

**Validation of International Outcome Inventory for  
Hearing Aids (IOI-HA) in Kannada – Adaptation from  
(IOI-HA) English**

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**This Dissertation is submitted as part fulfillment  
for the Degree of Master of Science in Audiology  
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**MAY 2016**



This is to certify that the dissertation entitled “**Validation of International Outcome Inventory for Hearing Aids (IOI-HA) In Kannada – Adaptation from (IOI-HA) English**” is the bonafide work submitted in part fulfillment for the degree of Master of Science (Audiology) of the student (Registration No. 14AUD011). 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.

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## **DECLARATION**

This is to certify that this dissertation entitled “**Validation of International Outcome Inventory for Hearing Aids (IOI-HA) In Kannada – Adaptation from (IOI-HA) English**” is the result of my own study under the guidance of Prof. Rajalakshmi K, Department of Audiology, All India Institute of Speech and Hearing, Mysore, and has not submitted earlier in any other University for the award of any Diploma or Degree.

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**May, 2016**



DEDICATED TO MY PARENTS AND MY GUIDE

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## ABSTRACT

The aim of the present study was to develop a self-assessment tool for Kannada speaking hearing aid users and to develop norms for the hearing aid users. Hence main objective of the present study was to translate, standardize and validate the English version of IOI-HA questionnaire in Kannada. The participants for the study included 120 subjects with hearing loss, who were subdivided into 40 in each age group, children (5 to 17 years), adults (18 to 55 years) and elderly adults (Greater than 55 years). The native language of participants was Kannada and all were digital hearing aid users. The procedure to standardize the English version of IOI-HA questionnaire in Kannada was divided into three phases as translation, administration, and scoring. The questionnaire had 8 questions and the participants were asked to tick the most appropriate option out of five. In results it was found that the hearing aids are satisfying the participants in their difficult listening situations and the quality of life of the participants has improved after using hearing aids. The hearing impaired individuals found it difficult to communicate without their hearing aids and all the participants were dependent on their hearing aids. On performing Spearman's correlation, it was found that the most and least representative of the questionnaire were second and first question respectively of the total items related to outcome of hearing aid. Other questions were highly significantly correlated with  $p < 0.01$ . Chi-square test results found that there was significant association between age and daily use, satisfaction, residual participation restriction with  $p < 0.01$  and quality of life with value of significance ( $p < 0.05$ ). There was no association of gender on other variables of questionnaire.

**Key words:** *International Outcome Inventory for Hearing Aids (IOI-HA), self-assessment questionnaire and hearing aid outcome benefit.*

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## CHAPTER 1

### INTRODUCTION

Hearing loss can occur at any age due to several causes such as middle ear pathology, aging, medicines, genetic etc. The amount of auditory disability depends upon the degree (mild, moderate, moderately severe, severe and profound) and type of hearing loss like conductive, mixed or sensorineural. Of all the types, sensorineural hearing loss has severe consequences to hearing impaired individuals especially in adults. Speech understanding ability deteriorates and the distortion is another factor that causes the greatest difficulty. As most of the adults are either students or employees and they will face more problems in day-to-day life working situations, as they are exposed to more listening environment such as classrooms, parties, office etc.

The effects of hearing loss are pervasive and far reaching for individuals and their families, Northern & Downs (2002) stated that “hearing loss affects social participation, emotional and behavioural well-being, employment status and quality of life. Fortunately, the effects of hearing loss can be limited by effective amplification and aural rehabilitation”.

These days the awareness about the importance of patient's point of view in determining the functional success of treatments in health-related fields has been increasing. Before, the success of an intervention used to be judged by healthcare professionals, often based on technical data or laboratory results. At present, evaluations take account of these types of data besides the judgement of the patient about the extent to which the treatment has improved the problems that he or she was experiencing in daily life is being considered. The consequence is that a treatment is

unlikely to be seen as fully successful unless it can be shown to have resulted in an improvement in the patient's health-related quality of life. This criterion shift is impacting on all branches of healthcare, including hearing healthcare. Thus, we are experiencing more interest in designing and using self-report instruments to document the patient's point of view in the evaluation of rehabilitative treatments using hearing aids (Bentler, & Kramer, 2000).

For many of the hearing aid users, enhanced capacity in understanding speech of everyday life is the key component of hearing aid benefit. Therefore, speech understanding ability is frequently tested during the fitting of hearing aid and the outcomes may be a key factor in deciding amplification device. For example, the difference between the aided and the unaided speech identification scores are frequently used to predict the benefit from hearing aid which can be predictable during fitting procedure. Yet, there is an unexpected lack of data to validate this practice. That is to say, we cannot declare with assurance that the hearing aid benefit measured at the time of fitting the hearing instrument can be used with accurateness to predict the everyday benefit that will eventually be found during the fitting of hearing aid. Validated procedures are needed immediately for predicting the long term benefit on the day of fitting hearing aid.

Questionnaire is the utmost popular method to measure the long term benefit of hearing aid where the experienced hearing aid users subjectively evaluate the benefit of the hearing aid in everyday life. The long term benefits have been compared through subjective assessment along with objective measures that were obtained during the initial hearing aid fitting. This association reveals whether the initial objective measures may possibly be used to predict the subjective data for long-term benefit.

“Most of these studies have reported a negative outcome. That is, objective measures of speech understanding obtained during the hearing aid fitting were not found to be closely related to the long-term subjective benefit of the instrument” Haggard, Foster, & Iredale (1981).

Considering these, Cox, Hyde, Gatehouse, Noble, & Dillon, (2000) proposed an alternative approach to achieve comparable data. They developed a short set of items/questions for self-assessment of hearing aid fitting outcomes, termed the International Outcome Inventory for Hearing Aids (IOI- HA). The IOI- HA is not proposed to be used as a substitute outcome measure, rather as a supplement.

The IOI-HA is an 8-item questionnaire aimed to assess the effectiveness of the hearing aid treatment. The eight items of the questionnaire covers a wide-range of subjective factors that complements well with the audiological objective measures that are used to evaluate the fitting success of hearing aid. Each item signifies a different outcome domain and has 5 response alternatives, where every single response ranges from the worst to the best outcome, and where higher scores indicate a better outcome. The IOI-HA is a questionnaire addressing the core dimensions of fitting outcome: (1) hearing aid usage, (2) benefit, (3) residual activity limitations, (4) satisfaction, (5) residual participation restrictions, (6) impact on others, and (7) quality of life. Dreschlerf & Festen (2002) found that “the IOI-HA consisted of two factors where factor one was represented by items 1, 2, 4, and 7 (daily use, benefit, satisfaction, & quality of life). These items could be summarized as the satisfaction variables, whereas the remaining items, factor two, more reflected issues such as residual participation restriction”.

The original items for the IOI- HA were composed in English. Cox & Alexander (2002) have stated that “the goals for the IOI- HA can be achieved only if

there is a set of equivalent translations so that hearing-impaired individuals in different countries can complete the inventory in their native language. Further, it is highly desirable that there be only one translation for a given language. So that the psychometric properties of that version of the inventory can be clearly established, appropriate changes can be made as necessary and there will not be confusion in the future when data obtained in a particular language are interpreted". Several members of the International Collegium of Rehabilitative Audiology (ICRA) undertook the task of generating a core of translations and these are published. To establish the comparability of the different translations, it is necessary to conduct a separate study of the psychometric properties of each translation. This study is the report of one such study for the Kannada version.

### ***1.1. Need for the study***

In Western countries there are several outcome measurement tools available for individuals with hearing impairment (Hearing handicap inventory for the elderly (HHIE), Client oriented scale of improvement (COSI), Satisfaction with amplification in daily life (SADL), IOI-HA), but in India there are lesser number of measurement scales to evaluate the extent of the individual's needs and expectations to be fulfilled by the use of the hearing aid given by the clinician. Among all the available tools IOI-HA covers most of the subjective factors that will supplement the audiological objective measures used to evaluate the fitting success of hearing aid.

Keeping this fact in consideration there is a need to develop a tool which can be used by the clinician to assess the outcome of prescribed hearing aid in the native language of the client and can also be used by client/caregiver to assess the outcome themselves.

## ***1.2. Aims of the study***

- This study will help in collecting data from the Kannada speaking population and help us in standardization of IOI-HA questionnaire in Kannada. It can be used to check the effectiveness of the hearing aid service.
- To investigate factors those contribute to better outcomes.
- Identify those factors which provide better outcomes and use them for effective counselling.

## CHAPTER 2

### REVIEW OF LITERATURE

Chisolm et al., (2007) have said that “assuring that the audiological intervention provided by hearing health-care professionals is at a high level should lead to improvements in patients’ health-related quality of life (HRQoL). Because perspectives, attitudes, communication needs, environments, and hearing losses differ, it is important to monitor outcomes for specific patients in order to individualize care for improvement in HRQoL”.

Hence to document the treatment outcomes from the viewpoint of patient who are using hearing aids, the research investigators, supervisors, clinicians, financiers are showing interest Bentler, & Kramer (2000) ; Cox & Alexander (2002).

To assess the benefit of hearing aid in multiple domains as satisfaction, benefit, participation restriction, activity limitations etc. many self-report measures have been done.

Below are a list of self-assessing questionnaires to assess the benefit of hearing aid in different domains.



