factors that Contribute to Hearing Aid Uptake and Use

Helvik et al. (2008) investigated 173 adult hearing aid users for their acceptance or rejection of a hearing aid. The younger patients who felt they had few problems with their hearing aids rejected them more often, while the older patients sought for trouble shooting. Those with high education were prone to reject hearing aids. However, rejecting or accepting hearing aids was not associated with factors such as participants living with a spouse or cohabitant, gender and duration of hearing loss.

A Systematic Review by Knudsen et al. (2010) listed the factors during hearing aid fitting stage that play a role in hearing aid uptake. Their search yielded four studies that dealt with the source of motivation for persons with hearing loss to enter the hearing clinic. All of these focused on whether the candidates were self-motivated or motivated by others (e.g., spouse, family) to seek help. They also investigated whether the source of motivation affected hearing aid use and satisfaction. Wilson and Stephens (2003) did not find an association between source of motivation and hearing aid satisfaction. However, Hickson et al. (1999) observed a significant relationship between the source of motivation (self vs. other) for attending a hearing clinic and the satisfaction with hearing aids. They demonstrated that self-motivated persons were more satisfied than those motivated by others. Wilson and Stephens (2003) reported significantly more frequent use of hearing aids and higher satisfaction levels among those with a positive (pre-fitting) attitude toward hearing aid rehabilitation compared to those with negative attitude.

Jerram and Purdy (2001) observed that those with better acceptance of their hearing loss prior to hearing aid fitting used their hearing aids more frequently than

those with less acceptance of their hearing loss. A positive correlation between perceived hearing difficulties and satisfaction with hearing aids is also reported (Uriarte et al., 2005; Hosford-Dunn & Halpern, 2001).

Gatehouse (1994) found that some aspects of personality (when measured at the initial appointment) had a significant relation to hearing aid use and satisfaction. Those with lower depression scores (according to the Crown-Crisp Experiential Index; Stephens & Hallam, 2015) scored higher on post-fit hearing aid use and satisfaction levels: those with higher hysteria scores scored higher on post-fit hearing aid use and satisfaction levels and: those with higher scores on obsession had higher scores on satisfaction.

### 4.5 Government and Non-Governmental Schemes to Promote Hearing Aid Uptake and Usage

Framing appropriate cost-benefit policies and regulations without compromising quality and safety determines the success of programmes undertaken to improve access to hearing aids (Nieman et al., 2016). Improving affordability is a very important issue to promote access to hearing aids, especially in developing countries. Introducing reimbursement policies and subsidizing hearing aid purchases would serve the purpose (Wang et al., 2011). Lack of public awareness regarding hearing aid benefits and subsidy schemes, scarcity of audiologists, dependency on multinational hearing aid manufacturers, and limited number of reimbursing schemes are some of the challenges reported to be faced by policy makers in low and middle income countries (Haile et al., 2021).

Ministry of social justice and empowerment, government of India succeeded to some extent in helping the needy. The ministry introduced a scheme for distributing hearing aids free of cost or at 50% discount to poor families.

Consequently, India could manufacture and distribute about 90,000 hearing aids with the support of 200 implementing government and non-governmental organisations (Basavaraj, 2008). Central government health scheme (CGHS) was adopted by Indian government is providing comprehensive medical care to central govt. government employees and pensioners enrolled under it. People from 74 cities all over India are benefitted under the scheme and it's yet to expand further. The beneficiary can claim reimbursement of expenses for treatment if eligible. This facility includes initial procurement and replacement of hearing aids after 5 years, subject to a condemnation certificate for the earlier hearing aid. Scheme reimburses expenses of hearing aids ranging from body-worn to ITC/CIC in type and technology, up to fixed ceiling rates.

Similarly, the United States introduced Direct-to-consumer service delivery models to improve access to quality devices (hearing devices) and reduce costs (Mamo et al., 2016; Nieman & Lin, 2017). The US government adopted Medicare and Medicaid – federal health insurance programs for eligible people aged 65 years or older, and certain younger people with disabilities. Medicaid is available to people below a certain income level who meet other criteria (e.g., age, disability status, pregnancy) or to those below a certain income level. But, coverage for hearing aids is not mandated in all the states and for all age groups. American Speech and Hearing Association recommends extending these insurance programs' benefits to all states (Willink et al., 2019).

A study on United States population by Arnold et al. (2017) highlighted on the importance of insurance coverage (Medicaid) of hearing aids and associated hearing health care. The study found that only 28 out of 50 states offered some insurance

coverage. Eligibility criteria and coverage policies varied from state to state. Some states covered bilateral hearing aids, supply of batteries for the lifetime of hearing aids, and assistive listening devices, unlike states which covered only unilateral hearing aids and an initial supply of batteries. Findings emphasized the need to expand and standardize eligibility criteria and make hearing health care a mandatory benefit under Medicaid.

Despite the adoption of effective programs to promote hearing aid uptake and usage, low and middle-income countries like India face many challenges to reach all the beneficiaries. Increasing prevalence of hearing loss, delayed realization about hearing loss, lack of government policy, scarcity of reimbursement and third-party payment facilities to procure hearing aids, and scarcity of indigenous manufacturers of hearing aids and attractive products are some of the prevalent challenges (Bagatto et al., 2011; Seelman & Werner 2021).

# CHAPTER 3

# METHOD

The study used qualitative research design to assess the perceived satisfaction and benefit with the hearing aids among the beneficiaries of the HDDU scheme of AIISH. The study was conducted in two phases: Phase I - Development of the questionnaire and Phase II – assessment of satisfaction and benefit in the beneficiaries of HDDU scheme using the questionnaire. The details of the methods used in the two phases are reported in this chapter.

## Phase I: Development of the Questionnaire

In the new era of' consumer-driven hearing healthcare, the primary quality index of service is self-report outcome and satisfaction data. To assess the efficacy of HDDU scheme in the consumer point of view, it was decided to develop a questionnaire that taps the perceived satisfaction and benefit of the consumers with the hearing aids they procured under HDDU scheme. There were three steps in the questionnaire development: 1) Identification of the factors that determine perceived satisfaction and perceived benefit, 2) Preparation of the questionnaire, and 3) Content validation and revision of the questions.

### 3.1 Identification of the Factors that Determine Perceived Satisfaction and Perceived Benefit

To begin with, a detailed review of the literature pertaining to perceived satisfaction and benefit with hearing aids was carried out. This was meant to identify the factors that determine the satisfaction and benefit with hearing aids in the

consumers. The factors were also drawn from the existing questionnaire on hearing aid satisfaction. Three questionnaires from which the ideas for the current questionnaire were drawn are questionnaire developed by Kochkin for the satisfaction of hearing aid users (Kochkin, 1997), Abbreviated profile of hearing aid benefit (Cox & Alexander, 1995) and Client-Oriented Scale of Improvement COSI (Dillon, James & Ginnis, 1997). Inputs were also taken from the experienced clinicians of AIISH regarding the factors that determine the consumer satisfaction and benefit with hearing aids. Table 3.1 shows the list of factors identified through review of literature, from the fore-mentioned questionnaires, from the investigator, the mentor and the experienced clinicians of AIISH.

### 3.2 Preparation of the Questionnaire

The factors were then grouped under three broad categories: Listening related factors, Product related factors, and Dispenser related factors. 'Listening related factors' was operationally defined as 'the factors pertaining to listening experience of the participants through their hearing aid/s in different day-to-day environments'; 'Product related factors' was operationally defined as 'the factors pertaining to the technical and physical features of the hearing aid/s'; 'Dispenser related factors' was operationally defined as 'the factors pertaining to the hearing aid trial and prescription and to service delivery with respect to the procurement of hearing aid'. The list of factors under each factor group and their score is depicted in Table 3.1. with the following legend.

Listening related factors

Product related factors

Dispenser related factors

*Table 3.1: List of factors identified as the ones that determine perceived satisfaction and perceived benefit with hearing aids*

| Sl No. | Factors | Source of the factor |
|---|---|---|
| 01. | identifying the direction of the sound source | Questionnaire * |
| 02. | the Quality of own voice | Self experience of the investigator |
| 03. | cosmetic appeal | Input of the mentor |
| 04. | understanding speech through telephone /mobile phone | Questionnaire* |
| 05. | understanding conversations in the restaurant | Questionnaire * |
| 06. | understanding conversations in social gatherings such as marriage, parties etc | Questionnaire *** |
| 07. | understanding speech in market | Self experience of the investigator |
| 08. | battery life | Input of the mentor |
| 09. | cost | Self experience of the investigator |
| 10. | understanding speech coming from a distance | Input from experienced clinicians from AIISH |
| 11. | understanding speech in a group conversation | Input from experienced clinicians from AIISH |
| 12. | understanding speech in the presence of noise | Input from experienced clinicians from AIISH |
| 13. | comfort of fit | Input of the mentor |
| 14. | ease of handling | Input of the mentor |
| 15. | ease of manipulating the controls | Input of the mentor |
| 16. | counselling on the realistic expectations from the hearing aids | Self experience of the investigator |
| 17. | listening in different day-to-day environments | Self experience of the investigator |
| 18. | technical and physical features | Self experience of the investigator |
| 19. | overall professional service delivery choosing AIISH to procure the hearing aid/s | Input of the mentor |
| 20. | clarity of sound | Questionnaire ** |

| Sl No. | Factors | Source of the factor |
|---|---|---|
| 21. | naturalness of sound | Questionnaire *** |
| 22. | hearing aid trial given to you | Questionnaire * |
| 23. | hearing aid programming as per the listening needs | Input of the mentor |
| 24. | overall satisfaction | Self experience of the investigator |
| 25. | overall satisfaction with the product | Self experience of the investigator |
| 26. | overall professional service delivery | Input of the mentor |
| 27. | hearing soft sounds | Questionnaire*** |
| 28. | counselling by audiologist on the need for a hearing aid | Input of the mentor |
| 29. | perceiving music | Self experience of the investigator |
| 30. | explanation of features of hearing aid by audiologist | Input of the mentor |
| 31. | guidance by audiologist for choosing the hearing aids | Input of the mentor |
| 32. | warranty | Questionnaire* |
| 33. | understanding conversations while chewing and swallowing | Self experience of the investigator |
| 34. | understanding conversations of family members when the television is on | Self experience of the investigator |
| 35. | understanding conversations in TV shows | Self experience of the investigator |

*Note*: *The Satisfaction of hearing aid users by Kochkin
** Abbreviated profile of hearing aid benefit
***Client-Oriented Scale of Improvement

To tap the perceived satisfaction with respect to each of the identified factors, the questions were phrased in English. Care was taken to ensure that the questions are grammatically correct, short in length and easy to understand by a layman. The care was also taken to eliminate semantic ambiguity in the questions. There were three

questions phrased for tapping perceived satisfaction and there were three questions phrased for tapping perceived benefit. Table 3.2 shows the list of questions phrased.

*Table 3.2: List of questions phrased for the perceived satisfaction and perceived benefit with hearing aids*

| Sl No | Attribute | Factor group | Question |
|---|---|---|---|
| 01. | Satisfaction | Listening related | How do you rate your satisfaction with the hearing aid/s for…….. |
| 02. | Benefit | Listening related | Please rate your overall benefit with the hearing aid in terms of…… |
| 03. | Satisfaction | Product related | How do you rate your satisfaction with the hearing aid/s for its…… |
| 04. | Benefit | Product related | Please rate your overall benefit with the hearing aid in terms of its……. |
| 05 | Satisfaction | Dispenser related | How satisfied are you regarding the…….. |
| 06. | Benefit | Dispenser related | Please rate your overall benefit derived by... |

The perceived satisfaction was elicited on a 5-point Likert rating scale, with '5' being 'Highly satisfied' and '1' being 'Highly Dissatisfied'. Whereas, the perceived benefit was elicited on a 10-point rating scale (0 to 9) wherein, '0' represented 'No benefit' and '9' represented 'Highly beneficial'. The intermediate numbers between 0 and 9 represented different degrees of benefit in the increasing order.

### 3.3 Content Validation by Audiologists

After formulating the questions, the respective factors were listed below the questions. The questions and the respective factor list were then given to four experienced audiologists (with an experience of more than ten years in the field of

hearing aid trail, prescription and dispensing). These experts rated all three subscales (listening related, product related and dispenser related) for their relevance, grammatical correctness, ease of understanding, clarity of meaning and non-offensiveness. Each question and factor were judged for each of these parameters on a binary scale ('yes' or 'no'). The experts could also provide open ended remarks, if any for the questions and factors. The list of comments received from the four experts is shown in Table 3.3.