**Table 2.1:** Self-assessing hearing aid outcome scales

Sl. No	Questionnaire	Authors	Year
1.	Hearing Handicap Scale ( <b>HSS</b> )	High, Fairbanks, & Glorig	1964
2.	Hearing Measurement Scale ( <b>HMS</b> )	Noble and Atherley	1970
3.	Hearing Performance Inventory ( <b>HPI</b> )	Giolas, Owens, Lamb, & Schuber	1979
4.	Hearing Aid Performance Inventory ( <b>HAPI</b> )	Walden, Demorest & Heple	1984
5.	Profile of Hearing Aid Performance ( <b>PHAP</b> )	Cox & Gilmore	1990
6.	Profile of Hearing Aid Benefit ( <b>PHAB</b> )	Cox, Gilmore & Alexander	1991
7.	Shortened hearing aid performance inventory ( <b>SHAPI</b> )	Schum & Dillon	1992
8.	Abbreviated profile of hearing aid benefit ( <b>APHAB</b> )	Cox & Alexander	1995
9.	Client oriented scale of improvement ( <b>COSI</b> )	Dillon, James & Ginis	1997
10.	Profile of aided loudness ( <b>PAL</b> )	Mueller and Palmer	1998
11.	Glasgow hearing aid benefit profile ( <b>GRABP</b> )	Gatehouse	1999
12.	International outcome inventory ( <b>IOI-HA</b> )	Cox et al.,	2000

However none of these self-report measures assess all of the domains. Hence clinicians use a battery of self-report measures to evaluate hearing aid outcomes, which is difficult to carry out.

Hence to overcome the above drawback, Cox, Hyde, Gatehouse, Noble, & Dillon, (2000) proposed an alternative approach. They developed a self-rating questionnaire to assess the hearing aid fitting outcomes, termed as the International Outcome Inventory for Hearing Aids (IOI- HA). The IOI- HA is proposed to be used as a supplement outcome measure along with the objective measures.

The IOI-HA is an 8-item questionnaire aimed to assess the effectiveness of the hearing aid treatment. The eight items of the questionnaire covers a wide-range of subjective factors that complements well with the audiological objective measures that are used to evaluate the fitting success of hearing aid. Each item signifies a different outcome domain and has 5 response alternatives, where every single response ranges from the worst to the best outcome, and where higher scores indicate a better outcome. The IOI-HA is a questionnaire addressing the core dimensions of fitting outcome: (1) hearing aid usage, (2) benefit, (3) residual activity limitations, (4) satisfaction, (5) residual participation restrictions, (6) impact on others, and (7) quality of life. Dreschlerf & Festen (2002) found that “the IOI-HA consisted of two factors where factor one was represented by items 1, 2, 4, and 7 (daily use, benefit, satisfaction, & quality of life). These items could be summarized as the satisfaction variables, whereas the remaining items, factor two, more reflected issues such as residual participation restriction”.

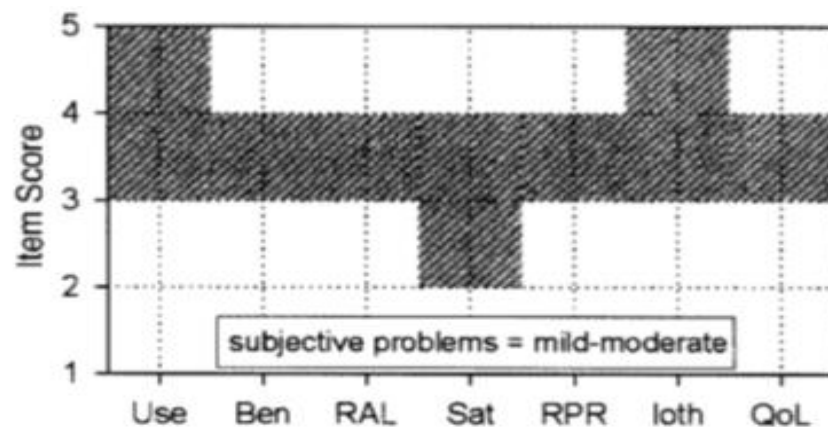
Cox, Stephens, & Kramer (2002) studied the psychometric functions of the original (English) version of IOI-HA. Through mail they administered the questionnaire on 260 adults with mean age of 72 years (range 26 to 98). Results

indicated that less than 15% of people indicated less outcome scores. Here the authors have discussed if the IOI-HA should be treated as mini profile i.e., reporting each question separately and comparing with normative data? Or should it be summed and compared with overall scores? Or should it be scored for each factor separately?

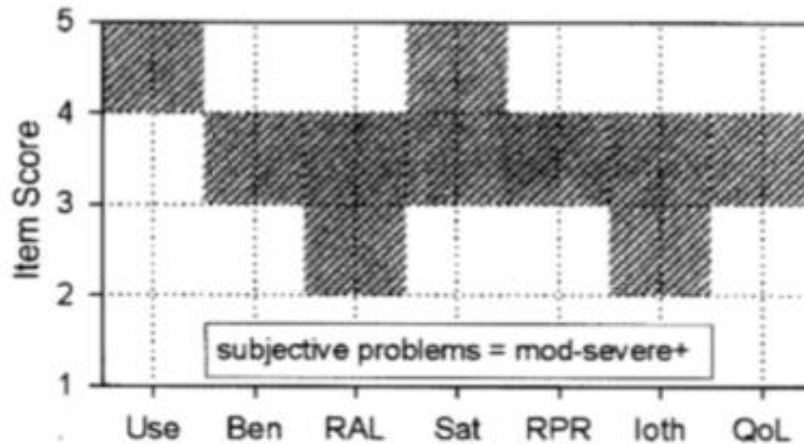
Cox, Stephens, & Kramer (2002) concluded saying that mean option and simplest one to interpret the results would be in considering the overall total score. One disadvantage is that few important information might be lost while summing up.

Cox & Alexander (2003) developed norms for IOI-HA, which are useful for both clinical and research purpose. In this study 154 subjects were involved. The authors have even studied the association between outcomes and demographic variables.

Cox & Alexander (2003) derived 2 set of norms, one for individuals who have mild to moderate degree of hearing loss (figure 2.1) and another for those individuals who have moderately severe and more degree of hearing loss (figure 2.2).



**Figure 2.1:** *Template of norms (mild to moderate)*



**Figure 2.2:** *Template of norms (moderately severe and more)*

*Use = hours of use per day; Ben = benefit; RAL = residual activity limitations; Sat = satisfaction; RPR = residual participation restrictions; loth = impact on others; QoL = quality of life.*

Note: “The shaded area depicts the range of scores for the middle 50 percent of individuals. Thus, 25 percent of hearing aid wearers scored lower than the shaded area and 25 percent scored higher. These norms can be used only to check how favorable an individual wearing hearing aid evaluates their hearing aid in a comparative sense” Cox & Alexander (2003)

Uriarte, Denzin, Dunstan, Sellars, & Hickson (2005) studied the hearing aid satisfaction using the Satisfaction with Amplification in daily life (SADL) questionnaire for older Australian hearing aid users with mean age of 75.32 years. It was compared with the normative data given by Cox & Alexander (2003). They even studied the relation between satisfaction obtained from SADL questionnaire and other participant factors, hearing aid variable and several other outcome measures.

They distributed the questionnaire through mail to 1284 adults 3 to 6 months priorly. Participants were digital programmable hearing aid users of several styles (22.5% BTEs, 34.8% ITEs, 41.8% ITCs, 0.9% nonstandard [NS] devices)

Results revealed that various variables that influenced the satisfaction levels were degree of hearing loss, type of hearing aid and style of hearing aid used. There was significant improvement in SADL satisfaction score as reported by participants.

Schum (1992) administered the 64 item Hearing Aid Performance Inventory (HAPI) to evaluate the benefit of hearing aid and to develop normative data for older individuals. 158 subjects were selected in the age range of 65 to 80 years.

Results reported that elderly individuals reported less benefit than younger individuals from their original normative study for the same measures. In this study degree of hearing loss, hearing aid style or hearing aid experience did not influence the satisfaction levels but it was influenced by the number of hours hearing aid used per week.

Newman & Weinstein (1986) studied the perception of hearing handicapness by elderly men and their spouses. Thirty hearing impaired subjects were involved in this study, Hearing Handicap Inventory for Elderly (HHIE) and a modification of the HHIE for spouses, Hearing Handicap Inventory for Elderly for spouses (HHIE-SP) were used to examine the same.

They found poor relation for emotional sub-scale compared to social/situational sub-scale on correlation analysis. This suggests that situational problem faced by an individual with hearing impairment were more easily observable by hearing impaired individuals than by their spouse compared to emotional responses. This can also be used to counsel the hearing impaired individual and their spouse.

Schow & Tannahill (1977) administered a self assessment measure, The Hearing Handicap Scale (HHS) on 50 individuals who were divided into three groups

based on puretone audiometric thresholds to obtain the HHS scores for different degree of hearing loss. Group 1 had 20 subjects whose puretone audiometric thresholds were 10dBHL or better. Group 2 had 10 subjects whose puretone audiometric thresholds were between 11 to 25 dBHL. Third group had 20 subjects with their puretone audiometric thresholds being greater than 25 dBHL.

The authors found that Hearing Handicap Scale (HHS) scores may be categorised into one of the categories ranging from “no handicap” to “severe handicap”.

Smith, Noe, & Alexander (2009) evaluated the psychometric properties of IOI-HA and developed normative data in a Veteran sample. 131 male subjects with mean age of 74.3 years with SD 7.4 were selected for this. The participants were digital hearing aid users. Two set of questionnaires were mailed to the participants and were asked to fill one of them immediately and another after two weeks. The questionnaire’s psychometric properties were assessed.

As reported by Cox & Alexander (2003), their participants were divided into two categories based on puretone audiometric thresholds i.e., none to moderate hearing loss and moderately severe and more hearing loss categories.

The norms obtained were compared with original norms published by Cox & Alexander (2003). Results found good internal consistency and high test-retest reliability.

Vanaja (2000) developed a questionnaire for self- assessment of hearing handicap for Indian scenario. It assesses the hearing handicap of individuals in various situations such as familiar/unfamiliar, noisy/quiet, with/without visual clue. It consisted of fifty questions and a three point rating scale was used. Rating was used

from most of the time (2) to seldom (0).

Results showed good correlation of self-perceived scores with the speech identification scores in quiet and noisy condition. It can be very helpful to predict degree of hearing loss.

Wood and Lutman (2004) conducted a study to check the association of speech recognition ability and self-assessed hearing aid benefit. 100 subjects were involved in this study who were linear analogue hearing aid and digital hearing aid users. The range of degree of hearing loss was mild-to-moderate SNHL.

To measure the self-assessed hearing aid benefit, The Abbreviated Profile of Hearing Aid Benefit (APHAB) and The Glasgow Hearing Aid Benefit Profile (GHABP) were used which assessed the quality of life, hearing aid use and user preferences too.

As expected the results found that the digital hearing aid users showed significant improvement in their speech recognition ability compared to the analog hearing aid users. On the other hand the Self-assessed hearing aid benefit questionnaires did not show any significant difference between the digital hearing aid users and the analog hearing aid users in terms of quality of life.

The authors concluded saying that both the objective and subjective outcomes showed good improvements in listening in adverse situations among digital hearing aid users compared to the analog hearing aid users.

Magni, Freiburger, & Tonn (2005) measured hearing aid satisfaction between the digital hearing aid users and the analog hearing aid users using the International Outcome Inventory for Hearing Aids (IOI-HA - Portuguese version) proposed by Cox et al., (2002). 40 subjects were involved in the study. The subjects were grouped equally into two groups based on the digital hearing aid users and the analog hearing

aid users. The subjects were selected in the age range of 45 to 95 years.

The results found that the digital hearing aid users found less difficulty in listening in difficult situation. Both digital hearing aid users and analog hearing aid users found satisfaction with their hearing aids but the digital hearing aid users were more benefited.

McCarthy & Alpiner (1983) administered McCarthy-Alpiner scale to sixty adults with hearing-impairment and their family members.

The results revealed an overall low level of agreement between the subjects and family members for items representing the psychological, social and vocational parameters. The results support the need for inclusion of family members in counselling and help to provide a basis for aural rehabilitation planning and management. They concluded that as an important part of the aural rehabilitation process, it is essential that counselling has to be included for family members.

Kozlowski, Almeida, & Ribas (2014) studied the level of hearing impaired individuals satisfaction with hearing aids. 108 individuals with mean age of 77 years (56% men and 44% women) with sensorineural and mixed post lingual hearing loss participated in this study.

They were asked to fill the questionnaire, International Outcome Inventory for Hearing Aids (IOI-HA). This questionnaire assesses the benefit and satisfaction obtained by hearing aid.

In the results they found high degree of satisfaction with their hearing aids which was reflected in the improvement in the quality of life of 52.78% of the patients after using hearing aid. Thus the authors conclude saying IOI-HA is a simple and easy tool to use.



## CHAPTER 3

### METHODS

The present study was taken upto validate the International Outcome Inventory for Hearing Aids (IOI-HA) English version. IOI-HA was adapted to Kannada and information was elicited from Kannada speaking individuals with hearing impairment across all age groups.

#### **3.1. *Participants***

The study was conducted on 120 individuals, which was subdivided into 40 in each age group, children (5 to 17 years), adults (18 to 55 years) and elderly adults (Greater than 55 years). The mean age of children were 8.55 years with standard deviation of 3.76, the mean age of adults were 31.9 years with standard deviation of 10.40, and the mean age of elderly adults were 66.7 years with standard deviation of 6.09. Overall number of participants comprised of males and females were 38years and 33.97 years with standard deviation of 25.52 and 24.74 respectively.

#### **3.2. *Participants Selection Criteria***

The participants fulfilling the following criteria were considered for the study:

- *Native language (Kannada)* –The participants selected were native Kannada speakers. Since it was necessary to fill the questionnaire by participants themselves/ caregivers only literate participants/caregivers were selected for this study.
- *Hearing aid* - Participants selected for the study were digital hearing aid users.

- *Minimum period of use of hearing aid* – Participants who were using the hearing aid at least for a period of minimum 3 months were selected for the study.

- *Maximum period of use of hearing aid* - There was no maximum time for the use of hearing aid by participants as the period of hearing aid use was considered as experience and the participants were compared accordingly.

### **3.3. Procedure**

Procedure was divided into three phases as translation, administration, and scoring.

#### *Phase I*

The original version of IOI HA which is in English language was translated to Kannada by three persons who were experienced in the Kannada language and had it as their first language in academics. Later each of 3 sets of Kannada translated questionnaires was reverse translated by three different individuals who were proficient in both languages. In the last phase of translation, a linguist who is expert in both Kannada and English was asked to evaluate each of translated questions and choose the best questions from each set which delivered same meaning as the original questions. Suitable modifications were done with the help of linguist and audiologist.

### *Phase II*

In this phase participants were asked to fill the questionnaire. Participants were given Kannada translated version of IOI-HA which had three categories/ sections, in which the first section was demographic data, filled by the client/ caregiver. Second section had hearing aid related questions filled by an audiologist and, third section had 8 questions representing outcome domains which were daily use, benefit, residual activity limitation, satisfaction, residual participation restriction, impact on others, quality of life and perception of their hearing difficulty These were filled by client themselves or caregivers for children.

### *Phase III*

Each question had 5 options. Participant had to tick the most appropriate option out of five for all eight questions. Each question was scored by converting these options into integers of 1-5. The left most response, indicating the poorest outcome, was scored as 1, right most response, denoting the most favourable outcome, was scored as 5. The questionnaire was given to participants in a one to one interview or correspondence through post. Participants had to read the instructions, fill the first three sections of questionnaire themselves and return it to the researcher.

#### **3.4. *Statistical analysis***

Descriptive and inferential statistical analysis was done across the following:

- Different age groups
- Different type of Hearing loss

## CHAPTER 4

### RESULTS

The present study was carried out to validate the International Outcome Inventory for Hearing Aids (IOI-HA) in Kannada that was adapted from (IOI-HA) English. The participants were Kannada speaking individuals with hearing impairment, across the children, adults and elderly adult individuals. Additionally, the association of age, duration of the problem and features associated with hearing aid use were investigated. Data were collected from 120 individuals in the age range of 5 to 78 years.

In this questionnaire each item of first seven questions had been scored from 1 to 5 for the responses being left (worst) to right (best) respectively excluding the eighth question which was scored from 1 to 5 for the responses being right (worst) to left (best) respectively. For first 7 questions the higher score is indicative of a better outcome and for the 8<sup>th</sup> question better outcome is indicated by the lowest score and the results found were subjected to item-wise analysis using the SPSS software (version 20).

The results of this study are being presented under the following domains:

1. To develop norms for IOI-HA for Kannada speaking population by means of each question's response.
2. To see the association of questions with each other in the translated version (Kannada).
3. To see the relation between demographic factors and hearing aid use (such as age, gender, degree of hearing loss, duration of use of hearing aid).

## 1. Norms development

### 4.1. Frequency distributions, mode, standard deviations, and variance of IOI-HA Kannada version

Descriptive analysis was done to develop norms. To see the response distribution across examined population for each questions, descriptive analysis (frequency analysis) was done which is displayed in table 4.1.

*Table 4.1* Frequency distributions of the IOI-HA items of Kannada version

Item	Children					Adults					Elderly adults				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<b>Use</b>				4	36				7	33				21	19
<b>Ben</b>		4	10	12	14		5	20	15			2	22	16	
<b>RAL</b>			12	27	1		5	20	15				24	12	4
<b>Sat</b>			11	26	3			20	20			2	22	16	
<b>RPR</b>		4	15	21				23	17			1	17	20	2
<b>Ioth</b>		3	19	17	1			24	16				30	10	
<b>QoL</b>			18	21	1			14	22	4			16	19	5

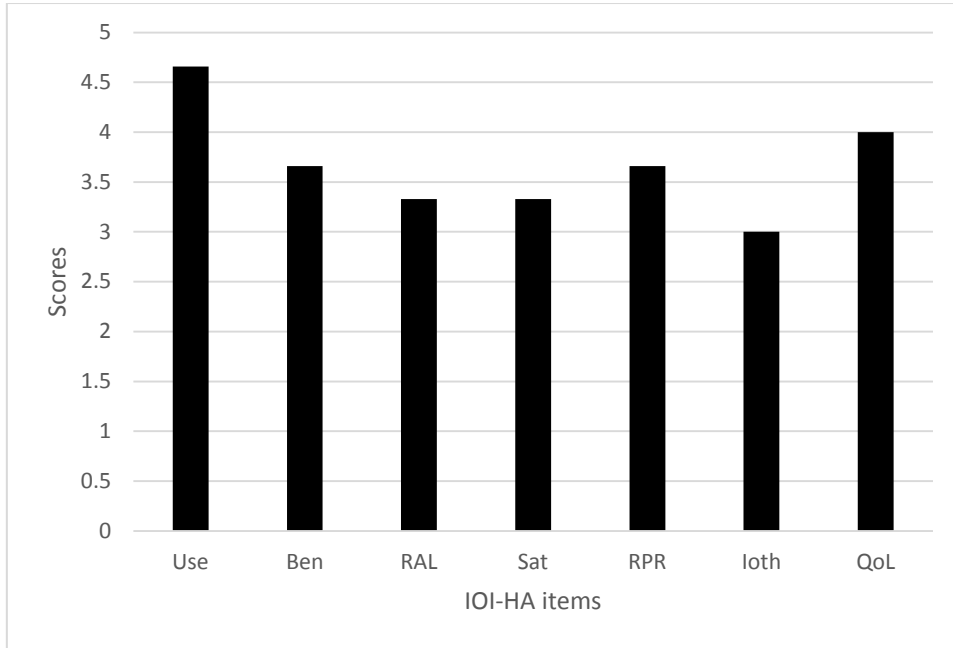
*Ben, benefit: RAL, Residual Activity Inhibition: Sat, Satisfaction: RPR, Residual Participation Restriction: Ioth, Impact on others: QoL, Quality of Life: TOH, type of hearing loss: DOH, degree of hearing loss: DOU, duration of hearing aid use:*