*Table 3.3: List of comments received from the four experts for the perceived satisfaction and perceived benefit with hearing aids*

| Sl No. | Attribute | Factor group | Questions /factors | Remarks of the experts |
|---|---|---|---|---|
| 01. | Satisfaction | Listening related | Under conversations in the restaurant | To be removed |
| 02. | Satisfaction | Listening related | Understanding conversations in social gatherings such as marriage, parties etc | To be removed |
| 03. | Satisfaction | Listening related | Understanding speech in market | To be removed |
| 04. | Satisfaction | Product related | Maintenance cost of hearing aids | To be added |
| 05. | Satisfaction | Dispenser related | • counselling on the realistic expectations from the hearing aids<br>• counseling on the use of hearing aid | To be combined |

The inputs received from the four experts was used to revise the questions and the statement of the factors as suggested. Based on the suggestions of the experts, three questions were removed in the listening related factors (understanding conversations in the restaurant, understanding conversations in social gatherings such as marriage, parties etc, understanding speech in market), and one question was added to the product related factors (maintenance cost of hearing aid).

A copy of the final questionnaire (revised as per the suggestions given by the experts) is shown in Appendix 1. The questionnaire consisted of 15 listening related factors, 9 product related factors, and 8 dispenser related factors.

### 3.4 Other Components of the Questionnaire

Apart from the questions, the questionnaire included a section wherein the participant has to fill in the demographic details. The investigator would additionally note down the geographical location of the participants, degree of hearing loss, and details of the hearing aid/s in terms of the model (BTE/RIC). This was followed by a passage on ***informed consent***. Each participant had to read the informed consent '*I have been informed about the study titled Assessment of Satisfaction and benefit with Hearing aids procured under HDDU. I understand the purpose and procedure of the questionnaire. I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without incurring a penalty or without being obligated to provide a reason. I understand that my participation in the study will not adversely affect me in any way and that confidentiality will be maintained about my identity at all times. I also understand that the information given by me will be used only for the purpose of the study. I do not have any financial or non-financial benefits from this study. I hereby give my consent to participate*.'" and sign the same to participate in the study'.

After obtaining the informed consent, participants were given the following ***instructions*** '*The questionnaire is arranged under three key constructs. Under each construct, there are questions with a table showing a list of factors related to the construct. You are requested to read the questions carefully and go through the factors one by one. In each factor, you are expected to rate the significance of that*

*factor in determining your satisfaction with the hearing aid. The rating scale varies from 1 to 5, with '5' being Highly satisfied and '1' being Highly Dissatisfied. Your choice should be based solely on your experience on use of hearing aids and their satisfaction. Below is an example.*

*Example: How do you rate your hearing aid for the clarity of sound?*

*If your answer to this question is 'Highly dissatisfied', you shall mark (√) on '1', as shown below.*

| **Question** | Highly Dissatisfied (1) | Dissatisfied (2) | Neutral (3) | Satisfied (4) | Highly Satisfied (5) |
|---|---|---|---|---|---|
| A. how do you rate your hearing aid for the clarity of sound? | √ | | | | |

*Rate your benefit on a 10-point (0 to 9) rating scale wherein , '0' represents 'no benefit' and '9' represents 'highly beneficial'. The intermediate numbers between 0 and 9 represent different degrees of benefit in the increasing order'.*

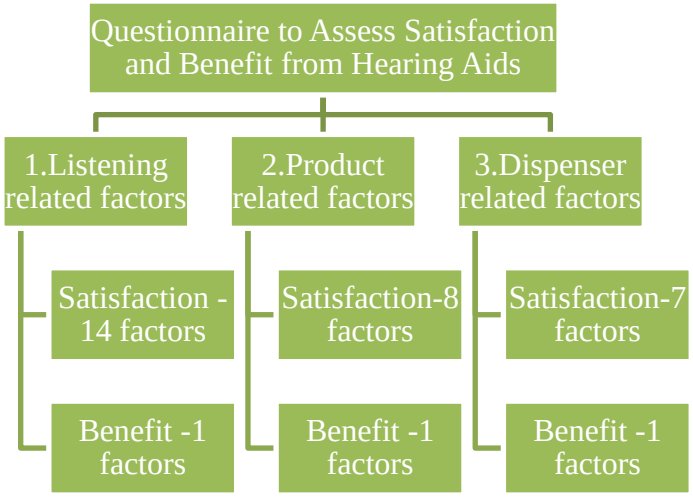
**3.5 Translation and Reverse Translation of the Questionnaire**

The questionnaire was then translated to Kannada, by the investigator, which was later reviewed by the mentor. Both of them were native speakers of Kannada, had studied Kannada as the main subject in their primary and secondary levels of schooling, familiar with the local culture, had in-depth understandingof the subject, and knowledge of research methods and translation processes.

To confirm the effectiveness of translation, the second key phase in the translation-adaptation process was done; Reverse translated to English by an adult bilingual who had background in speech and hearing and was proficient in both the languages. The translated Kannada questionnaire was given to her and was instructed

to independently translate to English. She was blinded to the English version of the questionnaire. The revised translated questionnaire is shown in Appendix II.

The final questionnaire in the two languages had a total of 32 questions grouped under 3 sections. Each had 2 subsections; perceived satisfaction and perceived benefit. There were 14 questions to tap perceived satisfaction in listening related factors, 1 question to tap perceived benefit in listening related factors; 8 questions to tap perceived satisfaction in product related factors, 1 question to tap perceived benefit in product related factors; 7 questions to tap perceived satisfaction in dispenser related factors and 1 question to tap perceived benefit in dispenser related factors. The following block diagram depicts the content and structure of the final questionnaire.




***Phase II - Administration of the questionnaire on the hearing aid users***

### 3.6 Informed Consent and Ethical Considerations

During the first-time registration at the institute, all the registered patients of the institute sign an informed consent, which includes their prior consent to use the

clinical information pertaining to them for research purpose. Considering that all the beneficiaries of the HDDU scheme were the registered patients at the institute, the study had the informed consent of the beneficiaries. In order to access the clinical data required for the study, prior permission was taken from the Chairperson of HDDU. From HDDU, the demographic details of the beneficiaries and details of the hearing aid procured was taken. A hand written requisition letter was submitted through the dissertation guide to the Chairperson of HDDU to access and utilize the data for dissertation.

From the database of HDDU, the list of beneficiaries of the past five years was noted down. The data in the HDDU was available as soft copy in Microsoft Excel sheet maintained in the unit. The demographic details noted down included the name, age, gender and contact details of the beneficiaries. Within the age range of 41 to 70 years there were 1,233 beneficiaries in the last five years. Among them, attempt was made to contact 150 beneficiaries through telephone, but only 115 could be successfully contacted. Among the contacted, 89 agreed to participate in the study but only 72 turned out. The 72 participants were explained about the purpose of the study.

### 3.7 Administration of the Questionnaire

Depending on the then stipulated guidelines by state and central government for Covid Appropriate Behavior, either a direct or telephonic interview was conducted. Accordingly, the first 29 participants were administered telephonically. Later, when the restrictions were relaxed, in the next 43 participants the questionnaire was administered in-person (direct interview). An informed consent (page no:30-31) was taken from each participant prior to their participation. The participants were advised to read the instructions which included the example of how to rate the

questionnaire before filling it. The questionnaire was administered by the investigator of this dissertation. Fifty four participants were administered with Kannada version of the questionnaire while eighteen participants were administered with Kannada version of the questionnaire, depending on their preferred language. Questions were posed to the participants verbatim and no rephrasing of the questions were done. The participants were asked to rate their response on a 5-point Likert rating scale for the satisfaction of hearing aids and on a 10- point rating scale for the benefit of the hearing aid.

### 3.8 Data Analysis

The responses were tabulated in a SPSS (version 21) data sheet. The data were first assessed for their distribution using Shapiro Wilk test of normality. Based on the results of normality test, either a parametric or a non-parametric test was used for statically analysis. The group data was analysed to derive the mean, median, standard deviation and inter quartile range of the perceived satisfaction and perceived benefit.

# CHAPTER 4

# RESULTS

The study aimed to assess the satisfaction and benefit with hearing aids among the persons who procured their hearing aids from HDDU scheme. A thirty-two items questionnaire was administered to assess the satisfaction and benefit. The independent variables considered were age, gender, education, employment, geographical location, type of hearing aid, degree of hearing loss, the years of experience of hearing aid use, hearing aid usage time in a day, and laterality of hearing aid usage (monaural & binaural). The effect of these variables on the perceived satisfaction and benefit (dependent variables) was stastically determined using Mann-Whitney U test, ANOVA and, Kruskal–Wallis tests.

To begin with, the perceived satisfaction and benefit measured through the questionnaire was compared between its Kannada and English versions. The questionnaire was administered in Kannada (using Kannada version) in 54 participants and it was administered in English (using English version) in 18 participants. Table 4.1 shows the median and interquartile range of the overall satisfaction and benefit score obtained in listening related, product related and dispenser related factors for the two versions of the questionnaire (English & Kannada). The results of Mann–Whitney U test (Table 4.1) showed no significant difference ($p>0.05$) for the overall satisfaction as well as benefit.

Similarly, the perceived satisfaction and benefit measured through the questionnaire was compared between the two modes of administration (Direct & telephonic). The questionnaire was administered directly in 43 participants and it was administered telephonically in 29 participants.

*Table 4.1: Median and interquartile range of the overall satisfaction and benefit score obtained in listening related, product related and dispenser related factors for the two versions of the questionnaire (English & Kannada). The results of Mann-Whitney U test comparing the groups are also shown in the table*

| Attribute | Factors | Categories | Median | IQR | Z | p |
|---|---|---|---|---|---|---|
| Satisfaction | Listening related | Kannada | 4 | 1 | -1.103 | 0.270 |
| | | English | 4 | 0 | | |
| | Product related | Kannada | 4 | 1 | -0.041 | 0.968 |
| | | English | 4 | 1 | | |
| | Dispenser related | Kannada | 5 | 1 | -1.109 | 0.268 |
| | | English | 5 | 1 | | |
| Benefit | Listening related | Kannada | 8 | 0 | -0.666 | 0.506 |
| | | English | 8 | 0 | | |
| | Product related | Kannada | 8 | 0 | -1.226 | 0.220 |
| | | English | 8 | 0 | | |
| | Dispenser related | Kannada | 8 | 1 | -0.397 | 0.691 |
| | | English | 8 | 1 | | |

Table 4.2 shows the median and interquartile range of the overall satisfaction and benefit score obtained in listening related, product related and dispenser related factors for the two modes of administration. The results of Mann-Whitney U test (Table 4.2) showed no significant difference ($p>0.05$) either in overall satisfaction or in benefit between the two modes of administration.

*Table 4.2: Shows the median and interquartile range of the overall satisfaction and benefit score obtained in listening related, product related and dispenser related factors for the two modes of administration (Direct & telephonic)*

| Attribute | Factors | Categories | Median | IQR | Z | p |
|---|---|---|---|---|---|---|
| Satisfaction | Listening related | Telephone | 4 | 0 | -1.422 | 0.155 |
| | | Direct Interview | 4 | 1 | | |
| | Product related | Telephone | 4 | 1 | -0.86 | 0.931 |
| | | Direct Interview | 4 | 1 | | |
| | Dispenser related | Telephone | 5 | 1 | -0.625 | 0.532 |
| | | Direct Interview | 5 | 1 | | |
| Benefit | Listening related | Telephone | 8 | 0 | -0.566 | 0.50 |
| | | Direct Interview | 8 | 0 | | |
| | Product related | Telephone | 8 | 0 | -0.236 | 0.320 |
| | | Direct Interview | 8 | 0 | | |
| | Dispenser related | Telephone | 8 | 1 | -0.342 | 0.441 |
| | | Direct Interview | 8 | 1 | | |

In view of no significant difference between the two versions of questionnaire and the two modalities of administration, the data was clubbed together and treated as one set for further statistical analysis.