*Table 4.2* Mode of the IOI-HA items of Kannada version

Item	Children	Adults	Elderly adults
<b>Use</b>	5	5	4
<b>Ben</b>	5	3	3
<b>RAL</b>	4	3	3
<b>Sat</b>	4	3	3
<b>RPR</b>	4	3	4
<b>Ioth</b>	3	3	3
<b>QoL</b>	4	4	4

*Ben, benefit: RAL, Residual Activity Inhibition: Sat, Satisfaction: RPR, Residual Participation Restriction: Ioth, Impact on others: QoL, Quality of Life: TOH, type of hearing loss: DOH, degree of hearing loss: DOU, duration of hearing aid use:*

The overall mode score for each item is shown in the figure 4.1. It ranged from 3 to 4.66 with the highest mode for the item USE and the lowest mode for Impact on others (Ioth).



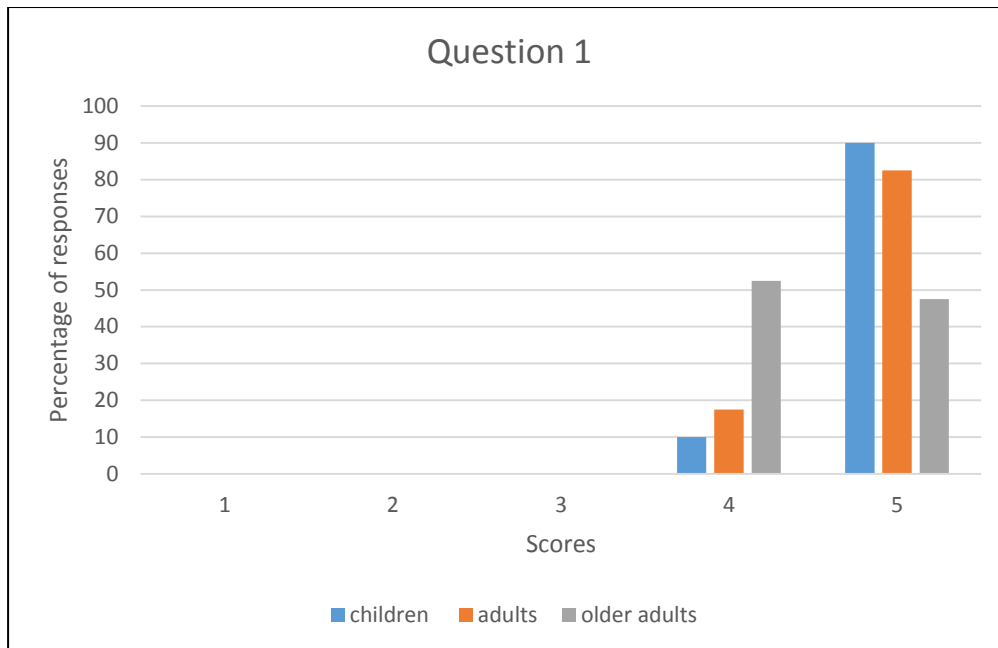
**Figure 4.1:** *The average Mode scores of the items of IOI-HA Kannada version*

*Ben, Benefit: RAL, Residual Activity Inhibition: Sat, Satisfaction: RPR, Residual Participation Restriction: loth, Impact on others: QoL, Quality of Life: TOH, type of hearing loss: DOH, degree of hearing loss: DOU, duration of hearing aid use.*

#### 4.2. Question 1

The 1<sup>st</sup> question reports about the number of hours the hearing aid was used in a day.

The findings of the present study indicate (figure 4.2) that among children 10% of them were wearing their hearing aids for 4 to 8 hours in a day and remaining 90% of them were wearing for more than 8 hours in a day. Among adults and elderly adults 17.5 and 52.5% of them were wearing their hearing aids for 4 to 8 hours in a day respectively and 82.5 and 47.5% of them were wearing for more than 8 hours in a day respectively.

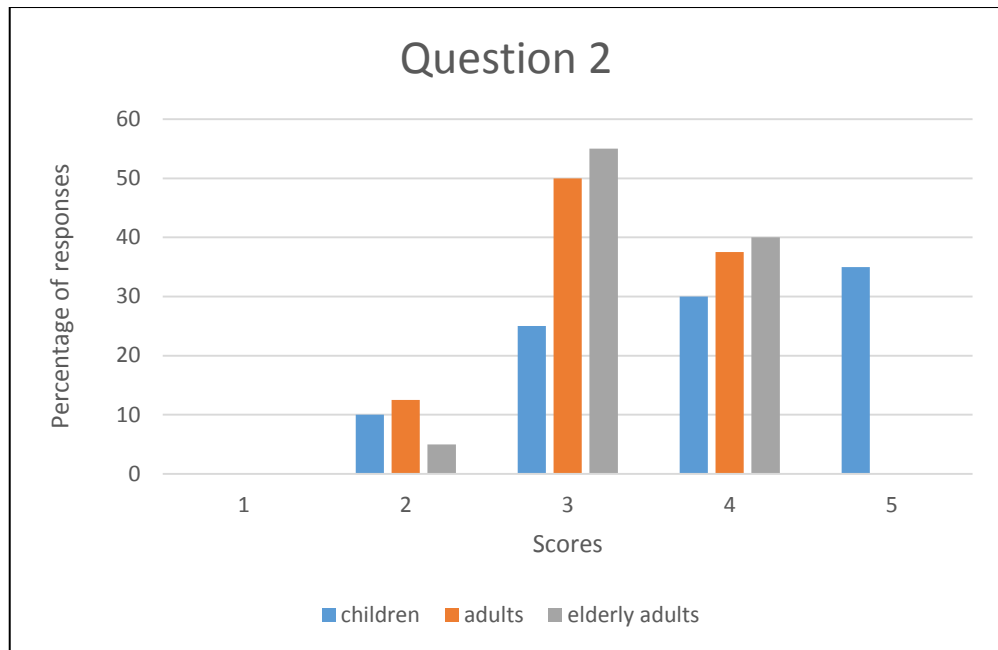


**Figure 4.2:** *Frequency distributions for question 1 (USE) in percentage.*

Cox (2003) has reported that the use time is an indicator of real world hearing aid outcome. More the time a person uses hearing aid, more he will be helped in the worst listening situations which thereby inspires him to wear it for longer time.

#### 4.3. *Question 2*

The 2<sup>nd</sup> question reports about the hearing aid benefit (figure 4.3). 25% of children, 50% of adults and 55% of elderly adults reported that their hearing aids helped them moderately. Besides 30% of children, 37.5% of adults and 40% of elderly adults reported that their hearing aids helped them quite a lot whereas only 35% of children reported that it helped them very much.



**Figure 4.3:** Frequency distributions for question 2 (benefit) in percentage.

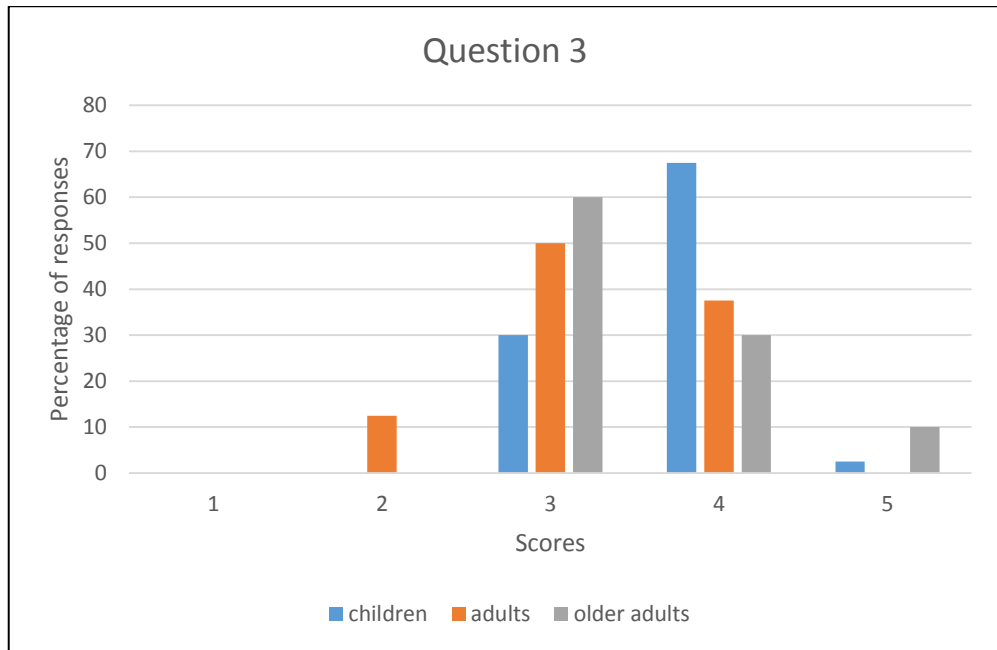
Cox, Gilmore, & Alexander (1991) had measured both objective and subjective benefit using shorter and longer term follow-up. The results showed improved objective benefit [Connected Sentence Test (CST) (Cox, Alexander, Gilmore, & Pusakulich, 1989)] in addition to the PHAB [Profile of Hearing Aid Benefit (Cox, Gilmore, & Alexander, 1991)]. Self-perceived benefit was significantly greater at 10 weeks than at 2 weeks post-fitting. Similarly in this study also it is shown that more number of participants were getting benefit from hearing aids.

#### 4.4. Question 3

The 3<sup>rd</sup> question points towards the residual activity limitation (figure 4.4).

Here majority of people have ranked it as ‘moderately difficult’ and ‘slightly difficult’, while 12.5% of individuals report as ‘no difficulty’.





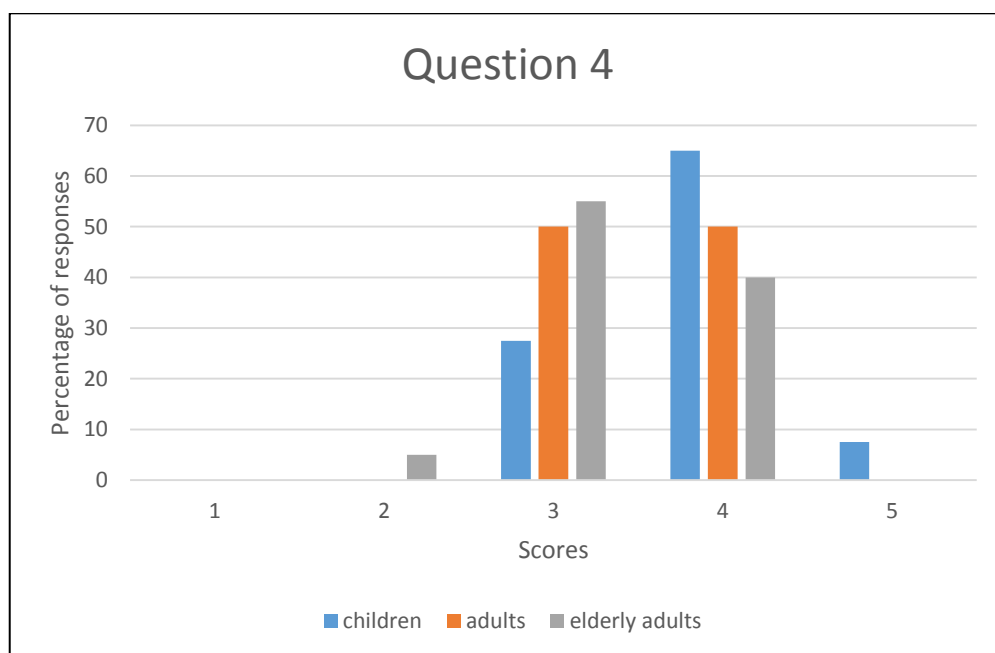
**Figure 4.4:** *Frequency distributions for question 3 (residual activity limitations) in percentage*

Compared to per capital income of India, the cost of hearing aid is more relatively but the effect of cost on the use of hearing aid or residual activity limitation was not evidenced. Bentler, Niebuhr, Getta, & Anderson, (1993) have reported that approximately half of the participants reported to get benefit from hearing aid in spite of high cost and expectations. In the study done by Alexander & Beyer, (2002) experienced users reported greater residual activity limitations than novice users. No such results were found in the present study and that might be because of the limited number of less experienced users.

#### 4.5. Question 4

The 4<sup>th</sup> question describes the satisfaction of the hearing aid user i.e. about how their hearing aid fulfils their expectation.

In this study, (figure 4.5) shows that 27.5% of children, 50% of adults and 55% of elderly adults reported that their hearing aid was moderately fulfilling their expectation by rating it as ‘moderately worth it’, 65% of children, 50% of adults and 40% of elderly adults reported that it was fulfilling their expectation by rating it as ‘quite a lot worth it’ while, 7.5% of children rated it as ‘very much worth it’.



**Figure 4.5:** Frequency distributions for question 4 (satisfaction) in percentage

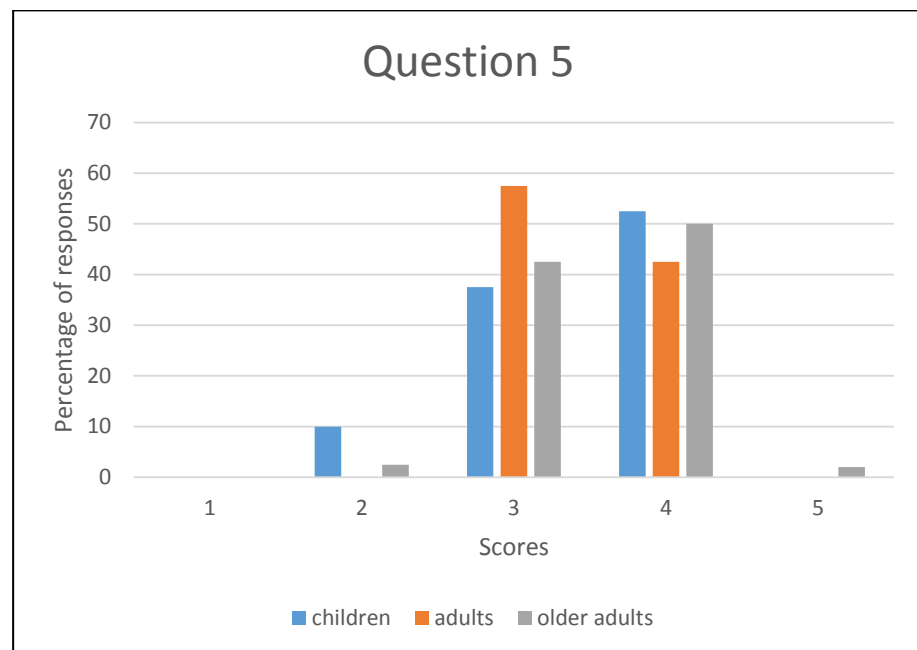
Bender, Getta, & Anderson, (2015) have reported that “Satisfaction ratings at 6 months post-fitting correlated fairly well with satisfaction ratings obtained at 12 months post- fitting ( $r = .72$ ,  $p < .00001$ )” which is expected result that as an individual uses hearing aid regularly, that will help him

further in worst listening circumstances, thereby meets his satisfaction or expectations. Same results have been seen in the present study as well.

#### 4.6. Question 5

The 5<sup>th</sup> question discloses about residual participation.

This part of the questionnaire informs about the residual participation restrictions by asking individuals whether their hearing aid affected their daily routine in the last two weeks. It is reported that (figure 4.6) 37.5% of children, 57.5% of adults and 42.5% of elderly adults find their routine to be affected moderately and 52.5% of children, 42.5% of adults and 50% of elderly adults found it to be affected slightly.

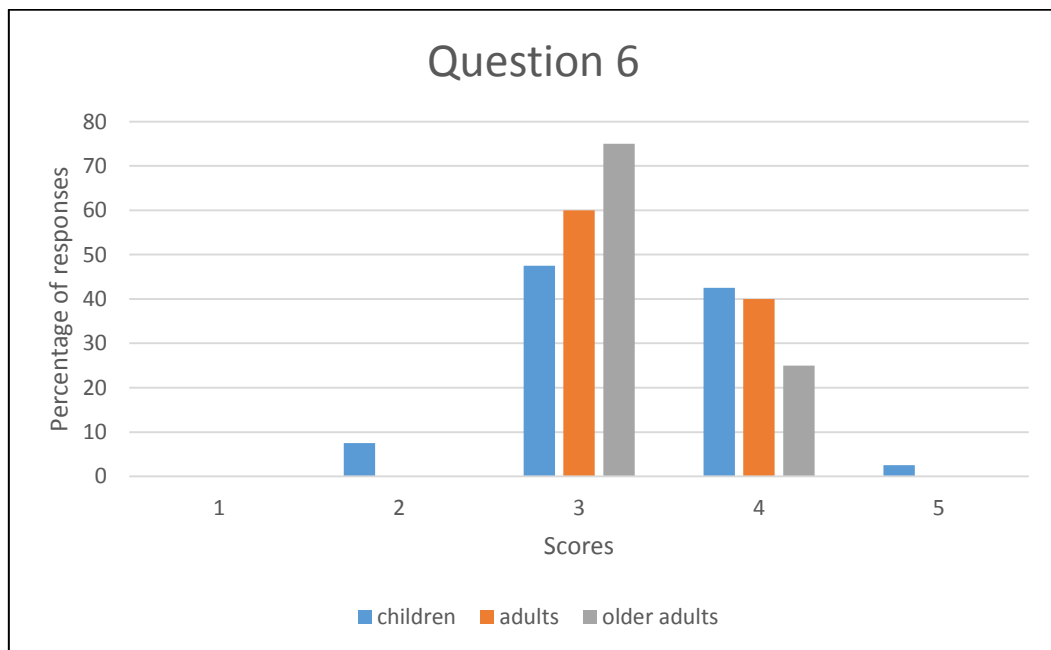


**Figure 4.6:** *Frequency distributions for question 5 (residual participation restrictions) in percentage*

This questionnaire was given to many of the participants when they came for re-evaluation that is when they had problem with their hearing aids that was causing hearing difficulty. This explains the obtained results that is more than 50% of the total individuals had residual participation restrictions.