Table 4.3 shows the categories made in independent variables and the number of participants in each category. These categories were made after the completion of data collection. No such categories made for the variables,

'hearing aid experience' and 'hearing aid use'. The hearing aid experience ranged from 8 months to 15 years with a mean of 3.066 years (SD: 3.09). The hearing aid usage ranged from 1 to 15 hours with a mean duration of 9.61 hours (3.29).

*Table 4.3: The categories made in independent variables and the number of participants in each category*

| Independent Variable | Categories | Number of participants |
|---|---|---|
| Age | 41 to 55 years | 41 |
| | 56 to 70 years | 31 |
| Gender | Male | 40 |
| | Female | 32 |
| Education level | Above graduation | 38 |
| | Below graduation | 34 |
| Employment | Employed | 40 |
| | Unemployed | 32 |
| Location | Rural | 26 |
| | Urban | 46 |
| Type of hearing aid | BTE | 46 |
| | RIC | 26 |
| Laterality | Monaural | 28 |
| | Binaural | 44 |
| Degree of hearing loss | Mild | 25 |
| | Moderate | 18 |
| | Moderately severe | 18 |
| | Severe | 11 |

## 4.1 Results of Perceived Satisfaction with Hearing Aids

### 4.1.1 Perceived overall satisfaction

Table 4.4 shows the median, interquartile range, mean and standard deviation of the overall satisfaction score obtained in the listening-related, product-related, and

dispenser-related factors. The mean score was maximum for dispenser related factors followed by listening related and product related factors.

*Table 4.4: Median, interquartile range, mean and standard deviation of the overall satisfaction score obtained in listening-related, product-related, and dispenser-related factors*

| Factors | Median (IQR) | Mean (SD) |
|---|---|---|
| Listening related factors | 4(0) | 4.03(0.556) |
| Product related factors | 4(0) | 3.94(0.407) |
| Dispenser related factors | 5(1) | 4.83(0.375) |

*Note :* Maximum Score = 5

### 4.1.2 Effect of independent variables on the perceived overall satisfaction in listening related factors

Table 4.5 shows the median and interquartile range of the overall satisfaction score in listening related factors for different categories of the independent variables. The data were first assessed for their distribution using Shapiro Wilk test of normality. Considering that the data distribution was non-normal, Mann–Whitney U test and the Kruskal–Wallis test was used to test the group differences. The results (Table 4.5) showed no significant group difference ($p>0.05$) for the overall satisfaction in any of the independent variables in the listening related factors.

*Table 4.5: Median and interquartile range of overall satisfaction score in listerning related factors in different categories of the independent variables, and the results of Mann–Whitney U test and the Kruskal–Wallis test comparing the groups*

| Independent variable | Categories | Median | Interquartile range | Z | p |
|---|---|---|---|---|---|
| Age | 41 to 55 | 4 | 0 | -1.235* | 0.217* |
| | 56 to 70 | 4 | 1 | | |
| Gender | Male | 4 | 0 | -0.51* | 0.16* |
| | Female | 4 | 1 | | |
| Education | Below graduation | 4 | 0 | -1.235* | 0.217* |
| | Above graduation | 4 | 0 | | |
| Employment | Employed | 4 | 0 | -1.235* | 0.217* |
| | Unemployed | 4 | 1 | | |
| Geographical location | Urban | 4 | 0 | -0.254* | 0.799* |
| | rural | 4 | 0 | | |
| Type of hearing aid | BTE | 4 | 0 | -0.828* | 0.408* |
| | RIC | 4 | 1 | | |
| Laterality | Monaural | 4 | 0 | -0.794* | 0.427* |
| | Binaural | 4 | 1 | | |
| Degree of hearing loss | Mild | 4 | 0 | 3(df)** | 0.94** |
| | Moderate | 4 | 1 | | |
| | Moderately severe | 4 | 1 | | |
| | Severe | 4 | 0 | | |

*Note* : ***** Mann–Whitney U test, ** *Kruskal–Wallis* test

### 4.1.3 Effect of independent variables on the perceived overall satisfaction in product related factors

Table 4.6 shows the median and interquartile range of the overall satisfaction score in product related factors for different categories of the independent variables.

The data were first assessed for their distribution using Shapiro Wilk test of normality. Considering that the data distribution was non-normal, Mann–Whitney U test and the *Kruskal–Wallis* test was used to test the group differences. The results (Table 4.6) showed no significant group difference ($p>0.05$) for the overall satisfaction in any of the independent variables in the product related factors.

*Table 4.6: Median and interquartile range of overall satisfaction score in product related factors in different categories of the independent variables, and the results of Mann–Whitney U test and the Kruskal–Wallis test comparing the groups*

| Independent variable | Categories | Median | Interquartile range | Z | p |
|---|---|---|---|---|---|
| Age | 41 to 55 | 4 | 1 | -1.515* | 0.130* |
| | 56 to 70 | 4 | 1 | | |
| Gender | Male | 4 | 1 | -1.353* | 0.176* |
| | Female | 4 | 0 | | |
| Education | Below graduation | 4 | 0 | -1.353* | 0.176* |
| | Above graduation | 4 | 1 | | |
| Employment | Employed | 4 | 1 | -0.007* | 0.994* |
| | Unemployed | 4 | 1 | | |
| Geographical location | Urban | 4 | 1 | -0.168* | 0.866* |
| | Rural | 4 | 1 | | |
| Type of hearing aid | BTE | 4 | 0 | -1.018* | 0.309* |
| | RIC | 4 | 1 | | |
| Laterality | Monaural | 4 | 1 | -0.823* | 0.411* |
| | Binaural | 4 | 1 | | |
| Degree of hearing loss | Mild | 4 | 1 | 3(df)** | 0.736** |
| | Moderate | 4 | 0 | | |
| | Moderately severe | 4 | 1 | | |
| | Severe | 4 | 0 | | |

*Note* : ***** Mann–Whitney U test, ** *Kruskal–Wallis* test

### 4.1.4 Effect of independent variables on the perceived overall satisfaction in dispenser related factors

Table 4.7 shows the median and interquartile range of the overall satisfaction score in dispenser related factors for different categories of the independent variables. The data were first assessed for their distribution using Shapiro Wilk test of normality. Considering that the data distribution was non-normal, Mann–Whitney U test and the *Kruskal–Wallis* test was used to test the group differences. The results (Table 4.7) showed no significant group difference ($p>0.05$) for the overall satisfaction in any of the independent variables in the dispenser related factors.

*Table 4.7: Median and interquartile range of overall satisfaction score in dispenser related factors in different categories of the independent variables, and the results of Mann–Whitney U test and the Kruskal–Wallis test comparing the groups*

| Independent variable | Categories | Median | Interquartile range | Z | p |
|---|---|---|---|---|---|
| Age | 41 to 55 | 5 | 1 | -0.193* | 0.847* |
| | 56 to 70 | 5 | 1 | | |
| Gender | Male | 5 | 1 | -0.346* | 0.729* |
| | Female | 5 | 1 | | |
| Education | Below graduation | 5 | 1 | -0.268* | 0.788* |
| | Above graduation | 5 | 1 | | |
| Employment | Employed | 5 | 1 | -0.374* | 0.708* |
| | Unemployed | 5 | 1 | | |
| Geographical location | Urban | 5 | 1 | -1.345* | 0.179* |
| | Rural | 5 | 1 | | |
| Type of hearing aid | BTE | 5 | 1 | -0.865* | 0.387* |
| | RIC | 5 | 1 | | |
| Laterality | Monaural | 5 | 1 | -2.223* | 0.026* |
| | Binaural | 5 | 1 | | |
| Degree of hearing loss | Mild | 5 | 1 | 3(df)** | 0.894** |
| | Moderate | 5 | 1 | | |
| | Moderately severe | 5 | 1 | | |
| | Severe | 5 | 1 | | |

*Note* : ***** Mann–Whitney U test, ** *Kruskal–Wallis* test

### 4.1.5 Results of satisfaction for each attribute in listening related factors

The data were first tested for their distribution using Shapiro Wilk test. It was found that the data for all the independent variables was non-normally distributed except for ‘degree of hearing loss’. Therefore, the group differences were statistically tested using Mann–Whitney U test in all the independent variables except for degree of hearing los. In degree of hearing loss, ANOVA was used for the normally distributed attributes and Kruskal–Wallis test was used for non-normally distributed attributes. The results can be summarised as follows:

a) Among the listening related factors, there was a significant effect of

- Education on listenting to music (p=0.004): Partcipants with higher educational qualification (graduation & beyond) had significantly lesser score compared to those with lesser educational qualification (lesser than graduation)
- Type of hearing aid on listening to soft sounds (p=0.003): Participants who were using BTE hearing aid had significantly lesser score compared to those with RIC hearing aid users.
- Laterality on perceiving the direction of sound (p=0.0) and listening while swallowing and chewing (p=0.002): Participants who were monaural hearing aid users had signficantly lesser scores compared to binaural hearing aid users.
- Degree of hearing loss on listening from far distance (p=0.0), understanding conversation in TV shows (p=0.0) and understanding speech in group conversation (p=0.0): The post-hoc pair-wise comparisons showed that, participants with severe hearing loss had significantly lesser scores compared to mild, moderate and moderately severe hearing loss. However,

there was no significant difference across mild, moderate and moderately severe hearing loss groups.

b) Among the product related factors, there was a significant effect of

- Age on warranty of hearing aid (p=0.0), gender on warranty of hearing aid (p=0.002), and education level on warranty of hearing aid (p=0.005): Participants with age range from 41 to 55 years had significantly lesser satisfaction scores compared to 56 to 70 years; Females had significantly lesser scores compared to males; Partcipants with higher educational qualification (graduation and beyond) had significantly lesser score compared to those with lesser educational qualification (lesser than graduation).
- Type of hearing aid on cosmetic appeal (p=0.0) and ease of handling the device and its control (p=0.003): Participants who were using BTE hearing aid had significantly lesser score compared to RIC hearing aid users for the cosmetic appeal and, RIC hearing aid users had significantly lesser score compared to BTE hearing aid users for the ease of handling the device and its control.
- Laterality on maintainance cost of the hearing aid (p=0.0): Participants who are binaural users had significantly lesser score compared to monaural users.

c) Among the dispenser related factors, there was no significant effect of on any of the independent variables.

*Table 4.8: The results of Mann–Whitney U test, the ANOVA and, the Kruskal–Wallis test comparing the groups*

| Independent variable | Factors | Attributes | Z | p |
|---|---|---|---|---|
| Age | Product related | Warranty of hearing aid | -3.032* | 0.002* |
| Gender | Product related | Warranty of hearing aid | -4.359* | 0.0* |
| Education | Listening related | Listening to music | -2.753* | 0.004* |
| | Product related | Warranty of hearing aid | -2.82* | 0.005* |
| Type of hearing aid | Listening related | Listening to soft sounds | -3.002* | 0.003* |
| | Product related | • Cosmetic appeal<br>• Ease of handling the device and its control | -3.939*<br>-2.924* | 0.0*<br>0.003* |
| Laterality | Listening related | • Identifying the direction of sound source<br>• Understanding conversations while chewing and swallowing | -5.659*<br>-3.087* | 0.0*<br>0.002* |
| | Product related | • Maintenance cost | -4.886* | 0.0* |
| Degree of hearing loss | Listening related | • Understanding speech coming from a farther distance<br>• Understanding conversations in TV shows<br>• Understanding speech in group conversation | 9.054(F)**<br>7.437(F)**<br>3(d.f) # | 0.0**<br>0.0**<br>0.0* |

*Note* : * Mann–Whitney U test, ** ANOVA, # *Kruskal–Wallis* test

### 4.1.6 Correlation of Satisfaction with the Usage Time and Experience of Hearing Aid

The hearing aid usage (in hours) and the experience with hearing aid (in years) of the beneficiaries showed a significant moderate degree of positive correlation with satisfaction scores on Pearson rank order correlation (Table 4.9)

*Table 4.9: The results of Pearson Corelation test showing the correlation in usage time and experience of hearing aid use*

| | Usage time | Experience |
|---|---|---|
| Pearson Correlation | .356** | .356** |
| Coefficient p | 0.002 | 0.002 |

*Note :* **significant correlation

### 4.2 Overall Perceived Benefit

Table 4.10 shows the mean and standard deviation of the overall benefit score obtained in the listening-related, product-related, and dispenser-related factors. The mean score was maximum for dispenser related factors followed by listening related and product related factors.