#### 4.7. Question 6

The 6<sup>th</sup> question is about the impact of hearing aid use on others. Answering this question 47.5% of children, 60% of adults and 75% of elderly adults said that people were moderately bothered and 42.5% of children, 40% of adults and 25% of elderly adults reported that people were slightly bothered, which shows the influence on others represented in figure 4.7.



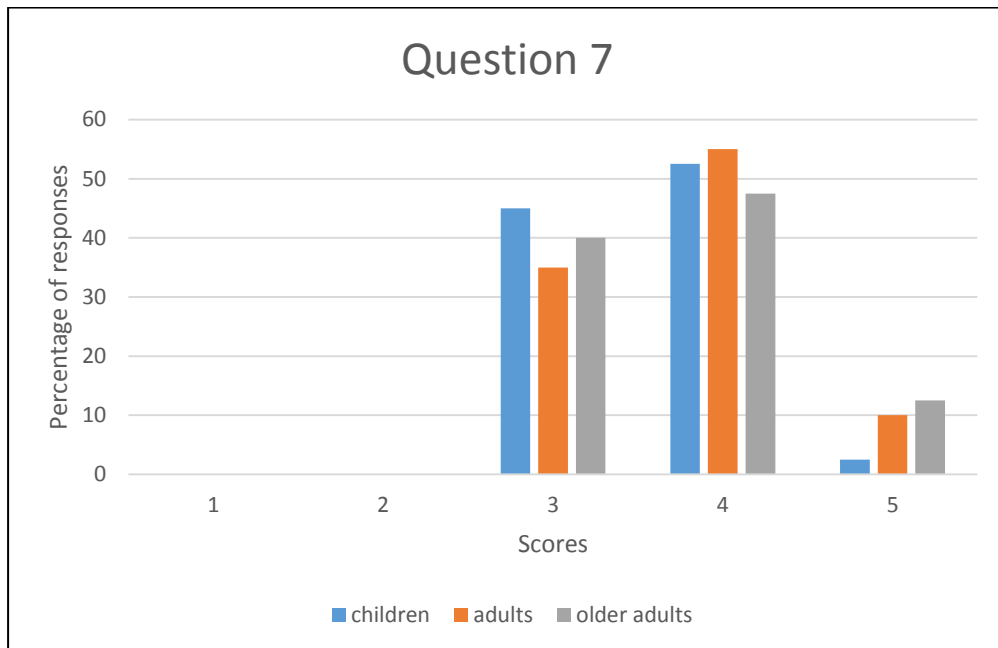
**Figure 4.7:** Frequency distributions for question 6 (impact on others) in percentage

Often when an individual starts using a hearing aid his or her communication skills increase and the society starts interacting with them and gives better response to their call which reduces the impact on others after using a hearing aid.

#### 4.8. Question 7

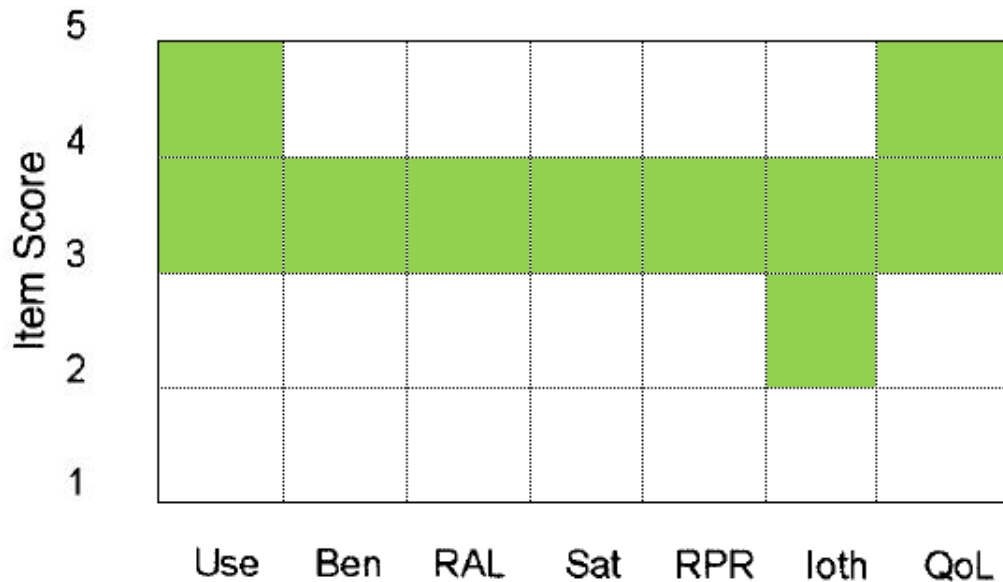
The seventh question is about the quality of life.

For the betterment of quality of life (figure 4.8) 45% of children, 35% of adults and 40% of elderly adults said that their life has become slightly better and 52.5% of children, 55% of adults and 47.5% of elderly adults reported their life to be quite a lot better and 2.5% of children, 10% of adults and 12.5% of elderly adults found it to be very much better.



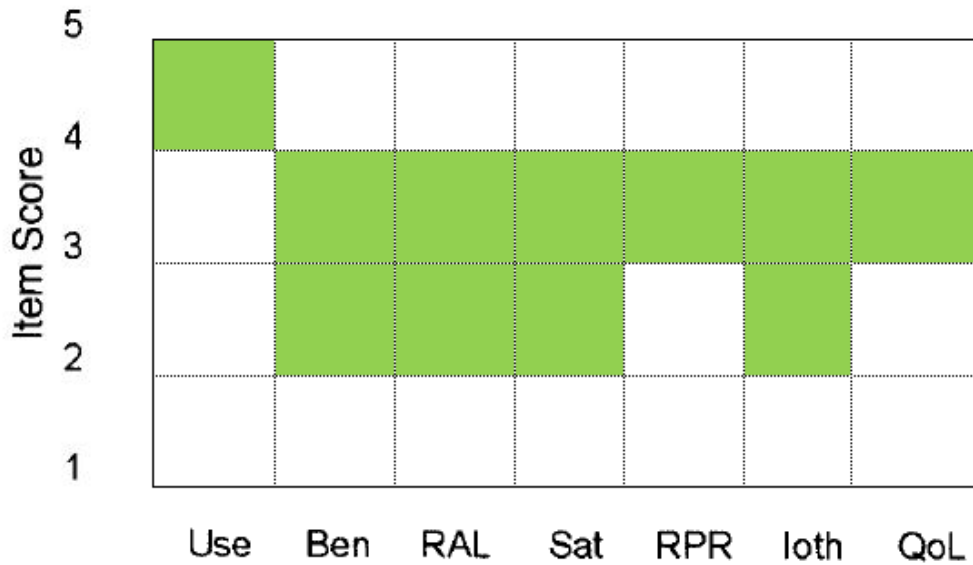
**Figure 4.8:** Frequency distributions for question 7 (quality of life) in percentage

The speech perception ability of people progresses as they start using their hearing aid in all situations which is directly linked to quality of life from the days when they were not using the hearing aid. This has been depicted in the present study results as well.



**Figure 4.9:** *Template of norms to assess item scores for individuals with degree of hearing loss moderate or less.*

*Ben, Benefit; RAL, Residual Activity Inhibition; Sat, Satisfaction; RPR, Residual Participation Restriction; Ioth, Impact on others; QoL, Quality of Life; TOH, type of hearing loss; DOH, degree of hearing loss; DOU, duration of hearing aid use;*



**Figure 4.10:** *Template of norms to assess item scores for individuals with degree of hearing loss moderately severe and more.*

*Ben, Benefit; RAL, Residual Activity Inhibition; Sat, Satisfaction; RPR, Residual Participation Restriction; Ioth, Impact on others; QoL, Quality of Life; TOH, type of hearing loss; DOH, degree of hearing loss; DOU, duration of hearing aid use:*

Figure 4.9 and 4.10 represents the templates for assessing the responses from individual hearing aid users. Figure 4.9 is the norms for assessing individuals who have hearing loss between mild to moderate and figure 4.10 is for those who have hearing loss of moderately severe and more. The shaded areas in Figures 4.9 and 4.10 show the range of the middle 50% of the data for each question.

In figure 4.9 the norm recommends that, if an individual having moderate degree of hearing loss scores less than 3, it indicates comparatively poor treatment outcome. Conversely, the possible occurrence for an excellent outcome on few questions is because the norms do not include the maximum score.

The norms in Figure 4.10 are applicable for individuals with moderately severe (or more) degree of hearing loss. The norms show that these persons report high daily use (item 1) which is sensitive to poor outcomes. In contrast, for other

questions the shaded areas are in the middle of the response scale. Thus, all of these questions are potentially sensitive to greater outcomes as well as poor outcomes. Similar results has been reported by Cox & Alexander ( 2003).



## 2. Association between the questions in the Kannada version

To see the association of each questions in the Kannada translated version with each other and with the total score, Spearman's correlation was done. The results of the data obtained is given in the Table 4.3

**Table 4.3 Inter-question correlations for IOI-HA Kannada**

	<i>Ben(2)</i>	<i>RAL(3)</i>	<i>Sat(4)</i>	<i>RPR(5)</i>	<i>Ioth(6)</i>	<i>QoL(7)</i>	<i>TOTAL</i>
<i>Use(1)</i>	.429**	.445**	.337**	.211*	.331**	.145	.505**
<i>Ben(2)</i>		.795**	.690**	.588**	.437**	.428**	.856**
<i>RAL(3)</i>			.690**	.639**	.415**	.491**	.854**
<i>Sat(4)</i>				.692**	.340**	.383**	.791**
<i>RPR(5)</i>					.464**	.495**	.794**
<i>Ioth(6)</i>						.422**	.623**
<i>QoL(7)</i>							.668**

*Ben, Benefit; RAL, Residual Activity Inhibition; Sat, Satisfaction; RPR, Residual Participation Restriction; Ioth, Impact on others; QoL, Quality of Life; \*\* Correlation is significant at the 0.01 level (2-tailed), \* Correlation is significant at the 0.05 level (2-tailed)*

Table 4.3 represents the inter-question correlations. The total values of correlation ranges from .505 to .856, it is evident that the second question has been most representative of the questionnaire and first question has been least representative of the total items related to outcome of hearing aid. Other questions were highly significantly correlated with  $p < 0.01$ .

Besides, the order of relationships is complicated. Every single question is notably related (positively correlated) to several other questions, but none of them is related to all the other questions. This result proposes that,

regardless of the fact that all of the questions tap few features of hearing aid fitting outcome, they might not be measuring identical underlying aspects.

Question 1 (“Think about how much you used your present hearing aid(s) over the past two weeks. On an average day, how many hours did you use the hearing aid(s)?”) was positively correlated with second, third, fourth and sixth questions with  $p$  value  $< 0.01$  and with 5<sup>th</sup> question with  $p$  value  $< 0.05$  but it was not significantly different with question 7 that is quality of life. Cox & Alexander (2003) reported that “as the duration of use of hearing aid increases people communicating to them starts less bothered about their hearing loss”. (Go, 2006) found similar result but it was not significantly different with question 6.

Question 2 (“Think about the situation where you most wanted to hear well, before you got your present hearing aid(s). Over the past two weeks, how much has the hearing aid helped in those situations?”) Revealed a strong correlation with the rest of the questions with  $p$  value  $< 0.01$ . Similar results were reported by Cox & Alexander (2003); Go (2006) with the exception of that in (Go, 2006) study did not get any correlation with question 6. This strong correlation can be described easily as when a person is being benefitted from his hearing aid, his ability to hear in required situation ought to be better.

Question 3 (“Think again about the situation where you most wanted to hear well. When you use your present hearing aid(s), how much difficulty do you still have in that situation?”) Showed a strong positive association with question 4, 5, 6, and 7 with correlation coefficient of 0.690, 0.639, 0.415, and 0.491 respectively having  $p$  value  $< 0.01$ .

For most hearing aid users the main concern is that their inability to hear better in most needful listening situations. If they manage such situations with hearing aid they get more satisfied and that is strongly correlated as shown by the results.

Question 4 (“Considering everything, do you think your present hearing aid(s) is worth the trouble?”) showed strong positive correlation with question 5, 6 and 7 with value 0.692, 0.340 and 0.383 respectively with p value less than 0.01. Same type of result was given by Cox & Alexander (2003). Go (2006) got correlation only with question 7. This difference can be because of language or culture (Yau, 1994).

Question 5 (“Over the past two weeks, with your present hearing aid(s), how much have your hearing difficulties affected the things you can do?”) showed positive correlation with all the questions with p value <0.01 except for question 1 which got p value <0.05. (Go, 2006) found positive correlation with question 6.

Question 6 (“Over the past two weeks, with your present hearing aid(s), how much do you think other people were bothered by your hearing difficulties?”) has got positive correlation of 0.422 with p value <0.01.

Bender et al., (2015) have reported that “Satisfaction ratings at 6 months post-fitting correlated fairly well with satisfaction ratings obtained at 12 months post- fitting ( $r = .72, p < .00001$ )” which shows positive association of satisfaction and daily use. In the study done by Alexander & Beyer (2002) experienced users reported greater residual activity limitations

than novice users, which shows positive association of residual activity limitations and daily use.

### 3. Relation between demographic factors and hearing aid use

**Table 4.4 chi-square test values**

	<i>Age</i>	<i>Gender</i>	<i>TOH</i>	<i>DOH</i>	<i>DOU</i>
<i>Use</i>	21.05**	5.973*	1.07	8.192*	4.55*
<i>Ben</i>	7.40	1.100	3.48	37.91**	7.43*
<i>RAL</i>	5.78	2.426	3.57	13.54**	6.63*
<i>Sat</i>	33.05**	1.708	2.52	14.45**	10.76*
<i>RPR</i>	16.77**	1.972	7.30*	38.93**	10.68*
<i>Iotl</i>	3.73	1.374	1.28	20.50**	8.87*
<i>QoL</i>	11.14*	4.068	6.38*	36.69**	8.54

*Ben, Benefit: RAL, Residual Activity Inhibition: Sat, Satisfaction: RPR, Residual Participation Restriction: Iotl, Impact on others: QoL, Quality of Life: TOH, type of hearing loss: DOH, degree of hearing loss: DOU, duration of hearing aid use: \*\* Correlation is significant at the 0.01 level (2-tailed), \* Correlation is significant at the 0.05 level (2-tailed)*

Note: To meet the assumptions of performing chi-square test, the cells that had got expected count less than 5% has been merged with their adjacent cells.

Chi-square test was done to check the association of age, gender, type of hearing loss, degree of hearing loss and duration of hearing loss against the first seven questions. Table 4.4 depicts the results of chi-square test values.

Results found that there was significant association between age and daily use, satisfaction, residual participation restriction with  $p < 0.01$  and quality of life with value of significance ( $p < 0.05$ ).

While studying the association of gender on each variables of questionnaire, it was found that the gender is not associated with any of the parameters of the questionnaire, showing  $p > 0.05$  (significance value) except with one of the factor i.e. daily use with  $p < 0.05$ . Study done by Liu et al., (2011) in Chinese version got the role of gender on the item on quality of life and satisfaction. This difference can be because of language, culture, environmental or technological difference.

Sensorineural and mixed type of hearing loss was also studied for association and in results it was found that it was associated with residual participation restriction and quality of life with  $p < 0.05$  of significance. Cox, Stephens, & Kramer, (2002) and Rachana (2014) did not find any significant association between type of hearing loss and all questions.

While studying the association of degree of hearing loss on each variables of questionnaire, it was found that there was significant association between degrees of hearing loss and all questions with  $p < 0.01$  excluding question 1 which had  $p < 0.05$ .

Duration of hearing aid use was significantly associated with first 6 questions with  $p < 0.05$ . Previously no study has reported it as an active factor which can influence the score of IOI-HA scores. But in the present study it can be seen that the association of degree of hearing loss is influencing the impact on others. It could be due to the fact that people of India accept and adapt themselves towards their own hearing loss and also towards a hearing impaired person.

When administering this version of the IOI-HA, question 8 is not included in the global score and is used only for normative purposes, same has been reported in Smith, Noe & Alexander (2009).

## CHAPTER 5

### SUMMARY AND CONCLUSION

The present study was done to develop a self-assessment tool for Kannada speaking hearing aid users and to develop norms for the hearing aid users. Hence main objective of the present study was to standardize the English version of IOI-HA questionnaire in Kannada. The participants for the study included 120 subjects with hearing loss, who were subdivided into 40 in each age group, children (5 to 17 years), adults (18 to 55 years) and elderly adults (Greater than 55 years). The native language of participants was Kannada and all were digital hearing aid users. Participants who were using the hearing aid at least for a period of minimum 3 months were selected for the study.

The procedure to standardize the English version of IOI-HA questionnaire in Kannada was divided into three phases as translation, administration, and scoring.

In phase 1, English version of IOI HA was translated to Kannada by three individuals who were well versed in the academic discipline and had the Kannada language as their first language. Later it was reverse translated by three different individuals who were expert in both Kannada and English languages. In the last phase of translation, a linguist who was proficient in both Kannada and English was asked to evaluate each of translated questions and choose the best questions from each set which delivered same meaning as original questions. Suitable modification was done with the help of linguist and audiologist.

In phase 2, the participants were asked to fill the Kannada translated version of IOI-HA questionnaire, which had three categories/ sections, first section being

demographic data, filled by the client/ caregiver. Second section had hearing aid related questions filled by an audiologist and, third section had 8 questions representing outcome domains which were daily use, benefit, residual activity limitation, satisfaction, residual participation restriction, impact on others, quality of life and perception of their hearing difficulty These were filled by client themselves or caregivers for children.

In phase 3, each question had 5 options. Participant had to tick the most appropriate option out of five. Each question was scored by converting these options into integers of 1-5. Each item of first seven questions had been scored from 1 to 5 for the responses being left (worst) to right (best) respectively excluding the eighth question which was scored from 1 to 5 for the responses being right (worst) to left (best) respectively. For first 7 questions the higher score is indicative of a better outcome and for the 8<sup>th</sup> question better outcome is indicated by the lowest score. The results found were analysed using the SPSS software (version 20) and are summarised below.

1. The Kannada speaking hearing aid users were wearing their hearing aids for more than 8 hours in a day on an average.
2. The Kannada speaking hearing aid users were getting good benefit from their hearing aids and they find their hearing aids moderately worth their troubles on an average.
3. The hearing aids are satisfying the participants in their difficult listening situations and the quality of life of the participants has improved after using hearing aids.

4. The hearing impaired individuals found it difficult to communicate without their hearing aids and all the participants depended on their hearing aids.
5. On performing spearman's correlation, it was found that the most and least representative of the questionnaire were second and first question respectively of the total items related to outcome of hearing aid. Other questions were highly significantly correlated with  $p < 0.01$ .
6. Chi-square test results found that there was significant association between age and daily use, satisfaction, residual participation restriction with  $p < 0.01$  and quality of life with value of significance ( $p < 0.05$ ). There was no association of gender on other variables of questionnaire.