*Table 4.10: Median, interquartile range, mean and standard deviation of the overall benefit score obtained in listening-related, product-related, and dispenser-related factors*

| **Factors** | **Median (IQR)** | **Mean (SD)** |
|---|---|---|
| Listening related factors | 8 (0) | 8.03 (0.503) |
| Product related factors | 8 (0) | 8 (0.444) |
| Dispenser related factors | 8 (1) | 8.24 (0.544) |

#### 4.2.1 Effect of independent variables on the perceived overall benefit in listening related factors

Table 4.11 shows the median and interquartile range of the overall benefit score in listening related factors for different categories of the independent variables. The data were first assessed for their distribution using Shapiro Wilk test of

normality. Considering that the data distribution was non-normal, Mann–Whitney U test and the Kruskal–Wallis test was used to test the group differences. The results (Table 4.11) showed no significant group difference (p>0.05) for the overall benefit in any of the independent variables in the listening related factors.

*Table 4.11: Median and interquartile range of overall benefit score in listening related factors in different categories of the independent variables, and the results of Mann–Whitney U test and the Kruskal–Wallis test comparing the groups*

| Independent variable | Categories | Median | Interquartile range | Z | p |
|---|---|---|---|---|---|
| Age | 41 to 55 | 8 | 0 | -0.873* | 0.383* |
| | 56 to 70 | 8 | 0 | | |
| Gender | Male | 8 | 0 | -0.290* | 0.772* |
| | Female | 8 | 0 | | |
| Education | Below graduation | 8 | 0 | -0.243* | 0.808* |
| | Above graduation | 8 | 0 | | |
| Employment | Employed | 8 | 0 | -0.145* | 0.885* |
| | Unemployed | 8 | 0 | | |
| Geographical location | Urban | 8 | 0 | -1.500* | 0.134* |
| | Rural | 8 | 0 | | |
| Type of hearing aid | BTE | 8 | 0 | -0.932* | 0.351* |
| | RIC | 8 | 0 | | |
| Laterality | Monaural | 8 | 0 | -1.035* | 0.301* |
| | Binaural | 8 | 0 | | |
| Degree of hearing loss | Mild | 8 | 0 | 3(df)** | 0.656** |
| | Moderate | 8 | 0 | | |
| | Moderately severe | 8 | 0 | | |
| | Severe | 8 | 0 | | |

*Note* : ** *Kruskal–Wallis* test, * Mann–Whitney U test

### 4.2.2 Effect of independent variables on the perceived overall benefit in product related factors

Table 4.12 shows the median and interquartile range of the overall benefit score in product related factors for different categories of the independent variables. The data were first assessed for their distribution using Shapiro Wilk test of normality. Considering that the data distribution was non-normal, Mann–Whitney U test and the Kruskal–Wallis test was used to test the group differences. The results (Table 4.12) showed no significant group difference ($p>0.05$) for the overall benefit in any of the independent variables in the product related factors.

*Table 4.12: Median and interquartile range of overall benefit score in product related factors in different categories of the independent variables, and the results of Mann–Whitney U test and the Kruskal–Wallis test comparing the groups*

| Independent variable | Categories | Median | Interquartile range | Z | p |
|---|---|---|---|---|---|
| Age | 41 to 55 | 8 | 0 | -0.536* | 0.592* |
| | 56 to 70 | 8 | 0 | | |
| Gender | Male | 8 | 0 | -1.068* | 0.285* |
| | Female | 8 | 0 | | |
| Education | Below graduation | 8 | 0 | 0.000* | 1.000* |
| | Above graduation | 8 | 0 | | |
| Employment | Employed | 8 | 0 | -0.534* | 0.593* |
| | Unemployed | 8 | 0 | | |
| Geographical location | Urban | 8 | 0 | -1.105* | 0.269* |
| | Rural | 8 | 0 | | |
| Type of hearing aid | BTE | 8 | 0 | -1.658* | 0.097* |
| | RIC | 8 | 0 | | |
| Laterality | Monaural | 8 | 0 | 0.000* | 1.000* |

| | | | | | |
|---|---|---|---|---|---|
| | Binaural | 8 | 0 | | |
| Degree of hearing loss | Mild | 8 | 0 | 3(df)** | 0.205** |
| | Moderate | 8 | 0 | | |
| | Moderately severe | 8 | 0 | | |
| | Severe | 8 | 0 | | |

*Note* : ** *Kruskal–Wallis* test, * Mann–Whitney U test

### 4.2.3 Effect of independent variables on the perceived overall benefit in dispenser related factors

Table 4.13 shows the median and interquartile range of the overall benefit score in dispenser related factors for different categories of the independent variables. The data were first assessed for their distribution using Shapiro Wilk test of normality. Considering that the data distribution was non-normal, Mann–Whitney U test and the *Kruskal–Wallis* test was used to test the group differences. The results (Table 4.13) showed no significant group difference ($p>0.05$) for the overall benefit in any of the independent variables in the dispenser related factors.

*Table 4.13: Median and interquartile range of overall benefit score in dispenser related factors in different categories of the independent variables, and the results of Mann–Whitney U test and the Kruskal–Wallis test comparing the groups*

| Independent variable | Categories | Median | Interquartile range | Z | p |
|---|---|---|---|---|---|
| Age | 41 to 55 | 8 | 1 | -0.463* | 0.643* |
| | 56 to 70 | 8 | 1 | | |
| Gender | Male | 8 | 1 | -1.038* | 0.299* |
| | Female | 8 | 1 | | |
| Education | Below graduation | 8 | 1 | 0.000* | 1.000* |
| | Above | 8 | 1 | | |

| | | | | | |
|---|---|---|---|---|---|
| | graduation | | | | |
| Employment | Employed | 8 | 1 | -1.038* | 0.299* |
| | Unemployed | 8 | 1 | | |
| Geographical location | Urban | 8 | 1 | -0.477* | 0.633* |
| | Rural | 8 | 1 | | |
| Type of hearing aid | BTE | 8 | 1 | -1.194* | 0.233* |
| | RIC | 8 | 1 | | |
| Laterality | Monaural | 8 | 1 | -0.118* | 0.906* |
| | Binaural | 8 | 1 | | |
| Degree of hearing loss | Mild | 8 | 1 | 3(df)** | 0.247** |
| | Moderate | 8 | 1 | | |
| | Moderately severe | 8 | 1 | | |
| | Severe | 8 | 1 | | |

*Note* : ** *Kruskal–Wallis* test, * Mann–Whitney U test

# CHAPTER 5

# DISCUSSION

The study assessed the satisfaction and benefit with hearing aids among the persons who procured their hearing aids from HDDU scheme of All India Institute of Speech and Hearing. The satisfaction and benefit was assessed with a thirty-six item questionnaire consisting of listening related, product related and dispenser related factors. The findings obtained are discussed in the subsequent sections.

## 5.1 Perceived Overall Satisfaction with Hearing aids

In general the participants rated four in a five point likert rating scale (1 to 5), indicating that they were all satisfied with the hearing aids they procured from HDDU, for the listening, product, and dispenser-related aspects, among the three group of factors. The mean and median satisfaction scores were higher for the dispenser-related factors compared to listening and product related factors. This indicates that the participants appreciated dispenser related services more than the listening and product related aspects of the hearing aids.

The influence of patient related factors on the perceived overall satisfaction was also assessed in the study. The factors assessed were, age, gender, education, employment, geographical location, type of hearing aid, laterality (monaural & binaural) and degree of hearing loss. There were two categories made in each variable except the degree of hearing loss. In degree of hearing loss there were four categories. The results showed that there was no significanty difference between the groups made. This reflects that these variables don’t have a significant effect on the perceived overall satisfaction.

There were two age groups in the study: 41 to 55 years and 56 to 70 years. The absence of significant difference between the two groups suggests that age of the patient does not influence the patient satisfaction. This was true for listening related, product related and dispenser related factors. The results are in agreement with the earlier studies wherein age of the patient was found to be not a determinant of patient satisfaction with hearing aids (Kochkin, 1992; Norman et al., 1994; Hickson et al., 1999). In the context of the study, one can infer that patients of all adult age groups are equally satisfied with the hearing aids procured from HDDU.

The study also showed no significant difference between males and females for their perceived satisfaction. This is in agreement with the earlier study (Hickson et al., 1999) and suggests that males and females are equally satisfied with the hearing aids procured from HDDU. Similarly, the study suggests education, employment and geographical location did not significantly influence the perceived satisfaction. Considering the median overall satisfaction was 4, it suggests that the hearing aids provided through HDDU satisfies the less educated and high educated, unemployed and employed, and rural and urban patients alike. All these patients of different categories appear to be satisfied with the hearing aids in terms of listening, product as well as the dispenser with reference to HDDU.

The earlier studies had shown that the satisfaction levels were higher with RIC (receiver in the canal) hearing aids compared to conventional BTEs (Kochkin, 2011). However, the current study showed no significant difference between the two. The RIC hearing aids are shown to provide better sound quality and comfort due to their open fit technology (Kuk & Baekgaard, 2008), but the perceived satisfaction appears to be not significantly different compared to conventional BTEs. This could be

because, the choice of the device was made by the patients themselves, while procuring them. Those who procured conventional BTEs under HDDU did not choose RICs due to their financial constraints. Further, they also do not have an experience of listening through RICs to compare with what they get from their conventional BTEs. If they are given an opportunity to compare with RICs, one may find differences in the perceived satisfaction. However, it needs to be experimentally verified.

The study also showed that the satisfaction did not differ significantly across the four categories of degree of hearing loss. This was true for listening related factors, product related and dispenser related factors. The four categories were, mild, moderate, moderately severe and severe. The earlier studies show contrasting evidence in this regard. While some showed findings that support the current findings (Norman et al., 1994; Dillon et al., 1997; Hickson et al., 1999), the others showed significant effect of degree of hearing loss on perceived satisfaction. Among these studies, Kochkin (1992), Korkmaz et al. (2016) and Bhat et al. (2015) reported persons with severe hearing loss to be more satisfied than those with mild hearing loss. Whereas, Munro and Lutman (2016) showed persons with mild hearing loss to be more satisfied than the higher degree. The lack of effect of degree of hearing loss on the perceived satisfaction with hearing aids found in the current study suggests that the scheme is beneficial to all categories of hearing loss to the same extent. In the HDDU, the hearing aids are selected based on the degree of hearing loss. The scheme provides hearing aids of all ranges of gain, technology, features and cost. The most suitable hearing aid is chosen as per the listening needs of the patient. This could be the reason for not finding differences across different degrees of hearing loss.

Another possibility is the effective counselling by the audiologist. The benefit drawn from the hearing aid is different in different degrees of hearing loss. The Audiologists is expected to counsel the patient on the realistic expectations from their hearing aid. If the counselling is done well, the satisfaction is expected to be high. As stated earlier, the dispenser related factors were rated the highest, supporting the effectiveness of counselling by the audiologists.

The results also showed that laterality of hearing aid usage (monaural & binaural fitting), did not make change in the overall satisfaction with regard to listening related factors, product related factors, and dispenser related factors. The support for the findings can be drawn from Korkmaz et al. (2016). On the contrary, Kochkin (2000) found an overall improvement in satisfaction for binaural users because of the Binaural advantage was more apparent for directionality, audibility of soft sounds, sound of voice, and performance in difficult listening situations. The exact reason for lack of difference in the current study is not known. However, one can speculate that an effective counselling regarding the realistic expectations from their hearing aid may have played role in it. When patients are fitted monaurally, they would be told about the listening challenges that they may encounter, as they are not wearing hearing aids binaurally. Probably, the patients were mentally ready for these challenges and were clear with what to expect from their monaural hearing aid. Also, as they did not have the experience with binaural aids, their yardstick of expectation was low.

### 5.2 Perceived Satisfaction for Each Attribute in Listening Related Factors

The overall satisfaction for the listening related factors was rated 4 and did not show effect of any of the independent variables on it. However, when the satisfaction

was assessed for each listening factor independently, there was significant influence of some of the independent variables. Results showed a significant effect of education on listening to music. Participants with higher educational qualification (graduation & beyond) were less satisfied compared to those with lesser educational qualification (lesser than graduation). This hints at the difference in the expectations of the two groups. It is speculated that participants with higher education have better understating of the music and expect the hearing aids to provide high fidelity input. Whereas, individuals with less educational qualifications may not prioritize listening to music. Helvik et al. (2008) showed that rejection rate of hearing aid is higher in high educated group as they have a tendency to reject even for small errors in hearing aid. Feldmann et al. (1988) obtained that 74% use their hearing aid more or less regularly when listening to music. The distorted sound and the fast alternating between "too soft" and "too loud", forcing the subject to continually adjusting his hearing aid, seem to be among the most annoying features.

Type of hearing aid showed a significant effect in listening to soft sounds, Participants using conventional BTE hearing aid were less satisfied compared to those with RIC hearing aid users. This suggests that the RIC hearing aids are more useful for listening soft sounds. However, it is important to note that RIC aids are typically prescribed in cases of hearing loss lesser than moderately severe degree, while BTE aids are prescribed even for severe and profound hearing loss. Those with lesser degree of hearing loss are likely to benefit more from the hearing aids. Kochkin (2005; 2011) also reported that with respect to sound quality, including listening to soft sounds and signal processing, RIC hearing aids users are more satisfied than the conventional BTE users.

Laterality showed a significant effect in perceiving the direction of sound, participants with monaural hearing aid were less satisfied compared to binaural hearing aid users. The cues from both the ears are important to derive inter-aural time and inter-aural intensity differences, which play a key role in sound localization (Kuk & Baekgaard, 2008). The binaural cues being unavailable in monaural hearing aid users, they will not be able to localize source of sound. This is the reason for low satisfaction in this attribute. Kochkin (2000) reported that ability to tell direction of sounds was more accurate in the binaural hearing aid users compared to monaural hearing aid users. Kobler and Rosenhall (2002) also noted bilateral hearing aid advantage over unilateral hearing aid use for localization.

Laterality also showed a significant effect in listening while swallowing and chewing. The monaural hearing aid users were less satisfied compared to binaural hearing aid users. The monaural users receive asymmetrical auditory feedback from the aided and the unaided side of the ear and the occlusion of one side may increase the swallowing and chewing sound in the monaural hearing aid users. But, contradicting results are shown in Kochkin (2005). He reported that more than half of his participants were satisfied with the ability of their hearing instruments while chewing or swallowing irrespective of monaural or binaural fitting.

Degree of hearing loss showed a significant effect in listening from far distance, understanding conversation in TV shows and understanding speech in group conversations. The participants with severe hearing loss were less satisfied compared to mild, moderate and moderately severe hearing loss. However, there was no significant difference across mild, moderate and moderately severe hearing loss groups. This may be attributed to poorer spectral and temporal resolution (Good et al.,

2017) in case of severe hearing loss compared to lesser degree hearing loss. Poorer temporal and spectral resolution reduced the ability to stream segregate, in turn posing challenges in difficult to listen conditions. Kochkin (2005) also got similar results, wherein individuals with higher degree of hearing loss had greater difficulty while listening in challenging conditions.

### 5.3 Perceived Satisfaction for Each Attribute in Product Related Factors

Among the product related factors, there was a significant effect of age on warranty of hearing aid, gender on warranty of hearing aid, and education level on warranty of hearing aid. The hearing aids dispensed through HDDU have 2 years warranty from the date of procurement. Participants in the age range of 41 to 55 years were less satisfied compared to 56 to 70 years. This hints at the difference in the expectations of the two groups. The younger group has more expectations in terms of the cost of hearing aid and its warranty. Females had less satisfaction compared to males as they compared the hearing aids to other electrical appliance which has warranty of more than 2 years. Similarly, participants with higher educational qualification (graduation and beyond) had less satisfaction compared to those with lesser educational qualification (lesser than graduation). Kochkin (2011) reported that the overall satisfaction of the participants to warranty ranged from 66% to 76%.

Type of hearing aid showed a significant effect in cosmetic appeal and ease of handling the device and its control. The participants who were using BTE hearing aids were less satisfied compared to RIC hearing aid users for the cosmetic appeal as BTE's were comparatively big in their size and are more visible to the others. In India social stigma about hearing aids is highly prevalent. Therefore, everyone prefers to wear a device that is not visible or at least, less visible. Kochkin (2011) reported that

mini RIC hearing aids are shown to be superior in cosmetic appeal. However, the current study showed that RIC hearing aid users were less satisfied compared to BTE hearing aid users for the ease of handling the device and its controls. RIC aids are smaller in size, have smaller batter compartment, battery and the controls. It also has a thin wire that transmits the sound to the receiver in the canal. Handling RICs and its controls requires good vision and dexterity. The participants faced difficulty in manipulating the controls and to place the battery in its proper position which is not a notable issue in case of BTE hearing aid users. Kochkin (2011) also reported that RIC hearing aids are rated lower in Ease of manipulating the volume controls.

In the current study, laterality showed a significant effect on maintenance cost of the hearing aid. Participants who are binaural users were less satisfied compared to monaural users as the service cost and, battery cost will be doubled for the binaural hearing aid users compared to monaural hearing aid users. The relationship between laterality and the maintenance cost of hearing aid is not attempted earlier to this study.

The results showed that there is moderate degree of correlation with the hearing aid usage and satisfaction with the aid. Dillon et al. (1991) and Kochkin (1997) found that satisfaction correlated more with aid use than a range of other measures such as aid problems, and service satisfaction. This highlights the importance of assessing satisfaction with hearing aids in its users. Satisfaction need not relate to the benefit provided by the hearing aid (Uriarte et al., 2016), which means, better aided benefit does not assure better usage of hearing aid. Therefore, to facilitate better usage of hearing aid, it is recommended to assess satisfaction with it.

The beneficiarie's experience with the hearing aid (in years) showed moderate degree of correlation with satisfaction. This could be partly attributed to the hearing

aid acclimatization. It takes about 1 to 6 months to get acclimatized to the new hearing aid (Vestergaard 2006). During this period, one can expect satisfaction with the hearing aid to improve. All the participants of this study had an experience of listening through their hearing aid for more than 6 months. Kochkin (2000) also found that overall satisfaction for new users was about 9% lower than for experienced users. New users were less satisfied in different listening situations.

### 5.4 Perceived Benefit with Hearing Aids

The average benefit score of the participants was eight on a ten-point rating (0 to 9), indicating that they perceived significant benefit from the hearing aid. This was true for listening related, product related, and dispenser related factors. The benefit was independently assessed in each attribute of listening related, product related, and dispenser related factors, but there was no significant effect of any of the independent variables. Earlier studies have reported that significant perceived benefit is seen in more than ninety percent participants using hearing aids (Dillon et al., 1991; Sinclair & Goldstein, 1991; Gatehouse, 1994; Norman et al., 1994; Brooks & Hallam, 1998). Kochkin (2005) found participants who are regular hearing aid users benefit with their hearing aids more.

Overall, the findings indicate that hearing aids being dispensed through HDDU of AIISH is highly satisfactory and benefitting to the patients who have procured. This is true for various listening related, product related and dispenser related factors. Among these three groups of factors, dispenser related factors were rated the maximum. The dispenser related factors reflect the high standard, quality and consumer-friendly hearing health service provided at the institute. There are isolated subgroups who are less satisfied in few of the listening and product related

factors. The institute can attend to these to improvise the perceived satisfaction of the beneficiaries. The findings of the study strongly indicate that HDDU is a successful venture, in view of hearing health care service.

# CHAPTER 6

# SUMMARY AND CONCLUSIONS

Although there is exponential progress in the technology of hearing aids, the hearing aid uptake by the needy ultimately depends on their perceived satisfaction and benefit. Although there is no agreed definition of success with hearing aids, it could reasonably be argued that a successful outcome is one in which a person with hearing loss wears the hearing aids regularly and reports benefit from them.

AIISH through its HDDU scheme dispenses hearing aids of all technologies at a discounted cost to its patients. At the outset, it appears that the scheme is benefitial to the society, as the number of seekers are increasing with each passing year. However, it needs to be verified with scientific data. It is important to study whether the persons using hearing aid procured from HDDU are satisfied with the device's features, performance, cost, and the professional service provided. Hence the present study was taken up to understand the perceived satisfaction and benefit of the beneficiaries of HDDU and thereby assess the need to revise the scheme.

The data was acquired from the beneficiaries of HDDU scheme through administration of a 32-item questionnaire developed for the purpose. The questionnaire assessed satisfaction and benefit that the beneficiaries perceived with their hearing aids procured from HDDU. They rated the perceived satisfaction and benefit in 15 listening related, 9 product related and 8 dispenser related factors. The questionnaire was administered on 72 beneficieries in the age range of 41 to 70 years. The group was heterogenous in terms of their age, gender, education, employment, type of hearing aid, geographical location, laterality (monaural &

binaural) and degree of hearing loss. The rating obtained from the participants was analysed to derive the perceived satisfaction and benefit of the beneficiaries in various factors of the questionnaire. Post-hoc, the participants were devided into 2 categories each based on their age, gender, education, employment, type of hearing aid, geographical location and laterality. The participants were divided into 4 categories based on their degree of hearing loss. The groups were compared with each other to derive the effect of these variables on satisfaction and benefit.

The findings revealed that, for the listening, product and dispenser related factors, the perceived overall satisfaction and benefit showed no significant difference between the groups made. This reflects that these variables don't have a significant effect on the perceived overall satisfaction and all the groups were satisfied. However, the factor-wise analysis revealed that some variables affected the participant's satisfaction. For example, education on listening to music; type of hearing aid on listening to soft sounds; Laterality on perceiving the direction of sound, listening while swallowing & chewing and maintenance cost of the hearing aid; degree of hearing loss on listening from far distance, understanding conversation in TV shows and understanding speech in group conversation; age on warranty of hearing aid; gender and education level on warranty of hearing aid; and type of hearing aid on cosmetic appeal and ease of handling the device and its control. There was a moderate degree correlation among the hearing aid usage (in hours), experience with hearing aid (in years) and satisfaction. Overall, the findings indicate that the participants are satisfied with the hearing aids dispensed under HDDU scheme and are more satisfied with the hearing health care service delivered from AIISH followed by listening and product related factors.

The future studies can explore to perceived satisfaction and benefit in other age groups, and other hearing aids (CIC). Further studies can also compare the perceived satisfaction with aided benefit from the hearing aid.

## REFERENCES


Bagatto, Marlene P., Sheila T. Moodie, April C. Malandrino, Frances M. Richert, Debbie A. Clench, and Susan D. Scollie. 2011. "The University of Western Ontario Pediatric Audiological Monitoring Protocol ( UWO PedAMP )." doi: 10.1177/1084713811420304.

Bhat, Nalini, Shalaka S. Shewale, Pushkar D. Kasat, and Harshada S. Tawade. 2015. "Survey on Hearing Aid Use and Satisfaction in Patients with Presbyacusis." *Indian Journal of Otology* 21(2):124–28. doi: 10.4103/0971-7749.155299.

Chisolm, Theresa Hnath, Carole E. Johnson, Jeffrey L. Danhauer, Laural J. P. Portz, Harvey B. Abrams, Sharon Lesner, Patricia A. Mccarthy, and Craig W. Newman. 2015. "A Systematic Review of Health-Related Quality of Life and Hearing Aids : Final Report of the American Academy of Audiology Task Force on the Health-Related Quality of Life Benefits of Amplification in Adults." 183(2007):151–83.

Cox, Robyn M. 2003. "Assessment of Subjective Outcome of Hearing Aid Fitting: Getting the Client's Point of View." *International Journal of Audiology* 42(SUPPL. 1). doi: 10.3109/14992020309074629.

Cox, Robyn M., and Genevieve C. Alexander. 1991. "Patient-Assessed Hearing Aid Benefit." 145:134–45.

Good, With, Poor Word, Susan L. Phillips, Sandra Gordon-salant, Peter J. Fitzgibbons, and Grace Yeni-komshian. 2017. "Frequency and Temporal." 217–28.