### ***Implications of the study***

- Present study has developed a self-assessment tool for Kannada speaking hearing aid users who use digital hearing aids.
- The norms obtained from this study can be used by the clinician/ audiological practitioner to understand the problem of hearing aid users and provides guidelines to counsel and determine the benefits from hearing aids.
- The audiologist or clinician can use this in understanding the listening needs and expectations of the hearing impaired individuals during hearing aid fitting and post hearing aid fitting.
- This tool can save time for both the audiologist as well as client in the process of best fit.



- The results of the present study can be used to achieve satisfactory level in hearing aid fitting for both clinician and the hearing impaired individuals.

***Future research:***

The questionnaire can be converted to different Indian languages to compare the data across populations speaking different Indian languages.

Other factors which influence the outcomes such as type of hearing aid, technologies used in hearing aids and the contribution of speech spectrum of the language to hearing aid use can be studied.

This study can also be done to evaluate the outcome of cochlear implant.

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## APPENDIX

### ಅಂತರಾಷ್ಟ್ರೀಯ ಪರಿಣಾಮ ತಪಶೀಲ ಪಟ್ಟಿ - ಹಿಯರಿಂಗ್ ಏಡ್ಸ್

ನಿಮ್ಮ ಈಗಿನ ಹಿಯರಿಂಗ್ ಏಡ್ಸ್‌ಗಳನ್ನು ಕಳೆದ ಎರಡು ವಾರಗಳಲ್ಲಿ ದಿನಕ್ಕೆ ಅಂದಾಜು ಎಷ್ಟು ಗಂಟೆಗಳ ಕಾಲ ಉಪಯೋಗಿಸಿರುವಿರಿ?

ಉಪಯೋಗಿಸಿಯೇ ಇಲ್ಲ	1ಗಂಟೆಗಿಂತ ಕಡಿಮೆ	1ರಿಂದ4 ಗಂಟೆಗಳು	4ರಿಂದ8 ಗಂಟೆಗಳು	8ಗಂಟೆಗಿಂತ ಅಧಿಕ
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ಈ ಹಿಯರಿಂಗ್ ಏಡ್ಸ್‌ನ್ನು ಪಡೆಯುವ ಮುನ್ನ ನಿಮಗೆ ತುಂಬಾ ಅವಶ್ಯಕವೆನಿಸುವ ಸಂದರ್ಭದಲ್ಲಿನ ಕೇಳುವಿಕೆಯ ಕುರಿತು ಯೋಚಿಸಿ. ಅಂತಹ ಸಂದರ್ಭದಲ್ಲಿ ನಿಮ್ಮ ಈಗಿನ ಹಿಯರಿಂಗ್ ಏಡ್ಸ್ ಕಳೆದರೆಡು ವಾರಗಳಲ್ಲಿ ಎಷ್ಟು ಸಹಾಯ ಮಾಡಿದೆ?

ಯಾವುದೇ ಸಹಾಯ ಮಾಡಿಲ್ಲ	ಸ್ವಲ್ಪ ಸಹಾಯ ಮಾಡಿದೆ	ಸಾಧಾರಣವಾಗಿ ಸಹಾಯ ಮಾಡಿದೆ	ಸಾಕಷ್ಟು ಸಹಾಯ ಮಾಡಿದೆ	ತುಂಬಾ ಹೆಚ್ಚು ಸಹಾಯ ಮಾಡಿದೆ
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ನಿಮಗೆ ಕೇಳಿಸಿಕೊಳ್ಳುವುದು ತುಂಬಾ ಅವಶ್ಯಕವೆನಿಸುವ ಸಂದರ್ಭದ ಕುರಿತು ಮತ್ತೊಮ್ಮೆ ಯೋಚಿಸಿ, ಅಂತಹ ಸಂದರ್ಭದಲ್ಲಿ ಈಗಿನ ಹಿಯರಿಂಗ್ ಏಡ್ಸ್ ಉಪಯೋಗಿಸುವಾಗ ಈಗಲೂ ಎಷ್ಟು ಕಷ್ಟವನ್ನು ಅನುಭವಿಸುತ್ತಿರುವಿರಿ.

ತುಂಬಾ ಕಷ್ಟವಾಗುತ್ತದೆ	ಸಾಕಷ್ಟು ಕಷ್ಟವಾಗುತ್ತದೆ	ಮಧ್ಯಮವಾಗಿ ಕಷ್ಟವಾಗುತ್ತದೆ	ಸ್ವಲ್ಪ ಕಷ್ಟವಾಗುತ್ತದೆ	ಯಾವುದೇ ಕಷ್ಟವಿಲ್ಲ
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ಎಲ್ಲಾ ಸನ್ನಿವೇಶಗಳನ್ನು ಪರಿಗಣಿಸಿದಲ್ಲಿ ಈಗಿನ ಹಿಯರಿಂಗ್ ಏಡ್ಸ್ ನಿಮ್ಮ ತೊಂದರೆಗೆ ಯೋಗ್ಯವಾಗಿದೆ ಎಂದು ಅನಿಸಿದೆಯೇ?

ಯೋಗ್ಯವೇ ಅಲ್ಲ,	ಸ್ವಲ್ಪ ಯೋಗ್ಯವಾಗಿದೆ	ಮಧ್ಯಮವಾಗಿ ಯೋಗ್ಯವಾಗಿದೆ	ಸಾಕಷ್ಟು ಯೋಗ್ಯವಾಗಿದೆ	ತುಂಬಾ ಹೆಚ್ಚು ಯೋಗ್ಯವಾಗಿದೆ
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ಕಳೆದ ಎರಡು ವಾರಗಳಲ್ಲಿ ಹಿಯರಿಂಗ್ ಏಡ್ಸ್ ಉಪಯೋಗಿಸಿದ ನಂತರ ನಿಮ್ಮ ಕೇಳುವಿಕೆಯ ತೊಂದರೆಯಿಂದ ನೀವು ಮಾಡುವ ಕೆಲಸಗಳ ಮೇಲೆ ಎಷ್ಟು ಪರಿಣಾಮ ಬೀರಿದೆ?

ತುಂಬಾ ಹೆಚ್ಚು ಪರಿಣಾಮ ಬೀರಿದೆ	ಸಾಕಷ್ಟು ಪರಿಣಾಮ ಬೀರಿದೆ	ಮಧ್ಯಮವಾಗಿ ಪರಿಣಾಮ ಬೀರಿದೆ	ಸ್ವಲ್ಪ ಪರಿಣಾಮ ಬೀರಿದೆ	ಯಾವುದೇ ಪರಿಣಾಮ ಬೀರಲಿಲ್ಲ
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ಕಳೆದರೆಡು ವಾರಗಳಲ್ಲಿ ಹಿಯರಿಂಗ್ ಏಡ್ಸ್ ಉಪಯೋಗಿಸಿದರೂ ನಿಮ್ಮ ಕೇಳುವಿಕೆಯ ತೊಂದರೆಯು ಇತರರನ್ನು ಎಷ್ಟು ತೊಂದರೆಗೀಡು ಮಾಡಿದೆ ಎಂದು ನಿಮಗೆ ಅನಿಸುತ್ತದೆ.

ತುಂಬಾ ಹೆಚ್ಚು ತೊಂದರೆ ಮಾಡಿದೆ	ಸಾಕಷ್ಟು ತೊಂದರೆ ಮಾಡಿದೆ	ಮಧ್ಯಮವಾಗಿ ತೊಂದರೆ ಮಾಡಿದೆ	ಸ್ವಲ್ಪ ತೊಂದರೆ ಮಾಡಿದೆ	ಯಾವುದೇ ತೊಂದರೆಯಾಗಿಲ್ಲ
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7 ಎಲ್ಲಾ ಸಂದರ್ಭವನ್ನು ಪರಿಗಣಿಸಿದಾಗ ಈಗಿನ ಹಿಯರಿಂಗ್ ಏಡ್ ನಿಮ್ಮ ಜೀವನದ ಸಂತೋಷವನ್ನು ಎಷ್ಟು ಬದಲಾಯಿಸಿದೆ.

ಜೀವನದ ಸಂತೋಷ ಕೆಟ್ಟಿದೆ	ಯಾವುದೇ ಬದಲಾವಣೆಯಾಗಿಲ್ಲ	ಸ್ವಲ್ಪ ಉತ್ತಮವಾಗಿದೆ	ಸಾಕಷ್ಟು ಉತ್ತಮವಾಗಿದೆ	ತುಂಬಾ ಹೆಚ್ಚು ಉತ್ತಮವಾಗಿದೆ
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8 ಹಿಯರಿಂಗ್ ಏಡ್‌ಗಳನ್ನು ಬಳಸದಿರುವ ಸಂದರ್ಭಗಳಲ್ಲಿ ಕೇಳಿಸಿಕೊಳ್ಳಲು ನಿಮಗೆ ಎಷ್ಟು ಕಷ್ಟವಾಗುತ್ತಿದೆ.

ತೀವ್ರವಾದ ಕಷ್ಟ	ಮಧ್ಯಮದಿಂದ- ತೀವ್ರವಾದ ಕಷ್ಟ	ಮಧ್ಯಮವಾದ ಕಷ್ಟ	ಸ್ವಲ್ಪ ಕಷ್ಟ	ಯಾವುದೇ ಕಷ್ಟವಿಲ್ಲ
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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