Haile, Lydia M., Kaloyan Kamenov, Paul Svitil Briant, Aislyn U. Orji, Jaimie D. Steinmetz, Amir Abdoli, Mohammad Abdollahi, Eman Abu-Gharbieh, Ashkan Afshin, Haroon Ahmed, Tarik Ahmed Rashid, Yonas Akalu, Fares Alahdab, Fahad Mashhour Alanezi, Turki M. Alanzi, Hanadi Al Hamad, Liaqat Ali, Vahid Alipour, Rajaa M. Al-Raddadi, Hubert Amu, Jalal Arabloo, Morteza Arab-Zozani, Judie Arulappan, Charlie Ashbaugh, Desta Debalkie Atnafu, Zaheer Ud Din Babar, Atif Amin Baig, Palash Chandra Banik, Till Winfried Bärnighausen, Amadou Barrow, Rose G. Bender, Akshaya Srikanth Bhagavathula, Nikha Bhardwaj, Pankaj Bhardwaj, Sadia Bibi, Ali Bijani, Katrin Burkart, Christopher R. Cederroth, Jaykaran Charan, Sonali Gajanan Choudhari, Dinh Toi Chu, Rosa A. S. Couto, Amare Belachew Dagnew, Baye Dagnew, Saad M. A. Dahlawi,

Xiaochen Dai, Lalit Dandona, Rakhi Dandona, Assefa Desalew, Deepak Dhamnetiya, Mandira Lamichhane Dhimal, Meghnath Dhimal, Kerrie E. Doyle, Bruce B. Duncan, Michael Ekholuenetale, Irina Filip, Florian Fischer, Richard Charles Franklin, Abhay Motiramji Gaidhane, Shilpa Gaidhane, Silvano Gallus, Farhad Ghamari, Ahmad Ghashghaee, Ghozali Ghozali, Syed Amir Gilani, Ionela Roxana Glăvan, Mahaveer Golechha, Barbara Niegia Garcia Goulart, Veer Bala Gupta, Vivek Kumar Gupta, Samer Hamidi, Billy Randall Hammond, Simon I. Hay, Khezar Hayat, Golnaz Heidari, Howard J. Hoffman, Kathleen Pillsbury Hopf, Mehdi Hosseinzadeh, Mowafa Househ, Rabia Hussain, Bing Fang Hwang, Ivo Iavicoli, Segun Emmanuel Ibitoye, Olayinka Stephen Ilesanmi, Seyed Sina Naghibi Irvani, Sheikh Mohammed Shariful Islam, Masao Iwagami, Louis Jacob, Sathish Kumar Jayapal, Ravi Prakash Jha, Jost B. Jonas, Rohollah Kalhor, Nawzad Kameran Al-Salihi, Himal Kandel, Ayele Semachew Kasa, Gbenga A. Kayode, Rovshan Khalilov, Ejaz Ahmad Khan, Mahalaqua Nazli Khatib, Soewarta Kosen, Ai Koyanagi, G. Anil Kumar, Ivan Landires, Savita Lasrado, Stephen S. Lim, Xuefeng Liu, Stany W. Lobo, Alessandra Lugo, Alaa Makki, Walter Mendoza, Amanual Getnet Mersha, Kebadnew Mulatu Mihretie, Ted R. Miller, Sanjeev Misra, Teroj Abdulrahman Mohamed, Mokhtar Mohammadi, Abdollah Mohammadian-Hafshejani, Arif Mohammed, Ali H. Mokdad, Mohammad Ali Moni, Sandhya Neupane Kandel, Huong Lan Thi Nguyen, Molly R. Nixon, Jean Jacques Noubiap, Virginia Nuñez-Samudio, Bogdan Oancea, Victor Maduabuchi Oguoma, Andrew T. Olagunju, Bolajoko Olubukunola Olusanya, Jacob Olusegun Olusanya, Hans Orru, Mayowa O. Owolabi, Jagadish Rao Padubidri, Keyvan Pakshir, Shahina Pardhan, Fatemeh Pashazadeh Kan, Maja Pasovic, Shrikant Pawar, Hai Quang Pham, Marina Pinheiro, Akram Pourshams, Navid Rabiee, Mohammad Rabiee, Amir Radfar, Fakher Rahim, Vafa Rahimi-Movaghar, Mohammad Hifz Ur Rahman, Mosiur Rahman, Amir Masoud Rahmani, Juwel Rana, Chythra R. Rao, Sowmya J. Rao, Vahid Rashedi, David Laith Rawaf, Salman Rawaf, Andre M. N. Renzaho, Aziz Rezapour, Rezaul Karim Ripon, Voilet Rodrigues, Neeti Rustagi, Umar Saeed, Amirhossein Sahebkar, Abdallah M. Samy, Milena M. Santric-Milicevic, Brijesh Sathian, Maheswar Satpathy, Monika Sawhney, Winfried Schlee, Maria Ines Schmidt, Allen Seylani, Masood Ali Shaikh, Mohammed Shannawaz, Wondimeneh Shibabaw Shiferaw, Soraya Siabani, Anjali Singal, Jasvinder A.

Singh, Jitendra Kumar Singh, Deepika Singhal, Valentin Yurievich Skryabin, Anna Aleksandrovna Skryabina, Houman Sotoudeh, Emma Elizabeth Spurlock, Biruk Wogayehu Taddele, Animut Tagele Tamiru, Md Ismail Tareque, Rekha Thapar, Marcos Roberto Tovani-Palone, Bach Xuan Tran, Saif Ullah, Sahel Valadan Tahbaz, Francesco S. Violante, Vasily Vlassov, Bay Vo, Avina Vongpradith, Giang Thu Vu, Jingkai Wei, Ali Yadollahpour, Seyed Hossein Yahyazadeh Jabbari, Yigizie Yeshaw, Vahit Yiğit, Birhanu Wubale Yirdaw, Naohiro Yonemoto, Chuanhua Yu, Ismaeel Yunusa, Mohammad Zamani, Mikhail Sergeevich Zastrozhin, Anasthasia Zastrozhina, Zhi Jiang Zhang, Jeff T. Zhao, Christopher J. L. Murray, Adrian C. Davis, Theo Vos, and Shelly Chadha. 2021. "Hearing Loss Prevalence and Years Lived with Disability, 1990-2019: Findings from the Global Burden of Disease Study 2019." *The Lancet* 397(10278):996–1009. doi: 10.1016/S0140-6736(21)00516-X.

Hartley, David, Elena Rochtchina, Philip Newall, Maryanne Golding, and Paul Mitchell. 2010. "In an Older Australian Population." 653:642–53. doi: 10.3766/jaaa.21.10.4.

Helvik, Anne-sofie, Siri Wennberg, Geir Jacobsen, and Lillemor R. Hallberg. 2008. "Why Do Some Individuals with Objectively Verified Hearing Loss Reject Hearing Aids ?" (7489). doi: 10.1080/16513860802178692.

Kirkwood, David H. 2005. "Dispensers Surveyed on What Leads to Patient Satisfaction." *Hearing Journal* 58(4):19–26. doi: 10.1097/01.HJ.0000286603.76729.a2.

Knudsen, Line Vestergaard, Marie Öberg, Claus Nielsen, Graham Naylor, and Sophia E. Kramer. 2010. "Factors Influencing Help Seeking , Hearing Aid Uptake , Hearing Aid Use and Satisfaction With Hearing Aids : A Review of the Literature." doi: 10.1177/1084713810385712.

Kochkin, By Sergei. 2002. "10-Year Customer Satisfaction Trends." (October).

Kochkin, By Sergei. 2011. "Mini-BTEs Tap New Market , Users More Satisfied." 64(3).

Kochkin, By Sergei. n.d. "MarkeTrak VII : Obstacles to Adult Non-User Adoption of Hearing Aids."

Kochkin, Sergei. 1997. "Subjective Measures of Satisfaction and Benefit: Establishing Norms." *Seminars in Hearing* 18(1):37–48. doi: 10.1055/s-0028-1083008.

Kochkin, Sergei. 2010. “MarkeTrak VIII : Consumer Satisfaction.” *The Hearing Journal* 63(1):19–32.

Korkmaz, Mehmet Hakan, Ömer Bayır, Serap Er, Eray Işık, Güleser Saylam, Emel Çadallı Tatar, and Ali Özdek. 2016. “Satisfaction and Compliance of Adult Patients Using Hearing Aid and Evaluation of Factors Affecting Them.” *European Archives of Oto-Rhino-Laryngology* 273(11):3723–32. doi: 10.1007/s00405-016-4046-x.

Kuk, Francis, and Lars Baekgaard. 2008. “Hearing Aid Selection and BTEs : Choosing Among Various ‘ Open-Ear ’ and ‘ Receiver-in-Canal ’ Options.” (March):2–7.

Mendel, Lisa Lucks. 2007. “Objective and Subjective Hearing Aid Assessment Outcomes.” *American Journal of Audiology* 16(2):118–29. doi: 10.1044/1059-0889(2007/016).

Munro, Kevin J., and Mark E. Lutman. 2016. “Self-Reported Outcome in New Hearing Aid Users over a 24-Week Post-Fitting Period.” 2027(March). doi: 10.1080/14992020400050071.

Newman, Craig W., and Sharon A. Sandridge. 1998. “Benefit From, Satisfaction With, and Cost-Effectiveness of Three Different Hearing Aid Technologies.” *American Journal of Audiology* 7(2):115–28. doi: 10.1044/1059-0889(1998/021).

Nieman, Carrie L., Nicole Marrone, Sara K. Mamo, S. Janet, J. Kevin, J. Roland, Thorpe Jr, Laura N. Gitlin, Elizabeth K. Tanner, Hae-ra Han, and Sarah L. Szanton. 2016. “The Baltimore HEARS Pilot Study : An Affordable , Accessible , Hearing Care Intervention.” 00(00):1–14. doi: 10.1093/geront/gnw153.

Seelman, Katherine D., and Roye Werner. 2021. “Technology Transfer of Hearing Aids to Low and Middle Income Countries : Policy and Market Factors.” 9(5):399–407. doi: 10.3109/17483107.2014.905641.

Stephens, S. D. G., and R. S. Hallam. 2015. “The Crown-Crisp Experiential Index in Patients Complaining of Tinnitus.” 5364(September). doi: 10.3109/03005368509078968.

Taylor, By Brian. 2007. “Putting Evidence into Practice Using a Certification Program.” 60(10):58–60.

Tse, David K., and Peter C. Wilton. 1988. “Models of Consumer Satisfaction Formation: An Extension.” *Journal of Marketing Research* 25(2):204. doi:

10.2307/3172652.

Turan, Selma, Selim Unsal, and Hanifi Kurtaran. 2019. “Satisfaction Assessment with Abbreviated Profile of Hearing Aid Benefit (APHAB) Questionnaire on People Using Hearing Aid Having Real Ear Measurement (REM) Eligibility.” *International Tinnitus Journal* 23(2):97–102. doi: 10.5935/0946-5448.20190017.

Urban, Rural, Central State, and Codes F. O. R. Block. 2001. “GOVERNMENT OF INDIA NATIONAL SAMPLE SURVEY ORGANISATION SOCIO-ECONOMIC SURVEY FIFTY SIXTH ROUND ( JULY 2000 - JUNE 2001 ) SCHEDULE 2 . 2 : UNORGANISED MANUFACTURING [ 0 ] Descriptive Identification of Sample Enterprise 8 . Name of Informant : 4 . Village .” 1–9.

Uriarte, Margaret, Lauren Denzin, Amy Dunstan, Jillian Sellars, and Louise Hickson. 2016. “Measuring Hearing Aid Outcomes Using the Satisfaction with Amplification in Daily Life (SADL) Questionnaire: Australian Data.” 402(2005):383–402.

Valente, Michael, and Holly S. Kaplan. 1998. “Guidelines for Hearing Aid Fitting for Adults.” *American Journal of Audiology* 7(1):5–13. doi: 10.1044/1059-0889.0701.05.

Verma, Ravneet Ravinder, Abhilash Konkimalla, Alok Thakar, Kapil Sikka, Amit Chirom Singh, and Tripti Khanna. 2022. “Prevalence of Hearing Loss in India.” *The National Medical Journal of India* 34(4):216–22. doi: 10.25259/NMJI_66_21.

Vestergaard, Martin D. 2006. “Self-Report Outcome in New Hearing-Aid Users: Longitudinal Trends and Relationships between Subjective Measures of Benefit and Satisfaction.” *International Journal of Audiology* 45(7):382–92. doi: 10.1080/14992020600690977.

Wang, Y. Claire, Klim Mcpherson, Tim Marsh, Steven L. Gortmaker, and Martin Brown. 2011. “Obesity 2 Health and Economic Burden of the Projected Obesity Trends in the USA and the UK.” *The Lancet* 378(9793):815–25. doi: 10.1016/S0140-6736(11)60814-3.

Wilson, C., and D. Stephens. 2003. “Reasons for Referral and Attitudes toward Hearing Aids : Do They Affect Outcome ?” 81–84.

Young, Min, Kwak Woo, Ri Choi, Jun Woo, Park Eun, Jeong Hwang, and Yeo Ra. 2020. “Assessment of Objective Audiometry to Predict Subjective Satisfaction in Patients With Hearing Aids.” 13(2):141–47.

## Appendix I

## Questionnaire to Assess Satisfaction and Benefit from Hearing Aids

| **Demographic details:** |
| --- |
| Name:<br>Age /gender:<br>Education:<br>Employment:<br>Experience of hearing aid use (yrs):<br>Daily duration of hearing aid use (Hours):<br>Bilateral or unilateral user: |

| **Informed consent** |
| --- |
| 'I have been informed about the study titled "Assessment of Satisfaction and Benefit with Hearing aids procured under HDDU". I understand the purpose and procedure of the questionnaire. I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without incurring a penalty or without being obligated to provide a reason. I understand that my participation in the study will not adversely affect me in any way and that confidentiality will be maintained about my identity at all times. I also understand that the information given by me will be used only for the purpose of the study. I do not have any financial or non-financial benefits from this study. I hereby give my consent to participate.'<br>Date: Name:<br>Place: Signature: |

**Instructions to the participants**

"The questionnaire is arranged under three key constructs. Under each construct, there are questions with a table showing a list of factors related to the construct. You are requested to read the questions carefully and go through the factors one by one. In each factor, you are expected to rate the significance of that factor in determining your satisfaction with the hearing aid. The rating scale varies from 1 to 5, with '5' being Highly satisfied and '1' being Highly Dissatisfied. Your choice should be based solely on your experience on use of hearing aids and their satisfaction. Below is an example."

*A. how do you rate your hearing aid for the clarity of sound?*

*If your answer to this question is 'Highly dissatisfied', you shall mark (√) on '1', as shown below.*

| | Highly Dissatisfied (1) | Dissatisfied (2) | Neutral (3) | Satisfied (4) | Highly Satisfied (5) |
|---|---|---|---|---|---|
| A. how do you rate your hearing aid for the clarity of sound? | √ | | | | |

Rate the benefit on a 10-point (0 to 9) rating scale, wherein, '0' represents 'no benefit' and 9 represents 'highly beneficial'. The intermediate numbers between 0 and 9 represent different degrees of benefit in the increasing order.

## I. Listening related factors

*Factors pertaining to listening experience of the participants through their hearing aid/s in different day-to-day environments*

How do you rate your **satisfaction** with the hearing aid/s for

| | | | | | |
|---|---|---|---|---|---|
| the clarity of sound | 1 | 2 | 3 | 4 | 5 |
| the naturalness of sound | 1 | 2 | 3 | 4 | 5 |
| hearing soft sounds | 1 | 2 | 3 | 4 | 5 |
| hearing loud sounds | 1 | 2 | 3 | 4 | 5 |
| understanding speech coming from a farther distance | 1 | 2 | 3 | 4 | 5 |
| understanding speech in a group conversation | 1 | 2 | 3 | 4 | 5 |
| identifying the direction of the sound source | 1 | 2 | 3 | 4 | 5 |
| the quality of own voice | 1 | 2 | 3 | 4 | 5 |
| understanding conversations while chewing and swallowing | 1 | 2 | 3 | 4 | 5 |
| understanding conversations of family members when the television is on | 1 | 2 | 3 | 4 | 5 |
| understanding conversations in TV shows | 1 | 2 | 3 | 4 | 5 |
| listening to music | 1 | 2 | 3 | 4 | 5 |
| understanding speech through telephone /mobile phone | 1 | 2 | 3 | 4 | 5 |
| the overall listening performance | 1 | 2 | 3 | 4 | 5 |

Please rate your **overall benefit** with the hearing aid in terms of

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| listening in different day-to-day environments | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

## II. Product related factors

*Factors pertaining to the technical and physical features of the hearing aid/s.*

| How do you rate your **satisfaction** with the hearing aid/s for its | | | | | |
|---|---|---|---|---|---|
| cosmetic appeal | 1 | 2 | 3 | 4 | 5 |
| comfort of fit | 1 | 2 | 3 | 4 | 5 |
| ease of handling the device and its controls | 1 | 2 | 3 | 4 | 5 |
| battery life | 1 | 2 | 3 | 4 | 5 |
| initial cost | 1 | 2 | 3 | 4 | 5 |
| maintenance cost | 1 | 2 | 3 | 4 | 5 |
| Warranty | 1 | 2 | 3 | 4 | 5 |
| Overall satisfaction with the product | 1 | 2 | 3 | 4 | 5 |

| Please rate your **overall benefit** with the hearing aid in terms of its | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| technical and physical features | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

## III. Dispenser related factors

- *Factors pertaining to the hearing aid trial and prescription*
- *Factors pertaining to service delivery with respect to procurement of hearing aid*

| How **satisfied** are you regarding the | | | | | |
|---|---|---|---|---|---|
| counselling by audiologist on the need for a hearing aid | 1 | 2 | 3 | 4 | 5 |
| explanation of features of hearing aid by audiologist | 1 | 2 | 3 | 4 | 5 |
| guidance by audiologist for choosing the hearing aids | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| hearing aid trial given to you | 1 | 2 | 3 | 4 | 5 |
| hearing aid programming as per the listening needs | 1 | 2 | 3 | 4 | 5 |
| counselling on the realistic expectations from the hearing aids and use | 1 | 2 | 3 | 4 | 5 |
| Overall professional service delivery | 1 | 2 | 3 | 4 | 5 |

Please rate your **overall benefit** derived by

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| choosing AIISH to procure the hearing aid/s | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

## APPENDIX II

**ಶ್ರವಣೋಪಕರಣದ ಬಗ್ಗೆ ಇರುವ ತೃಪ್ತಿ ಮತ್ತು ಅದರಿಂದಾದ ಪ್ರಯೋಜನಗಳ ಕುರಿತು ಪ್ರಶ್ನಾವಳಿ**

| ವೈಯಕ್ತಿಕ ವಿವರ |
|---|
| ಹೆಸರು: |
| ವಯಸ್ಸು / ಲಿಂಗ: |
| ಶಿಕ್ಷಣ: |
| ಉದ್ಯೋಗ: |
| ಶ್ರವಣೋಪಕರಣದ ಬಳಕೆಯ ಅನುಭವ: |
| ಶ್ರವಣೋಪಕರಣದ ದೈನಂದಿನ ಬಳಕೆಯ ಅವಧಿ: |
| ಒಂದು ಅಥವಾ ಎರಡು ಶ್ರವಣೋಪಕರಣದ ಬಳಕೆದಾರ: |

| ಒಪ್ಪಿಗೆ ಪತ್ರ |
|---|
| "HDDU ಯೋಜನೆಯ ಅಡಿಯಲ್ಲಿ ನೀಡಲಾದ ಶ್ರವಣೋಪಕರಣದ ಬಗ್ಗೆ ತೃಪ್ತಿ ಮತ್ತು ಅದರಿಂದಾದ ಪ್ರಯೋಜನಗಳು" ಎಂಬ ಅಧ್ಯಯನದ ಬಗ್ಗೆ ನನಗೆ ತಿಳಿಸಲಾಗಿದೆ. ಪ್ರಶ್ನಾವಳಿಯ ಉದ್ದೇಶ ಮತ್ತು ಕಾರ್ಯವಿಧಾನವನ್ನು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಾನು ಭಾಗವಹಿಸುತ್ತಿರುವುದು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ ಮತ್ತು ನಾನು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ದಂಡವನ್ನು ನೀಡದೆ ಅಥವಾ ಯಾವುದೇ ಕಾರಣ ನೀಡದೆ ಅಧ್ಯಯನದಿಂದ ಹೊರಬರಬಹುದೆಂದು ನನಗೆ ತಿಳಿದಿದೆ. ಅಧ್ಯಯನದಲ್ಲಿ ನಾನು ಭಾಗವಹಿಸುವುದರಿಂದ ನನ್ನ ಮೇಲೆ ಯಾವುದೇ ರೀತಿಯ ಪ್ರತಿಕೂಲ ಪರಿಣಾಮಗಳಾಗುವುದಿಲ್ಲ ಮತ್ತು ಎಲ್ಲಾ ಸಮಯದಲ್ಲೂ ನನ್ನ ಗುರುತಿನ ಬಗ್ಗೆ ಗೌಪ್ಯತೆಯನ್ನು ಕಾಪಾಡಿಕೊಳ್ಳಲಾಗುವುದು ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ. ನಾನು ನೀಡಿದ ಮಾಹಿತಿಯನ್ನು ಅಧ್ಯಯನದ ಉದ್ದೇಶಕ್ಕಾಗಿ ಮಾತ್ರ ಬಳಸಲಾಗುತ್ತದೆ ಎಂದು ನನಗೆ ತಿಳಿದಿದೆ. ಈ ಅಧ್ಯಯನದಿಂದ ನಾನು ಯಾವುದೇ ಹಣಕಾಸಿನ ಅಥವಾ ಆರ್ಥಿಕೇತರ ಪ್ರಯೋಜನಗಳನ್ನು ಪಡೆಯುವುದಿಲ್ಲ. ಈ ಮೂಲಕ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನನ್ನ ಸಂಪೂರ್ಣ ಸಮ್ಮತಿಯನ್ನು ನೀಡುತ್ತೇನೆ.<br>ದಿನಾಂಕ: ಹೆಸರು:<br>ಸ್ಥಳ: ಸಹಿ: |

ಭಾಗವಹಿಸುವವರಿಗೆ ಸೂಚನೆಗಳು

ಈ ಪ್ರಶ್ನಾವಳಿಯನ್ನು 3 ಪ್ರಮುಖ ಭಾಗಗಳಾಗಿ ವಿಂಗಡಿಸಲಾಗಿದೆ. ಪ್ರತಿ ಭಾಗದಲ್ಲಿ ನಿರ್ದಿಷ್ಟ ಪ್ರಶ್ನೆಗಳಿದ್ದು, ಅವುಗಳಿಗೆ ಸಂಬಂಧಿಸಿದ ಕೆಲವು ಅಂಶಗಳನ್ನು ಪ್ರಶ್ನೆಯ ಕೆಳಗೆ ಪಟ್ಟಿ ಮಾಡಲಾಗಿದೆ. ತಾವು ಮೊದಲು ಪ್ರಶ್ನೆಗಳನ್ನು ಓದಿ, ನಂತರ ಪಟ್ಟಿ ಮಾಡಿರುವ ಪ್ರತಿಯೊಂದು ಅಂಶವು **ಶ್ರವಣೋಪಕರಣದ** ಬಗ್ಗೆ ನಿಮಗಿರುವ ತೃಪ್ತಿಯನ್ನು ನಿರ್ಧರಿಸುವಲ್ಲಿ ಎಷ್ಟು ಮಹತ್ವ ವಹಿಸಿದೆ ಎಂಬುದನ್ನು **ಪಕ್ಕದಲ್ಲಿರುವ** ಅಂಕಪಟ್ಟಿಯಲ್ಲಿ ಗುರುತಿಸುವ ಮೂಲಕ ಸೂಚಿಸತಕ್ಕದ್ದು.

ಅಂಕಪಟ್ಟಿಯು 1 ರಿಂದ 5 ರ ವರೆಗಿನ ಅಂಕಿಗಳನ್ನು ಹೊಂದಿದ್ದು, '5' ಎಂದರೆ **ಅತ್ಯುತ್ತಮ** ಎಂದರ್ಥ ಮತ್ತು '1' ಎಂದರೆ **ಕಳಪೆ** ಎಂದರ್ಥ. ನಿಮ್ಮ ಆಯ್ಕೆಯು **ಶ್ರವಣೋಪಕರಣ**ಗಳನ್ನು ಬಳಸಿ ನಿಮಗಾದ ಅನುಭವದ ಮೇಲೆ ಆಧರಿಸಿರಬೇಕು.

ಒಂದು ಉದಾಹರಣೆಯನ್ನು ಕೆಳಗೆ ಚಿತ್ರಿಸಲಾಗಿದೆ.

A. ಧ್ವನಿಯ ಸ್ಪಷ್ಟತೆಗಾಗಿ ನಿಮ್ಮ **ಶ್ರವಣೋಪಕರಣ**ವನ್ನು ನೀವು ಹೇಗೆ ರೇಟ್ ಮಾಡುತ್ತೀರಿ?

ಈ ಪ್ರಶ್ನೆಗೆ ನಿಮ್ಮ ಉತ್ತರ '**ಕಳಪೆ**' **ಆದಲ್ಲಿ**, ನೀವು ಕೆಳಗೆ ತೋರಿಸಿರುವಂತೆ '1' ಎಂದು ಗುರುತಿಸಬೇಕು (√).

| | ಕಳಪೆ (1) | ಸಾಧಾರಣ (2) | ಒಳ್ಳೆಯ (3) | ಉತ್ತಮ (4) | ಅತ್ಯುತ್ತಮ (5) |
|---|---|---|---|---|---|
| A. ಧ್ವನಿಯ ಸ್ಪಷ್ಟತೆಗಾಗಿ ನಿಮ್ಮ **ಶ್ರವಣೋಪಕರಣ**ವನ್ನು ನೀವು ಹೇಗೆ ರೇಟ್ ಮಾಡುತ್ತೀರಿ? | √ | | | | |

**ಶ್ರವಣೋಪಕರಣ**ದಿಂದ ನಿಮಗಾದ ಪ್ರಯೋಜನವನ್ನು 10-ಪಾಯಿಂಟ್ಗಳ (0 ರಿಂದ 9) ಅಂಕಪಟ್ಟಿಯಲ್ಲಿ ಸೂಚಿಸಿ. ಇದರಲ್ಲಿ '0' ಎಂದರೆ ಯಾವುದೇ ಪ್ರಯೋಜನವಿಲ್ಲ ಎಂದರ್ಥ ಮತ್ತು '9' ಎಂದರೆ ಬಹಳ ಪ್ರಯೋಜನವಾಗಿದೆ' ಎಂದರ್ಥ. 0 ಮತ್ತು 9 ರ ನಡುವಿನ ಅಂಕಿಗಳು ಹೆಚ್ಚುತ್ತಿರುವ ಕ್ರಮದಲ್ಲಿ ಪ್ರಯೋಜನದ ವಿವಿಧ ಹಂತಗಳನ್ನು ಪ್ರತಿನಿಧಿಸುತ್ತವೆ.

I. ಕೇಳ್ಮಿಕೆಗೆ ಸಂಬಂಧಿತ ಅಂಶಗಳು

ನಿಮ್ಮ ದೈನಂದಿನ ಚಟುವಟಿಕೆಯಲ್ಲಿ ಕಂಡು ಬರಬಹುದಾದಂತಹ ಕೆಲವು ಸಂದರ್ಭಗಳನ್ನು ಇಲ್ಲಿ ಪಟ್ಟಿ ಮಾಡಲಾಗಿದೆ

ಈ ಕೆಳಗಿನ ಅಂಶಗಳ ಬಗ್ಗೆ ಶ್ರವಣೋಪಕರಣದಿಂದ ನಿಮಗಿರುವ ತೃಪ್ತಿಯನ್ನು ಸೂಚಿಸಿ

| | | | | | |
|---|---|---|---|---|---|
| ಧ್ವನಿಯ ಸ್ಪಷ್ಟತೆ | 1 | 2 | 3 | 4 | 5 |
| ಧ್ವನಿಯ ಸಹಜತೆ | 1 | 2 | 3 | 4 | 5 |
| ಮೆದುವಾದ/ಮೆತ್ತಗಿನ ಶಬ್ದಗಳನ್ನು ಕೇಳಿಸಿಕೊಳ್ಳುವುದು | 1 | 2 | 3 | 4 | 5 |
| ಜೋರಾದ ಶಬ್ದಗಳನ್ನು ಕೇಳಿಸಿಕೊಳ್ಳುವುದು | 1 | 2 | 3 | 4 | 5 |
| ದೂರದಿಂದ ಬರುವ ಮಾತನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳುವುದು | 1 | 2 | 3 | 4 | 5 |
| ಗುಂಪಿನಲ್ಲಿ ಸಂಭಾಷಣೆ ನಡೆಯುವಾಗ ಮಾತನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳುವುದು | 1 | 2 | 3 | 4 | 5 |
| ಶಬ್ದ ಬರುತ್ತಿರುವ ದಿಕ್ಕನ್ನು ಗುರುತಿಸುವುದು (ಎರಡು ಶ್ರವಣೋಪಕರಣಗಳ ಬಳಕೆದಾರರು) | 1 | 2 | 3 | 4 | 5 |
| ಸ್ವಂತ ಧ್ವನಿಯ ಗುಣಮಟ್ಟ | 1 | 2 | 3 | 4 | 5 |
| ಅಗಿಯುವಾಗ ಮತ್ತು ನುಂಗುವಾಗ ಸಂಭಾಷಣೆಗಳನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳುವುದು | 1 | 2 | 3 | 4 | 5 |
| ದೂರದರ್ಶನವನ್ನು(ಟಿ.ವಿ) ನೋಡುವಾಗ ಕುಟುಂಬ ಸದಸ್ಯರ ಸಂಭಾಷಣೆಗಳನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳುವುದು | 1 | 2 | 3 | 4 | 5 |
| ಟಿ.ವಿ ಕಾರ್ಯಕ್ರಮಗಳಲ್ಲಿ ಸಂಭಾಷಣೆಗಳನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳುವುದು | 1 | 2 | 3 | 4 | 5 |
| ಸಂಗೀತವನ್ನು ಆಲಿಸುವುದು | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| ದೂರವಾಣಿ / ಮೊಬೈಲ್ ಫೋನ್ ಮೂಲಕ ಮಾತನ್ನು ಅರ್ಥಮಾಡಿಕೊಳ್ಳುವುದು | 1 | 2 | 3 | 4 | 5 |
| ಶ್ರವಣೋಪಕರಣದಿಂದ ಆಗಿರುವ ಒಟ್ಟಾರೆ ತೃಪ್ತಿ | 1 | 2 | 3 | 4 | 5 |

ಶ್ರವಣೋಪಕರಣದಿಂದ ಆಗಿರುವ ಒಟ್ಟಾರೆ ಪ್ರಯೋಜವನ್ನು ಸೂಚಿಸಿ

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ವಿವಿಧ ದೈನಂದಿನ ಪರಿಸರದಲ್ಲಿ ಶಬ್ದಗಳನ್ನು ಆಲಿಸುವಲ್ಲಿ ಶ್ರವಣೋಪಕರಣದಿಂದ ಆಗಿರುವ ಪ್ರಯೋಜನ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

II. ಶ್ರವಣೋಪಕರಣಕ್ಕೆ ಸಂಬಂಧಿತ ಅಂಶಗಳು

ಶ್ರವಣೋಪಕರಣದ ತಾಂತ್ರಿಕ ಮತ್ತು ಭೌತಿಕ ಲಕ್ಷಣಗಳಿಗೆ ಸಂಬಂಧಿಸಿದ ಅಂಶಗಳು

ಶ್ರವಣೋಪಕರಣಕ್ಕೆ ಸಂಬಂಧಿತ ಈ ಅಂಶಗಳ ಬಗ್ಗೆ ನಿಮಗಿರುವ ತೃಪ್ತಿಯನ್ನು ಸೂಚಿಸಿ

| | | | | | |
|---|---|---|---|---|---|
| ಶ್ರವಣೋಪಕರಣದ ಹೊರನೋಟ /ಬಾಹ್ಯರೂಪ | 1 | 2 | 3 | 4 | 5 |
| ತೊಟ್ಟಾಗ ಇರುವ ಆರಾಮು | 1 | 2 | 3 | 4 | 5 |
| ಶ್ರವಣೋಪಕರಣವನ್ನು ನಿಯಂತ್ರಿಸುವುದು | 1 | 2 | 3 | 4 | 5 |
| ಬ್ಯಾಟರಿ ಬಾಳಿಕೆ | 1 | 2 | 3 | 4 | 5 |
| ಆರಂಭಿಕ ವೆಚ್ಚ | 1 | 2 | 3 | 4 | 5 |
| ನಿರ್ವಹಣೆಗೆ ತಗಲುವ ವೆಚ್ಚ | 1 | 2 | 3 | 4 | 5 |
| ಖಾತರಿ/ವಾರೆಂಟಿ | 1 | 2 | 3 | 4 | 5 |
| ಶ್ರವಣೋಪಕರಣದಿಂದ ಆಗಿರುವ ಒಟ್ಟಾರೆ | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| ತೃಪ್ತಿ | | | | | |

ಶ್ರವಣೋಪಕರಣದಿಂದ ಆಗಿರುವ ಒಟ್ಟಾರೆ ಪ್ರಯೋಜವನ್ನು ಸೂಚಿಸಿ

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ತಾಂತ್ರಿಕ ಮತ್ತು ಭೌತಿಕ ಲಕ್ಷಣಗಳು | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

III.ವಿತರಕನಿಗೆ ಸಂಬಂಧಿತ ಅಂಶಗಳು

- ಶ್ರವಣೋಪಕರಣದ ಪರೀಕ್ಷೆ ಮತ್ತು ಪ್ರಿಸ್ಕ್ರಿಪ್ಷನ್/ಸೂಚನೆಗೆ ಸಂಬಂಧಿತ ಅಂಶಗಳು
- ಶ್ರವಣೋಪಕರಣದ ವಿತರಣೆಗೆ ಸಂಬಂಧಿತ ಅಂಶಗಳು

ಈ ಕೆಳಗಿರುವ ಅಂಶಗಳ ಬಗ್ಗೆ ನಿಮಗಿರುವ ತೃಪ್ತಿಯನ್ನು ಸೂಚಿಸಿ.

| | | | | | |
|---|---|---|---|---|---|
| ಶ್ರವಣೋಪಕರಣದ ಅಗತ್ಯತೆಯ ಕುರಿತು ಶ್ರವಣತಜ್ಞರು ಕೊಟ್ಟ ಮಾಹಿತಿ | 1 | 2 | 3 | 4 | 5 |
| ಶ್ರವಣೋಪಕರಣದ ವೈಶಿಷ್ಟ್ಯಗಳ ಬಗ್ಗೆ ಶ್ರವಣತಜ್ಞರು ಕೊಟ್ಟ ವಿವರಣೆ | 1 | 2 | 3 | 4 | 5 |
| ಶ್ರವಣೋಪಕರಣವನ್ನು ಆಯ್ಕೆ ಮಾಡಲು ಶ್ರವಣತಜ್ಞರಿಂದ ಸಿಕ್ಕ ಮಾರ್ಗದರ್ಶನ | 1 | 2 | 3 | 4 | 5 |
| ಶ್ರವಣೋಪಕರಣಗಳೊಂದಿಗೆ ಮಾಡಿದ ಪರೀಕ್ಷೆ | 1 | 2 | 3 | 4 | 5 |
| ನಿಮ್ಮಅಗತ್ಯಗಳಿಗೆ ಅನುಗುಣವಾಗಿ ಮಾಡಿದ ಶ್ರವಣೋಪಕರಣದ ಪ್ರೋಗ್ರಾಮಿಂಗ್ | 1 | 2 | 3 | 4 | 5 |
| ಶ್ರವಣೋಪಕರಣದಿಂದಾಗುವ ವಾಸ್ತವಿಕ | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| ಪ್ರಯೋಜನದ ಬಗ್ಗೆ ಕೊಟ್ಟ ಮಾಹಿತಿ | | | | | |
| ತಜ್ಞರ ಮತ್ತು ಸಂಸ್ಥೆ ಬಗ್ಗೆ ಇರುವ ಒಟ್ಟಾರೆ ತೃಪ್ತಿ | 1 | 2 | 3 | 4 | 5 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ತಜ್ಞರಿಂದ ಮತ್ತು ಸಂಸ್ಥೆಯಿಂದ ಪಡೆದ ಒಟ್ಟಾರೆ ಪ್ರಯೋಜವನ್ನು ಸೂಚಿಸಿ | | | | | | | | | | |
| ಶ್ರವಣೋಪಕರಣಗಳನ್ನು ಪಡೆದುಕೊಳ್ಳಲು AIISH ಅನ್ನು ಆರಿಸಿಕೊಂಡದ್ದು | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |