TRANSLATION AND VALIDATION OF APHAB (GUJARATI VERSION) FOR EVALUATING HEARING AID BENEFIT IN ADULTS

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20AUD022

This Dissertation is submitted as part of fulfilment for the Degree of

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Dedicated

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CERTIFICATE

This is to certify that this dissertation entitled **"Translation and Validation of APHAB (Gujarati version) for Evaluating Hearing Aid Benefit in Adults"** is a bonafide work in part fulfillment for the degree of Master of Science (Audiology) of the student (Registration No. 20AUD022). 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 a Diploma or Degree.

Mysuru
August, 2022

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DECLARATION

This dissertation entitled **"Translation and Validation of APHAB (Gujarati version) for Evaluating Hearing Aid Benefit in Adults"** is the result of my study under the guidance of Dr. Mamatha N. M, Assistant professor, Department of Audiology, All India Institute of Speech and Hearing, Mysore and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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August, 2022

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ABSTRACT

The study was designed to assess the Hearing aid benefit in Gujarati speaking adults via administration of the APHAB (Gujarati version) Questionnaire. The present study aimed to translate and validate an Abbreviated Profile of Hearing Aid Benefit - Gujarati Version from the original Abbreviated profile of hearing aid benefit (English) to measure hearing aid benefit in Gujarati adult hearing aid users. The study was conducted in 3 different phases: Phase I - Translation of APHAB Questionnaire in the Gujarati language; Phase II – Validation of the translated questionnaire; Phase III - Administration of the validated Questionnaire. The validation of the questionnaire was done using three-point Likert scale (1-inappropriate, 2-somewhat appropriate, 3-more appropriate).

The final translated and validated Abbreviated Profile of Hearing Aid Benefit (APHAB) in Gujarati version was administered utilizing a google form on 30 adult hearing aid users aged 18 to 60 years (10 females & 20 males) from respected hearing aid centers in Ahmedabad, Gujarat, as well as from various other clinics around Gujarat. The current study's findings reveal that the participants' performance is more significant with the hearing aid compared to those without hearing aid condition. The overall results from the current study using the APHAB (Gujarati Version) suggests a significant benefit with the hearing aid condition compared to without hearing aid condition in all the domains (ease of communication, reverberation, background noise & averseness) in Gujarati adults.

Key words: APHAB (Gujarati Version), Hearing aid Benefit, translation, validation, Subjective scale for benefit

Chapter 1

INTRODUCTION

The World Health Organization (WHO, 1948) defines health as being physically, psychologically, as well as socially well-adjusted and free of illness and disability. The latter are seen as significant lifestyle behaviors in medical practice and research. According to the World Health Organization (2021) more than five percent of the people worldwide, or 430 million individuals, require rehabilitation to address "disabling" hearing damage (There are 4.5 million children). It has been predicted that by 2050, more than seven hundred million individuals, or one in ten, will have significant hearing loss. Hearing loss has been demonstrated to contribute considerably to the worldwide illness burden in individuals, families, societies, and governments.

Hearing loss can appear at any age due to a variety of factors, including middle ear pathology, medications, genetics, and so on. (Bess et al., 1990) showed a direct correlation between the degree of hearing impairment, and the Sickness Impact Profile (SIP), which was used in research of adult participants, to measure functional health status and the degree of one's impression of hearing impairment. The severity of hearing impairment was associated with a decline in psychological health and functional performance. The severity of auditory impairment is ultimately determined by the degree (mild, moderate, moderately severe, severe, and profound) and hearing loss (conductive, mixed, or sensorineural). The most crucial issue is caused by sensorineural hearing loss, which is particularly severe in adults. Speech understanding also worsens, and disturbance is yet another concern. Hearing loss may have devastating effects on a person's ability to function and quality of life while being an "invisible" illness ((Roberds & Armstrong, 1994).

Hearing loss has far-reaching consequences for individuals and their families. According to Northern & Downs (2000) hearing loss is found to have an impact on social involvement, behavioral and emotional wellbeing, work status, and living standards. Fortunately, adequate amplification and aural rehabilitation are noted to reduce the effects of hearing loss.

Amplification is the first and most significant stage in the auditory rehabilitation program. The primary method in the rehabilitation program is a listening device (Alpiner & McCarthy, 2000). As per Fitting (1998) hearing aid fitting procedure consists of six primary phases: evaluation, treatment management, choosing the hearing aid, validation, orientation, and validation. The evaluation stage is critical for determining the type and severity of deafness, and it aids in deciding amplification candidacy and planning the intervention program.

The audiologist, user, and family members review the evaluation stage outcomes and recognize challenges, barriers, and needs during the treatment planning phase. The electroacoustic and physical properties of the favored hearing devices are defined during the selection phase. During the verification process, the audiologist explains whether the hearing device fulfills standardized criteria such as essential electroacoustics characteristics. At the time of the guidance stage, the audiologist instructs the patient/or their family members on how to use and care for the hearing device and investigates the suitable criteria for assistive listening devices and rehabilitation diagnosis as well as management. During the validation phase, the audiologist assesses the intervention's impact on perceived impairment or hearing aid advantages due to hearing loss.

Merely giving amplification is insufficient for individuals with hearing loss. The profit of the hearing aid must be evaluated in terms of overall results. Generally speaking, outcome refers to the hearing aid's quantifiable impact on the user's hearing handicap, whether that impact is genuine or perceived (Weinstein, 2016). Over the last few decades, a wide range of hearing aid performance indicators have been developed. The majority of these measures can be classified as aided effectiveness, gain, satisfaction, or even use. Hearing aid benefit is defined by making comparisons between hearing aid performance without hearing aid results within that wearer, as opposed to assessments of aided performance (Weinstein, 1996).

The severity or degree of change from unaided to aided listening is expressed as a benefit. It is generally determined as a project rather than a percentage or proportion. It can be pleasant, harmful, or unbiased, based on how the hearing aid affects performance (Humes, 1999). According to Humes (1999), objective benefit criteria include modifications in speech recognition scores associated with hearing aid use and real-ear insertion gain (REIG = REAR - REUR). To determine the impact of the hearing aid, testing conditions in the aided and unaided conditions must be identical.

Subjective measurements of benefit are also available. Acceptance of subjective evaluation of the effectiveness of a hearing aid fitting as a crucial aspect of the hearing aid fitting is growing (McCarthy, 1996; Muller, 1998; Weinstein, 1996) Hearing aid users, for example, can make sound-quality ratings for a range of stimuli with and without their hearing aids to enhance sound quality in the aided state. Hearing handicap may be measured before and after using hearing aids, with the difference representing the subjective improvement or changes that occur in self-perceived impairment. In this context,

the Hearing Handicap Inventory for the Elderly (HHIE; Ventry & Weinstein, 1982) has been effective (Newman & Weinstein, 1988; Malinoff & Weinstein, 1989). The importance of integrating patient self-reports with technical and analytical data is demonstrated by Bentler & Kramer, (2000).

According to Palmer & Muller (1998), audiologists should ask patients to judge their own satisfaction with hearing device benefits. This should be a standard element of each hearing aid fitting. The difference serves as a subjective measure of benefit. The Profile of Hearing Aid Benefit (PHAB; Cox et al., 1991) and, more subsequently, the APHAB (Cox & Alexander, 1995) have been effective in this respect. In this technique, unassisted and aided performance are either measured twice in time (before and after a period of hearing aid use) or at one moment after hearing aid use. Still, the user must recollect how he or she performed without the hearing aid in that same listening scenario before attending aid usage.

Need of the study

Hearing aid satisfaction is a distinct component of the hearing aid benefit measure in hearing aid users. Hearing aid satisfaction varies from benefit in that it is not always motivated by performance. For example, a client may gain significantly on all assisted and unassisted tests but express unhappiness on a satisfaction rating. In India, the clinician gives a small number of measuring scales to assess how much an individual's needs and expectations are met through hearing aids. Self-reported questionnaires play an essential role in assessing an individual's hearing progress (Mendel, 2007). It also helps to understand better about an individual’s need for hearing aid in a variety of situations, such as noise and speech in silence (Nayana, 2011). The experience cannot be effectively

measured under laboratory conditions. Traditional objective measurements do not assess proper knowledge of hearing aid use in everyday listening situations. Self-reporting means are needed to quantify actual profits (Cox et al., 2003b). Self reporting measures are available generally in Hindi, Tamil languages. No subjective assessment of the benefits of adult hearing aids in Gujarati is available. Gujarati is the sixth most spoken language in India, with 55.5 million native speakers, accounting for about 4.5% of India's total population (CENSUS OF INDIA 2011). Therefore, a translated and validated Gujarati version of APHAB is needed for better understanding about the benefits of hearing aids in the community.

Aim of the study

To do the translation and validation of the APHAB questionnaire in the Gujarati language for evaluation of hearing aid benefits in individuals with hearing loss.

Objectives

- To translate the APHAB questionnaire into Gujarati for evaluating hearing device benefits in adults.
- To validate the APHAB questionnaire in Gujarati for evaluating hearing device benefits in adults.

Chapter 2

REVIEW OF LITERATURE

Hearing benefits from hearing aid vary from person to person. The benefit of hearing aids can be assessed through the difference between aided and unaided performance either subjectively or objectively (Dillon, 2001). Hearing aid benefits can be measured via subjective, objective methods and a self-reporting questionnaire. Several questionnaires were developed to assess the hearing aid benefits in adults and children Walden et al., 1984 (HAPI);(Cox & Gilmore, 1990 (PHAP);Cox et al., 1991 (PHAB); (Cox & Alexander, 1995 (APHAB); Dillon et al., 1997 (COSI); Muller & Palmer, 1998) (PAL), (Gatehouse, 1999) (GHABP); Forster & Tomlin, 1988 (HAUO). As hearing aid cannot restore natural hearing, most individuals suffer from various psychological issues and effects of hearing loss.

Hearing aid benefit measurement becomes very important. Follow-up research to a large and multi-clinical trial conducted in 1996–97 examined perceived advantage, pleasure, and hearing aid usage habits. The Hearing Aid Status Questionnaire includes the Profile of Hearing Glasgow Hearing Aid Benefit Profile, Satisfaction with Hearing Aid Benefit, and the International Outcome Inventory for Hearing and Amplification in Daily Life Aids. Compared to the original research, hearing aid users reported more unassisted difficulty in easy listening conditions and less aided benefit in more challenging listening situations on the Profile of Hearing Aid Benefit. Subjects who had stopped wearing hearing aids reported reduced difficulties in unsupported conditions. All measurements showed

that hearing aids provided considerable long-term subjective benefits and pleasure (Takahashi et al., 2007).

Meister et al., (2002) has researched to determine the importance of fundamental Hearing Aid attributes and concluded that among six fundamental hearing aid attributes (speech in a quiet, speech in noise, sound quality, handling, feedback, localization), hearing aid users concern more about speech in noise and speech in quiet, also give this to relatively more importance. Outcome assessment enables audiologists to demonstrate the advantages of a hearing aid and the expenses of attaining those benefits (Saunders et al., 2005).

Self-report questionnaire provides real-world benefits and ground-level satisfaction of the hearing aid performance of hearing aid users (Taylor, 2007). Hearing aid satisfaction may vary among individuals as it is performance-driven and based on individual perception of benefit (Kochkin, 1992). For example, an individual has enough satisfaction while performing objective benefit measurement such as aided scores but reports identical satisfaction scores while performing subjective benefit measurement such as self-reporting questionnaires.

There are at least three reasons, according to Cox et al. (2003) to employ self-report measurements of hearing aid benefit and satisfaction. First, health care is becoming increasingly consumer-driven, owing to a variety of factors, including cost. The patient chooses which treatment is appropriate for them and monitors how many times it takes to complete. Self-report of results and satisfactions are the two most important metrics of service quality (Nayana, 2011).

The patient's viewpoint is valued more highly in consumer-driven health care. As a result, determining the real-world value and satisfaction of hearing aid use is vital. A

second challenge is that many real-life events cannot assess effectiveness in a lab environment. Traditional hearing aid outcome measurements, such as speech recognition in calm and noise, fail to represent the genuine experiences of hearing aid use in everyday scenarios (Cox (1997) Self-report measures of outcome should be employed to evaluate the genuine impact of hearing loss and its accompanying therapy on activity restrictions, lifestyles, and other factors. Third, even when laboratory conditions are employed to imitate real-world listening scenarios, the patient's perception of the situation is not always accurate.

Hearing aid benefit self-report assessments can be classified into several categories. To begin, patients may be asked to perform a direct examination or a comparison of their hearing abilities with and without a hearing aid. Subjective outcomes seem to have become the "Gold Standard" to which hearing aid benefit results are compared (Mendel, 2007).

The abbreviated profile of hearing aid benefit (APHAB) measures the subjective hearing loss in four typical hearing situations (subscales). The ease of communication (EC) scale examines basic hearing situations without ambient noise in a quiet environment, the background noise (BN) scale examines hearing situations with background noise, and the reverberation (RV) scale investigates hearing situations in large spaces with echoes. The aversiveness (AV) scale measures the perception of loud sound events (Löhler et al., 2017). The subjective outcome measures part of the hearing aid validation process include questionnaires assessing hearing aid benefits. These hearing aid benefit outcomes are designed to assess treatment efficacy directly or the subjective benefits perceived by the listeners. Some popular assessment tools for measuring hearing aid benefit for adults include the Abbreviated Profile of Hearing Aid Benefit (APHAB Cox & Alexander, 1995),

the Client Oriented Scale of Improvement (COSI; Dillon et al., (1997), the Glasgow Hearing Aid Benefit Profile GHABP; Gatehouse, (1999), and the Hearing Aid Performance Inventory HAPI; Walden et al., (1984). Table 1 provides list of details of Questionnaires assessing hearing aid benefit, satisfaction, and hearing disability or hearing handicap available in literature.

Questionnaire Benefit scales (Authors & Year):

Table 1

List of details of Questionnaires assessing hearing aid benefit, satisfaction, and hearing disability or hearing handicap

HAPI Hearing Aid Performance Inventory Walden, Demorest & Hepler 1984
PHAP Profile of Hearing Aid Performance Cox & Gilmore 1990
PHAB Profile of Hearing Aid Benefit Cox, Gilmore & Alexander 1991
SHAPI Shortened Hearing Aid Performance Inventory Schum, Dillon 1992, 1994
APHAB Abbreviated Profile of Hearing Aid Benefit Cox & Alexander 1995
COSI Client-oriented scale of improvement Dillon, James & Ginis 1997
PAL Profile of aided loudness Mueller and Palmer 1998
GHABP Glasgow hearing aid benefit profile Gatehouse 1999
IOI-HA International Outcome Inventory Hearing Aid

Hearing aid Satisfactory profile:

HAUQ Hearing Aid user's Questionnaire, Forster & Tomlin 1998

SADL Satisfaction with Amplification in Daily Life Cox & Alexander 1999

Hearing Handicap Profile:

HHS Hearing Handicap Scale High, Fairbanks & Glorig 1964
HPI Hearing performance inventory Giolas, Owens, Lamb & Schubert 1964, 1979
HHIE Hearing handicap inventory for the elderly Ventry & Weinstein 1982
HHIE-S Hearing Handicap Inventory for the Elderly- Screening Ventry & Weinstein 1983
CPHI Communication Profile for the Hearing-Impaired Demorest & Erdman 1987
M-A Scale McCarthy-Alpiner Scale of Hearing Handicap McCarthy-Alpiner 1983
CSOA Communication Scale for Older Adults Kaplan, Bailly, Brandt, Busacco & Pray 1997

Hearing aid Benefit scales:

I. Hearing Aid Performance Inventory (HAPI)

Walden et al. (1984) developed the Hearing Aid Performance Inventory (HAPI), a self-reported scale that assesses the hearing aid user's amplification success. It has 64 things divided into four subsections based on the listening scenarios.

1. The situation is quite noisy.
2. Settings with no speech stimuli Quiet situations
3. Settings with speakers close by Situations with limited signal information Situations with no speech stimuli

It consists of a five-point rating scale that spans from "extremely useful" (1) to "hinders performance" (5). To reduce administration time and boost reliability, (Schum, 1992) updated HAPI and developed Shortened Hearing Aid Performance Inventory

(SHAPI), which has a total of 38 items, and (Dillon, 1994) developed Shortened Hearing Aid Performance Inventory (SHAPI), which has a total of 25 items.

Interpretation and scoring:

All items' scores are combined and averaged (except for the "not applicable" replies). If the average score is closer to "1," the person gains an advantage.

Advantages:

Despite the substantial inter-subject variability, the HAPI has good reliability (0.96), making it helpful in determining the self-perceived advantage of those who have been using amplification. The shortened form (SHAPI) cuts down on administration and scoring time.

Disadvantages:

Familiar environments such as home and work are represented several times throughout the questionnaire; however, other factors such as social and emotional behavior, listening telephone use, and hearing aid use, which have not been administered, may also influence the hearing aid outcome. According to Newman & Weinstein (1988), the items are appropriate to a range of listening contexts; however, the HAPI may not apply to some older respondents.

II. Profile of Hearing Aid Performance (PHAP)

PHAP was developed by Cox & Gilmore (1990). It was developed to measure aided performance in seven different dimensions. It has 66 items self-administered inventory. Three categories of speech communication and one category of environmental sound are used to score the PHAP. They are:

- Speech communication under relatively favorable conditions,
    - ❖ Speech communication under the unfavorable condition that is not due primarily to background noise,
    - ❖ Speech communication in noise and
    - ❖ Perception of environmental sounds.

Cox et al., (1991) established the Profile of Hearing Aid Benefit from (PHAB). It comprises 66 items separated into seven subscales: familiar talkers, ease of communication, reverberation, reduced cues, background noise, aversiveness, and distortion of sounds. The PHAB's purpose is to compare the benefits of hearing aids (unaided vs. aided) across those seven parameters.

Advantages:

The PHAP and the PHAB have 66 items, making them reasonably descriptive assessments for determining the benefit of hearing aids. (Cox & Gilmore, 1990) found that the PHAP and its subscales have strong internal consistency reliability, ranging from 0.70 to 0.91. Correlations between tests range from 0.66 to 0.88.

Disadvantages:

Cox & Rivera (1992) showed that PHAB has a ceiling effect in three subscales, low internal consistency, and low test-retest correlation. PHAP and PHAB both have 66 items and are too long for clinical use.

III. Abbreviated Profile of Hearing Aid Benefit (APHAB)

APHAB was developed by Cox & Alexander (1995). It is the shorthand version of PHAB. It consists of twenty-five items and is divided into four subscales.

It has four subscales.

1. Ease of Communication (EC)

2. Reverberations (RV)

3. Background Noise (BN)

4. Aversiveness of sounds (AV)

The first three subscales test speech comprehension in varied everyday settings, while the fourth assess adverse reactions to louder sounds (e.g., traffic sounds). A seven-point Likert scale is used. The replies range from "always" (ninety-nine percent) to "never" (one percent) (zero percent).

Interpretation and Scoring:

Unaided vs. aided sub-score variations, as well as subscale patterns, are used to determine the interpretation. A difference of 22 points between the unaided and aided scores, according to (Cox, 1997), is required to be sure of a substantial difference between the EC, RV, or BN conditions. To prove actual benefit from hearing aid use, aided scores on all three subscales must be at least 10 points higher than unassisted scores on all three subscales.

Advantages

The APHAB is widely used because of its brevity and high internal reliability, and its software is readily available and automatically scored. The APHAB's graphical representation allows the audiologist to quickly understand the patient's communication needs and how amplification affects those needs.

Disadvantages:

Not all patients can answer the questions in the subscale "communication in background noise." More research is needed to see if normative data for patients who use higher-performance hearing aids differ.

The APHAB is firmly rooted in the disability domain, paying little or no consideration to the emotional and psychological repercussions of hearing loss or any service delivery component that may influence the result (Gatehouse, 2001).

IV. Client-oriented scale of improvement (COSI)

The Client Oriented Scale of Improvement (COSI) was developed by clinicians at the National Acoustic Laboratories (NAL) over several years in the early 1990s (cited in Sandlin, 2000). Dillon et al. (1997) developed norms for COSI among new hearing aid users adults. It consists of five situations with different listening conditions.

There are two ratings to evaluate the COSI, which are recorded on the same sheet on which the situations were outlined. Relative (degree of change): How much better do you hear in the situation (worse, No difference, slightly bigger, better, much better), Absolute (final ability): How well do you do in this situation? I can hear: hardly ever, occasionally—half of the time, most of the time, almost always.

Interpretation:

The final evaluation may reveal areas that need improvement or counseling because the rehabilitation procedure is tailored to each patient's needs and wants. The COSI assists in clarifying expectations and reminding the patient and therapist of the original fitting goals.

Advantages:

The COSI method is a statistically reliable and more traditional questionnaire that is rapid in analyzing hearing aid outcomes and helps analyze patient needs. This questionnaire is relevant, works well with standard interviewing techniques, and has high test-retest reliability (Dillon et al., 1997).

Disadvantages:

This questionnaire includes two different sorts of ratings, which might confuse a hearing-challenged person and alter the outcome of a hearing aid.

V. Profile of aided loudness (PAL)

Muller & Palmer, (1998) developed the profile of aided loudness (PAL). It determines loudness restoration with amplification. The patient assesses the loudness and loudness satisfaction in 12 different settings or noises. The loudness rating ranges from "cannot hear" (0) to "uncomfortably loud" (7). The loudness rating is compared to the evaluations of normative (normal hearing) respondents. The target rating for each item is 70% of the norm group choosing that particular item. The loudness profile rating is established when the acceptable rating is within +1 standard deviation of the target. For example, the aim is 4 +/- 1 for medium noises such as typical speaking.

Interpretation and Scoring:

There are four possible outcomes.

• Goal of normal aided loudness perception met; the patient is satisfied.

• Goal of normal aided loudness perception met. The patient is dissatisfied

• Goal of normal aided loudness perception not met; the patient is satisfied

Goal of normal aided loudness perception not met; the patient is not satisfied.

For each loudness level, each satisfaction rating is examined (soft, medium, and loud). The loudness profile is then compared to the satisfaction profile.

Advantages:

The PAL is simple and can be used with high compression hearing aids like the WDRC or compression limiter.

Disadvantages:

This is a lengthy questionnaire because it evaluates people in various contexts and with varying intensity. It employs a seven-point rating scale, which provides a wide range of options that may reduce the questionnaire's reliability.

VI. Glasgow hearing aid benefit profile (GHABP)

The Glasgow hearing aid benefit profile was developed by Gatehouse (1999). It a ssesses the efficacy of hearing therapy for adults with hearing loss. The GHABP is a set of questions about various listening situations. It evaluates deaf and hard of hearing people in various ways, including initial disability, handicap, reported hearing aid use, reported benefit, satisfaction, and residual disability.

Interpretation:

Questions are looked at one at a time, but the higher the number linked with a specific answer, the easier it is.

Advantages:

Many characteristics (disability, handicap, hearing aid use, reported benefit, satisfaction, and residual disability) are measured at one point, saving time.

Disadvantage:

Gatehouse (2001) discovered a strong link between initial disability and handicap, hearing aid use but little benefit, residual disability, and low satisfaction.

VII. International Outcome Inventory – Hearing Aid (IOI-HA)

The International Outcome Inventory for Hearing Aids (IOI-HA) was developed by (Cox& Alexander,2000).The International Outcome Inventory for Hearing Aids (IOIHA) is a seven item questionnaire that can be used to assess the efficacy of hearing aid treatments in general. The IOIHA, which consists of seven questions on a five-point rating scale, aims to evaluate the benefit, satisfaction, and quality of life changes related to hearing aid use. 154 adults were used to standardize the IOI- HA (Cox et al.,2003). The IOIHA was created to be used alongside other self reporting tools, such as the APHAB.

Advantages:

Compared to other profiles, this inventory is simple to perform and requires less time. This questionnaire is accessible in various languages and is simple to use.

Disadvantages:

According to Stephens (2002), the IOIHA has two subscales:

A 'benefit' subscale and the other is residual difficulties subscale. The 'benefit' subscale was connected with both COSI elements, but only the residual measure was correlated with the residual problems subscale. The IOIHA has no consistent associations with a variety of demographic parameters.

Satisfaction inventories:

VIII. Hearing Aid User's Questionnaire (HAUQ)

The Hearing Aid User's Questionnaire (HAUQ) was developed by Forster and Tomlin,1988 (cited in Dillon, 2001). It includes questions about hearing aid use, challenges, and satisfaction related aspects. The primary purpose of HAUQ, according to Dillon et al., (1999), is to detect abnormalities that may impact a person's ability to use and benefit from a hearing aid. Dillon defined the questionnaire as follows:
Questions one and two deal with hearing aid usage, with categories in question two ranging from 1to 6. Question three is about benefits, with "not at all" being a 1, "a little" being a 2, and "a lot" being a 3. Question four concerns issues, with a value of 2 for "no" and 1 for "yes." Questions five- 7, on a scale of 1- 4, are about satisfaction. Question eight seeks the client's opinion on whether they have issues requiring another appointment. Questions nine to eleven are openended questions that seek the client's opinion on what they like and hate about the services and instruments they have received.

Advantages:

This questionnaire is simple to use and can also be mailed to patients. It assesses a variety of factors at once, including consumption, benefit, and satisfaction.

Disadvantages:

There are not many questions to assess the value of hearing aids. On the HAUQ, there is very little information.

IX. Satisfaction with Amplification in Daily Life (SADL)

Cox & Alexander (1999) developed the satisfaction with amplification in daily life questionnaire (SADL). The SADL is a self administered questionnaire created as a clinical measure of patient satisfaction. However, it is not administered in two stages like the APHAB (corresponding to unaided and unaided). It's given out after the event, and all questions are set up with an implicit reference. The SADL questionnaire has 15 items from which a global score and four subscales can be calculated. The four subscales are positive effect, service and cost, negative features, and personal image.

The following are some examples of the items:

1. Positive effect: 'Reduction in how often you ask people to repeat themselves
2. Service and cost: 'Competence of the dispenser
3. Negative features: Feedback when the hearing aid is turned up
4. Personal image: 'Does the hearing aid make you seem less capable

Interpretation and Scoring:

The global score is the average of all the completed items' scores. Averaging the item responses score the subscales separately. The higher the number, whether on an individual subscale or a global scale, the more satisfied the patient is, according to Cox & Alexander, (1999).

Advantages:

The SADL is brief and takes little time to complete. It can be emailed to patients or completed in the clinic, saving time for the physician.

Disadvantages:

This survey does not consider much in the way of listening conditions. According to Gatehouse (2001), the APHAB would be a better tool than the SADL for determining the benefits of higher-tech hearing devices (like directional microphones, different signal-to-noise ratios, etc.)

Hearing Handicap Profile

X. The Hearing Handicap Scale (HHS)

HIGH et al. (1964) developed the hearing handicap scale. This was the first time a self report questionnaire was used to evaluate hearing impairment. The HHS comprised forty questions about voice perception, localization, telephone communication, and noise settings. This questionnaire was divided into two halves (A & B), each with twenty questions. The pre and post testing forms are used. This survey employs a five-point rating system ranging from "almost usually" to "almost never."

Interpretation and Scoring:

Scores of 0 to 20% indicate no hearing handicap, 21 to 40% suggest a modest handicap, 41 to 70% indicate mild moderate handicap, and 71 to 100% indicate severe disability, according to (Schow & Tannahill, 1977).

Advantages:

HIGH et al., (1964) showed high internal consistency reliability (0.96) for each form. This questionnaire is easy to administer and calculate.

Disadvantages:

According to HIGH et al. (1964), questionnaire responses can be successfully fabricated, and there is no internal mechanism for assessing a response's legitimacy. This survey does not consider other aspects of experience, such as social, emotional, psychological, and vocational domains.

XI. Hearing Performance Inventory (HPI)

Schow & Tannahill (1977) developed the Hearing Performance Inventory to assess the problems faced by deaf and hard-of-hearing persons in daily life listening situations. There are twenty-five items in all, separated into emotional and social subscales. It examines the impact of hearing loss on older people's social and emotional conduct. The patient's attitudes and emotional responses to his or her hearing loss are assessed using the emotional scale. The social scale assesses how hearing loss is viewed in various social circumstances. After one year of using a hearing aid, (Newman & Weinstein, 1988) found a significant reduction in perceived social and emotional behavior. They concluded that the HHIE is valuable for measuring hearing device benefits. HHIE has been utilized in several studies to assess the effectiveness of hearing aids. HHIE is an effective method for measuring hearing aid benefits over time, according to (Malinoff & Weinstein, 1989). There are twenty-five items in all, separated into emotional and social subscales. It examines the impact of hearing loss on older adults' social and emotional conduct. The patient's attitudes and emotional responses to his or her hearing loss are assessed using the emotional scale. The social scale assesses how hearing loss is viewed in various social circumstances.

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Advantages:

This questionnaire examines persons in various domains, making it a practical assessment and planning tool for optimal rehabilitation. It provides detailed information on the hard of hearing person's difficulties in a wide variety of listening situations.

Disadvantages:

It is a lengthy questionnaire that takes a long time to complete, and most circumst ances are unfamiliar to the elderly.

XII. Hearing Handicap Inventory for the Elderly (HHIE)

Ventry & Weinstein, (1982) developed a Hearing Handicap Inventory for the Elderly. There are twenty-five items in all, separated into emotional and social subscales. It examines the impact of hearing loss on elderly people's social and emotional conduct. The patient's attitudes and emotional responses to his or her hearing loss are assessed using the emotional scale. The social scale assesses how hearing loss is viewed in a range of social circumstances. After one year of using a hearing aid, (Newman & Weinstein, 1988) found a significant reduction in perceived social and emotional behavior. They concluded that the HHIE is a valid tool for measuring hearing device benefits. HHIE has been utilized in a number of studies to assess the effectiveness of hearing aids. HHIE is an effective

method for measuring hearing aid benefits over time, according to Malinoff & Weinstein, (1989). The responses are on a three-point scale: "yes" (4 points), "occasionally" (2 points), and "no" /"not applicable" (0points). The highest score is 100, while the lowest score is 0. The larger the perceived handicap, the higher the score. HHIE-Screening was developed by Ventry & Weinstein, (1983). It is a screening version of the Elderly Hearing Handicap Inventory (HHIE-S). It is made up of ten items that are evenly distributed into each subscale.

Newman & Weinstein, (1986) created HHIE-Spouse. It is a ten-item scale based on the HHIE. It can be used as a screening method for analyzing a spouse's emotional and social components of hearing loss. Hearing Handicap Inventory for Adults (HHIA) was established by Newman et al., (1990) adapting HHIE. There were also twenty-five questions in total, with emotional and social subscales. The formerly featured questions that measured the occupational consequences of hearing loss, whereas the latter did not. Newman et al., (1991) reported good test-retest reliability (r= 0.93 to 0.97).

Interpretation and scoring:

It has a three-point rating scale, with "yes" receiving four points, "sometimes" two points, and "never" receiving zero points. The overall score is between 0 (no perceived handicap) to 100 (severe perceived hearing handicap), with higher scores indicating more significant perceived hearing handicap and lower scores indicating less perceived hearing handicap, according to Newman & Weinstein, (1989).

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Advantages:

HHIE had good dependability (0.94 to 0.95), according to Ventry & Weinstein, (1982). They also found a significant correlation of 0.87 between the two subscales and high internal consistency. This questionnaire can be completed in a short amount of time.

Disadvantage:

According to Gatehouse, (2001) there is a lower association between HHIE scores and speech identification scores, assisted scores.

XIII. McCarthy–Alpiner Scale of Hearing Handicap (M-A scale)

McCarthy and Alpiner (1983) developed a McCarthy–Alpiner Scale of Hearing Handicap questionnaire. It is a thirty-four-item questionnaire that examines the psychological, social, and occupational impacts of hearing problems in adults. It comprises two forms, one for the patients to fill out and the other for a family member. Family members may be able to offer a unique viewpoint on the patient's situation.

Advantages:

It thoroughly examines psychological, social, and occupational issues, which can be a valuable tool for determining a person's hearing problem. McCarthy and Alpiner (1983) observed a Cronbach's alpha of 0.81, indicating strong internal consistency.

XIV. Communication Profile for the Hearing Impaired (CPHI)

Communication Profile for the Hearing Impaired (CPHI) was created by Demorest & Erdman (1986). It was created to systematically and comprehensively examine hearing-impaired people's communication issues. The Communication Performance Scales,

Communication Importance, Communication Environment Scales, Communication Strategies Scales, and Personal Adjustment are the five subscales of the Communication Performance Scales. Each subscale consisted of a different set of questions that assessed various aspects.

Interpretation & scoring*:*

Demorest & Erdman, (1986) evaluated the results, stating that a low score may indicate challenges in a particular area, while a high score indicates good communication.

Advantages:

This scale had multiple subscales that may be used to assess an individual with a hearing disability in various ways. (Demorest & Erdman, 1987) found this questionnaire reliable and valid.

Disadvantages:

This questionnaire is very lengthy to administer compared to other handicap scales like the hearing handicap scale and hearing handicap inventory for the elderly.

This questionnaire is very costly to purchase.

Communication scale for older adults (CSOA)

Kaplan (1997) established the communication scale for older individuals. (CSOA). It is a self-assessment measure that assesses autonomous, older patients' communication tactics and attitudes. It is made up of 72 items that are separated into two subscales: communication methods and communication attitudes. The communication techniques scale evaluates actual or perceived communication failures and strategies in each scenario. The communication attitudes scale assesses the patient's attitude toward his or her hearing

loss and his or her self-perceptions as a hard-of-hearing person. It also touches on the perceptions of others (friends and family) regarding hearing loss.

Advantages:

The CSOA assesses a deaf or hard of hearing individual in a large domain, i.e., communication strategies and attitude, which can be very useful to help the person in management.

Disadvantage*:*

This one is quite long compared to other scales, such as the hearing handicap inventory for the elderly.

Interpretation and Scoring:

Individual scores on the communication methods scale that surpass 0.10 suggest benefit on the three-point scale, and 0.04 or above show benefit on the five-point scale, according to Kaplan, (1997). A difference of 0.10 on the three-point scale and 0.11 on the 5-point scale indicates benefit on the communication attitude scale.

For the Indian context Vanaja (2000) created a questionnaire for self-assessment of hearing impairment. It evaluates people's hearing impairment in a variety of scenarios, including familiar/unfamiliar, noisy/quiet, and with/without visual indication. It had fifty questions and was graded on a three-point scale. From all of the time (2) to only a few times (1), a rating system was applied (0). The results demonstrated a good correlation between self-perceived and speech identification scores in both quiet and noisy conditions. It can be advantageous in predicting the severity of hearing loss. One hundred first-time hearing device users with mild-to-moderate hearing impairment were fitted with linear

analog and modern (digital) hearing aids. Wood & Lutman, (2004) assessed speech recognition ability and self-reported benefit.

The Abbreviated Profile of Hearing Aid Benefit (APHAB) and the Glasgow Hearing Aid Benefit Profile was used to assess self-reported benefit (GHABP). The quality of life, the use of hearing aids, and the users' preferences were all evaluated. At 75dB, the digital aids performed much better than the analog aids in speech recognition. It should be noted that the APHAB is a checklist that assesses the handicap associated with hearing loss and also the decline in hearing capacity. The degree of impairment acquired using a hearing aid. It is worth pausing to examine what this implies and does not imply. A hearing aid is often the recommended treatment for auditory impairment. As a result, the APHAB and its related inventories were mainly intended to measure this area in order to assess the efficacy of the fitting in reducing impairment. It is expected that the impairment decline will be followed by some relief of handicap, which is undoubtedly a complicated variable (Kochkin, 1992), including factors frequently overlooked in the hearing restoration program. We expect comprehensive documenting of impairment minimization using APHAB will encourage hearing aid fitting optimization. These questionnaires, developed for children and adults, assess various aspects of communication skills and ease of listening in various acoustic conditions. Similarly, subjective preference for satisfaction is of utmost importance in outcome measurements for hearing aid benefit assessment.

Chapter 3

METHODS

The present study aimed to translate and validate an Abbreviated Profile of Hearing Aid Benefit - Gujarati Version from the original Abbreviated profile of hearing aid benefit (English) to measure hearing aid benefit in Gujarati adult hearing aid users.

Research Design

A preliminary descriptive study validated the hearing aid benefit using APHAB (Gujarati version). A comparison between with and without hearing aid was employed to compare the hearing aid (HA) benefit of HA users and without hearing aid.

Participants

A total of 30 participants who were Hearing Aid users and native Gujarati speakers with an age range of 18 - 60 years from various private clinics and government hospitals in Gujarat state were recruited for the study. The Questionnaire was administered on all the 30 participants.

Mode of Assessment

As per the AIISH academics guidelines, the study was conducted online due to the Covid 19 pandemic restrictions. The participants/caregivers were informed about the questions needed to administer the test.

Source of the participants

The participants were sourced from Ahmedabad, Maharashtra. The data was collected from the participants online using Google Forms. Participants were included in

the study only on fulfilling specific criteria. Before administration of the questionnaire consent for participation in the study was taken from the participants. The criteria are listed in the following sections.

Demographic Data

During the evaluation, specific demographic data was noted regarding case serial number, age, gender, contact number, E-mail id, daily use of hearing aid, duration of hearing aid use, hearing aid type, and degree of hearing difficulty.

Inclusion Criteria

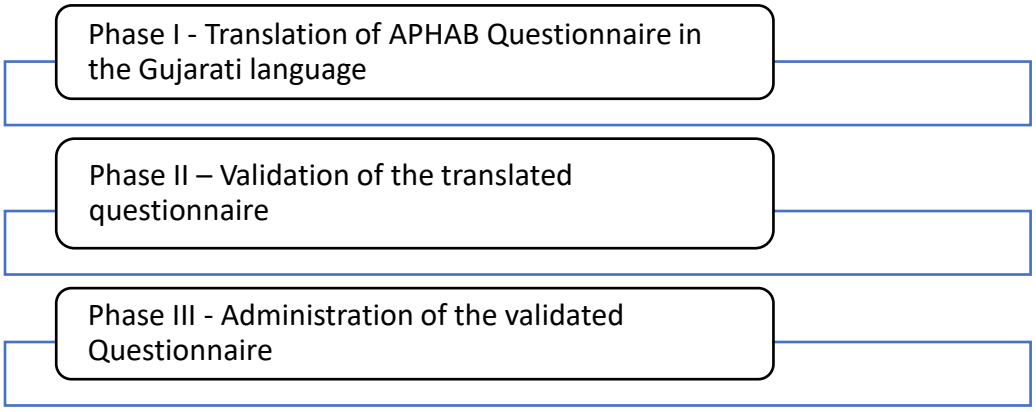
- The pure tone unaided threshold ranged from mild to severe sensorineural hearing loss (in frequencies between 250 Hz and 8000 Hz).
- The aided pure tone threshold within the speech spectrum (in frequencies between 250 Hz and 4000 Hz).
- Individuals newly fitted with a Digital hearing aid and with prior 2-3 years of amplification experience are selected.
- Participants should be native of the Gujarati language.
- No otologic and neurologic history.

Exclusion criteria

- Persons with congenital hearing loss.
- Persons with conductive or mixed hearing loss.
- History of neurological and psychological problems.

Procedure

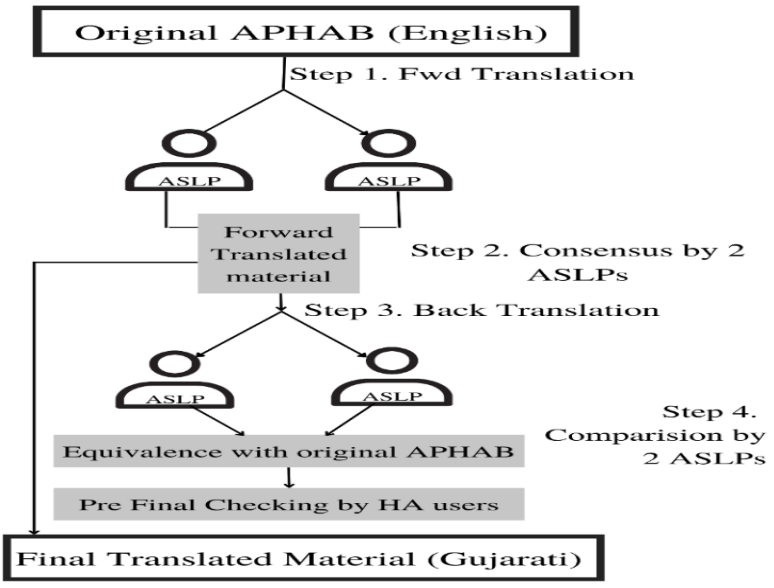
This study was carried out in three phases:



The Questionnaire must be translated and culturally adjusted following a technique that has gained international acclaim to preserve the quality of the cross-cultural adaptation process. The American Association of Orthopaedic Surgeons (AAOS) Results Committee has employed this technique, which is reflected in Figure 1.

Figure 1

Translation procedure for translating APHAB (Gujarati Version)



Phase I: Translation of the Questionnaire in the Gujarati language

The first phase involved translating the Abbreviated profile of hearing aid benefit, available in English, into the Gujarati language. The Abbreviated Profile of Hearing Aid Benefit was translated using the well-accepted American Academy of Orthopedic Surgery (AAOS, 2000) guidelines that included the forward-backward translation process. The following five steps were included:

1. **Forward translation:** Initially, in step 1 of translation, the test material available in English was given to two professional experts for forward translation. APHAB, available in English, was translated to Gujarati Version using the established translation technique (AAOS, 2000). Consequently, two multilingual persons converted the measure from English (original language) into Gujarati (target language). The fundamental goal of adopting this approach was to achieve translation conceptually equal to the target language's culture. To achieve the goal, two multilingual professionals were carefully chosen (an assistant professor of audiology from the audiology department of Sola Audiology College having more than 20 years of experience as a professional practitioner Audiologist and speech-language pathologist). They were fluent in both languages and were well-versed in both cultures.

   Furthermore, experts were instructed to be cautious of technical correspondences of the language, such as grammatical rules, question length, and an appropriate level of abstraction about socio-cultural context. Finally, two APHAB (Gujarati Version) were generated independently.

2. Synthesizing popular translation: A single combined approved version of the forward translations done by two translators was done. Two proficient translators participated in this process, and a consolidated version was done.

3. Backward translation: This was done primarily to determine the conceptual equivalence between the obedient forward translation and the original version. The consolidated approved version in the Gujarati language was independently translated into English by two adult bilingual translators proficient in both languages (English & Gujarati). The fact that these specialists would be unaware of the actual scale was considered. This phase in the current study was designed to guarantee that the Gujarati-translated view is correct, valid, trustworthy, and devoid of linguistic biases. As a result, two separate English translations for APHAB (Gujarati version) were completed.

4. Analysis by the expert committee: The expert analysis committee included two experienced ASLP to compare and evaluate the forward and backward translations. The common approval assured the accuracy of the translation of all specialists. The Committee will make decisions on any of the instrument's translated sections (instructions or punctuation) to establish symmetry between the translated and original versions in four areas:

1. Semantic similarity in terms of word meaning, including vocabulary and grammar;
2. Idiomatic similarity takes into account common expressions and idioms, which should be present in both languages;
3. experimental similarity, often referred to as cultural equivalent, in which the circumstances shown in the original versions of the objects must correspond to those encountered in the cultural context;

4. Conceptual similarity includes the validity of the notion studied and the experiences the person describing them in the Questionnaire about the target culture has.

5. Pre-final checking: The cognitive interviewing/debriefing stage included the pre-final version of Questionnaire APHAB (Gujarati version) that was administered to the target population sample to obtain their opinion/feedback on the acceptance and interpretation of the questions. Based on their suggestion, appropriate changes were made to the Questionnaire. After incorporating the suggestions from the target population, the Questionnaire was sent to five Hearing Aid users to assess the hearing aid benefit. After the final translated Questionnaire, it was distributed to the hearing aid users through Gmail, WhatsApp, and social media platforms through a Google form that describes the purpose of the questionnaire and completion instructions for administration.

All the ASLPs involved in the translation process were native speakers of Gujarati, with their second language as English, who were proficient in reading and writing both languages. The ASLPs had an experience in the field of Audiological rehabilitation for a minimum of five years, and some had the experience of more than 15 years.

Phase II – Content Validation of the Abbreviated profile of hearing aid benefit (Gujarati version) Questionnaire

Following the completion of the surveys, it was advised that an expert group of five professional audiologists with more than ten years of experience in audiology, specifically in the field of Auditory Rehabilitation, was formed to examine the construct validity of the questionnaire and response alternatives. The Questionnaire was graded on a

three-point Likert scale (1-inappropriate, 2-somewhat appropriate, 3-more appropriate). The questions that obtained ratings of 1 and 2 during validation were modified and included in the Questionnaire.

After incorporating the suggestions from audiologists during content validation the final questionnaire was prepared. The Abbreviated Profile of Hearing Aid Benefit (Gujarati version) is attached in appendix A.

Phase III – Administration of the APHAB (Gujarati Version) Questionnaire

After the translation and validation completion, it was essential to administer the Abbreviated Profile of Hearing Aid Benefit (Gujarati Version) to adults with the digital hearing aid. The administration of the Questionnaire provides the idea of the actual usefulness of the Questionnaire in a real clinical scenario. Before administration of the Questionnaire to adult hearing aid users, they were made aware of the Questionnaire in terms of how to select the appropriate option according to their daily life experience with the hearing aid, test scores, domains of the Questionnaire, and sections of the Questionnaire.

Inventory description

The APHAB- Gujarati version includes 24 questions with two sections (With hearing aid & without hearing aid), and six questions for each subscale were distributed randomly within the inventory. Those four sections are Ease of communication, Reverberation, Background noise, and Aversiveness. Each question is answered 'with hearing aid' and 'without hearing aid,' so each subscale produces the score for unaided

listening and aided listening. In addition, the difference between the two section's mean scores can be used to obtain the hearing aid benefit. The APHAB consists of 24 questions that are assessed on four different subscales.

The following are the different elements of APHAB questionnaire:

(1) Ease of Communication (EC): the difficulty of communicating under reasonably favorable settings.

(2) Reverberation (RV): interaction in reverberant spaces such as lecture halls.

(3) Background noise (BN): conversation in environments with a lot of background noise.

(4) Aversiveness (AV): the discomfort or annoyance of ambient noise.

Pretest Instructions

Before administering the Questionnaire, instructions were given to see if the participant understood the task that needed to be completed. "Please keep in mind your daily experiences and correct the nearest answer. Each option has a certain percentage that should be kept in mind. You can use it to check your answers. For example, if the statement is 75% true, for that statement to be true on "C" (Generally). If you have not experienced the given situation, consider the appropriate applicable situation and respond to the situation. If we still do not understand, leave the given statement blank".

Participants were asked to estimate the time spent on each section of the Questionnaire (with & without HA). The Questionnaire was self-administered, although if the patient needed support, the assistance was provided to individuals. They were instructed to rate each question on a seven-point rating scale (A, B, C, D, E, F & G). There

are seven different options available: A means Always, B means almost always, C means Generally, D means Half-the-time, E means Occasionally, F means Seldom, and G means Never. The scoring for each point was 99% for response 'A', 87% for response 'B',75% for response 'C',50% for response 'D', and 25% for response 'E',12% for response 'F' and 1% for response 'G'. All the questions are administered (with/without Hearing Aid) at the same time as sitting with the patients.

Test Administration

A Google form was used to administer the APHAB-Gujarati version questionnaire. The response from the patient could be operated using the traditional pen and paper format or with the patient responding directly on the electronic platform such as Google form. It is more convenient if the patient reacts instantly on the electronic platform as its saves time for both the clinician and patient. The patient was recommended to attempt the "without hearing aid" portion before attempting "with the hearing aid" for a better comparison of hearing aid. The patient must complete both parts of the inventory in the same sitting; you should ask them to complete all the "without hearing aid" before the "with the hearing aid" responses. This precaution minimizes the likelihood of the patient becoming confused and entering the data in the wrong columns. Following validation, the Questionnaire was circulated randomly to several hearing aid wearers (native Gujarati speakers) via Gmail, WhatsApp, and other social media platforms using a Google form. The HA users were chosen through personal connections and a variety of groups of professional audiologists. The goal, objective, and the need for the study were described to the clients once the subject met the eligibility criteria. The consent form was completed once the client agreed to

participate in the study. All of their inquiries were answered satisfactorily, and participants were requested to respond to the questions honestly.

Furthermore, they were assured that the security and privacy of their data would be protected. Before completing the Questionnaire, clients were recommended to read it. The Questionnaire is self-administered; even so, if the client requires guidance, the set of questions can be assisted by an interviewer.

Scoring:

After administering the Questionnaire to adult hearing aid users, questionnaires were scored, and initial values were assigned to each answer from the index. The values were denoted in mean scores for each section, average unaided and average aided scores were calculated.

Analysis of the Data

The data collected were tabulated using the SPSS software (Statistical Package for the Social Sciences package (version 25). The data were subjected to statistical analysis to compare the Hearing Aid benefit to adult native speakers of Gujarati by using APHAB (Gujarati version). The mean scores (with hearing aid & without hearing aid) were obtained from the participants. To analyze the data, the following statistical measures were used:

- Mean scores, to arrive at the comparative scores for each subsection, namely, benefit without hearing aid, benefit with hearing aid.
- Shapiro-Wilk test was done to assess normality of the data.

- Wilcoxon Sign Rank test was administered to assess whether there is any statistically significant difference present for 4 domains with and without hearing aid condition.

CHAPTER 4

RESULTS AND DISCUSSION

The aim of the present study was to translate and validate the Abbreviated Profile of Hearing Aid Benefit available in English to the Gujarati Version. The statistics were done using the SPSS (25 Version). The statistical analysis was done for Comparison of the benefit scores of digital hearing aid users without and with hearing aids using the Abbreviated Profile of Hearing Aid Benefit (Gujarati Version) using the SPSS 25 version. Data obtained were statistically analyzed to see if the translated questionnaire demonstrated enough validity. The data's normality was assessed using the Shapiro-Wilk test, and the results showed that the data was not normally distributed ($p<0.05$). Hence, a Wilcoxon Sign Rank test was administered for further analysis. Mean, Median, Standard Deviation (SD), and 95% confidence interval for mean were obtained for each domain of the questionnaire using descriptive statistics. The findings of this study are divided into two sections: 1) content validation of the modified test and 2) administration of the translated and validated questionnaire

Content validation of the translated questionnaire

The material of the APHAB (Gujarati version) was validated. Three Audiologists with at least two years of experience and a Master's Degree in Audiology were asked to validate the content for each question in the translated material. A three-point Likert scale has been used to score the questionnaire (where 1-inappropriate, 2-somewhat appropriate, 3-more appropriate) (Lawshe, 1975). The spelling, grammatical rules, simplicity, and word meaning was rated for the following parameter in the following table 2.

Table 2

Demonstrates the content validation scores for each questionnaire question, including instructions and hearing aid use details

	Validator 1	**Validator 2**	**Validator 3**	**Validator 4**	**Validator 5**
Instructions	SA	MA	MA	MA	MA
Hearing aid use details	MA	MA	MA	MA	MA
Q1	SA	MA	MA	MA	MA
Q2	SA	MA	MA	MA	SA
Q3	MA	MA	MA	MA	MA
Q4	SA	SA	SA	SA	MA
Q5	SA	MA	MA	MA	MA
Q6	MA	MA	SA	MA	MA
Q7	SA	MA	MA	MA	MA
Q8	MA	MA	MA	MA	MA
Q9	MA	MA	MA	MA	MA
Q10	MA	SA	MA	MA	MA
Q11	MA	MA	MA	MA	MA
Q12	MA	MA	MA	MA	MA
Q13	MA	MA	MA	MA	MA
Q14	SA	MA	MA	MA	MA
Q15	SA	MA	MA	MA	SA

Q16	MA	MA	MA	MA	MA
Q17	SA	SA	MA	MA	MA
Q18	MA	MA	MA	MA	MA
Q19	MA	MA	MA	MA	MA
Q20	MA	MA	MA	MA	MA
Q21	MA	IA	SA	MA	MA
Q22	MA	MA	MA	MA	MA
Q23	SA	MA	M	MA	MA
Q24	SA	IA	MA	MA	MA

Note- MA- More Appropriate, SA- Somewhat Appropriate, IA- Inappropriate. This table demonstrates the content validation scores for each questionnaire question, including instructions and hearing aid use details. As seen above, almost all the questions were scored between more appropriate and somewhat appropriate. The suggestions and recommendations, such as changes in the grammatical form of changes received by the validators, were considered and incorporated into the constructed questionnaire.

Information about the patient's demographic details and questions related to hearing aid use (24 questions) translated into the Gujarati language was validated for content by five experts and is given in Table 2. It is evident from Table 2 that almost all the questions that were scored by most of the validators varied between more appropriate and somewhat appropriate. Validator 1 scores about 32% for somewhat appropriate and 68% for more appropriate for all the questions. Validator 2 scores are 28% for somewhat appropriate and 72% for more appropriate for given questions. Same way, validator 3 scores around 8% for somewhat appropriate and 92% for more appropriate. Whereas, validator 4 has scored 4% for somewhat appropriate, 4% for inappropriate and 92% for more appropriate responses. Validator 5 has scored the scores of somewhat appropriate and more appropriate 4% and 96% respectively. In table 1 'validator's responses for the questions of the questionnaire has given, which indicates all the validators were agreed for the given translated questions and gave scores more appropriately. Most of the responses for each test question by all the validators were more or less similar, and the same was considered as validated responses. The suggestions and recommendations, such as changes in the grammatical rules, question length, and an appropriate level of abstraction about socio-cultural context of modifications received by the validators, were considered, and changes were incorporated into the constructed questionnaire.

After incorporating the suggestions from audiologists during content validation the final questionnaire was prepared. The Abbreviated Profile of Hearing Aid Benefit (Gujarati version) is attached in Appendix A.

Comparison of the benefit scores of digital hearing aid users without and with hearing aids using the Abbreviated Profile of Hearing Aid Benefit (Gujarati Version).

Gujarati translation of the APHAB self-reported benefit questionnaire was used to assess the benefits of hearing aids. The questionnaire was given randomly to Forty-five individuals with hearing impairment. Incomplete questionnaire were rejected and 30 hearing aid users having mild to severe hearing loss (25-90 dB) who have filled the questionnaire were finally considered for further statistical Analysis. Participants' responses to each question were averaged for the "with hearing aid" and "without hearing aid" sections. The average Mean, Median, and, Standard Deviation (SD) scores for all the 24 questions were calculated for both domains: "with hearing aid" and "without hearing aid" and are tabulated in Table 3 and Figure 1.

Table 3

Average Mean, Median, and standard deviation scores of questionnaire (24 questions) for with and without hearing aid condition

	With Hearing Aid	Without Hearing Aid
Mean	4.71	4.53
Median	4.70	4.29
Std. Deviation	0.75	0.85

Figure 2

Average Mean, Median, and standard deviation scores of questionnaires (24 questions) for with and without hearing aid and condition

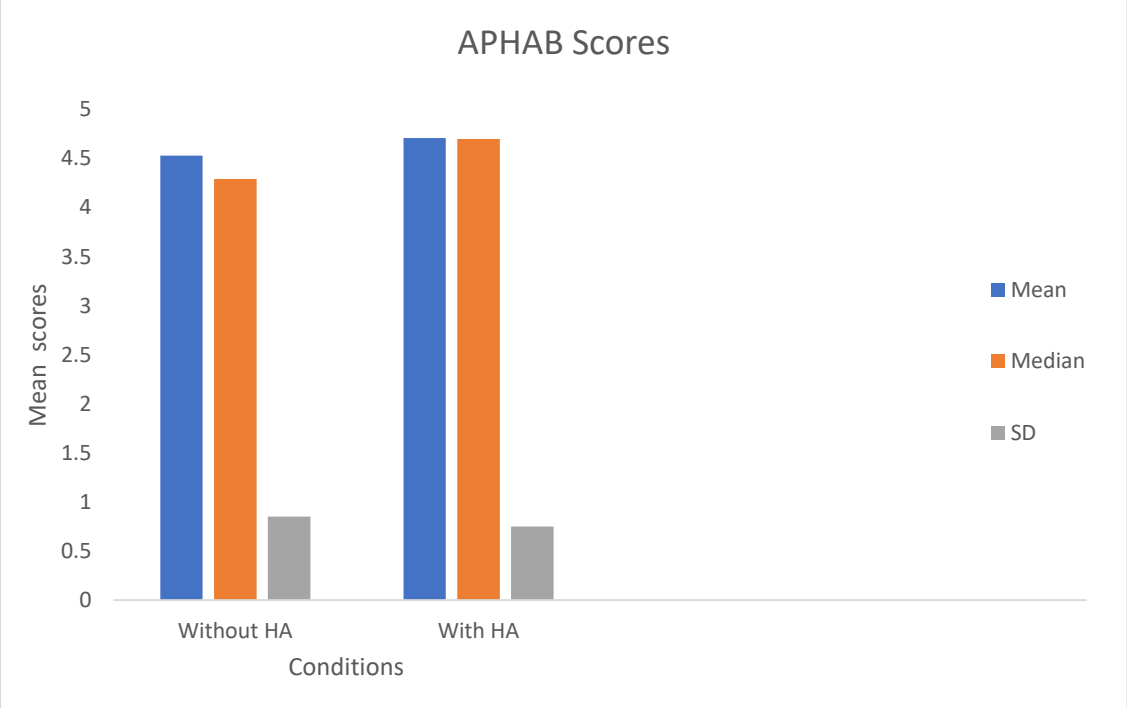


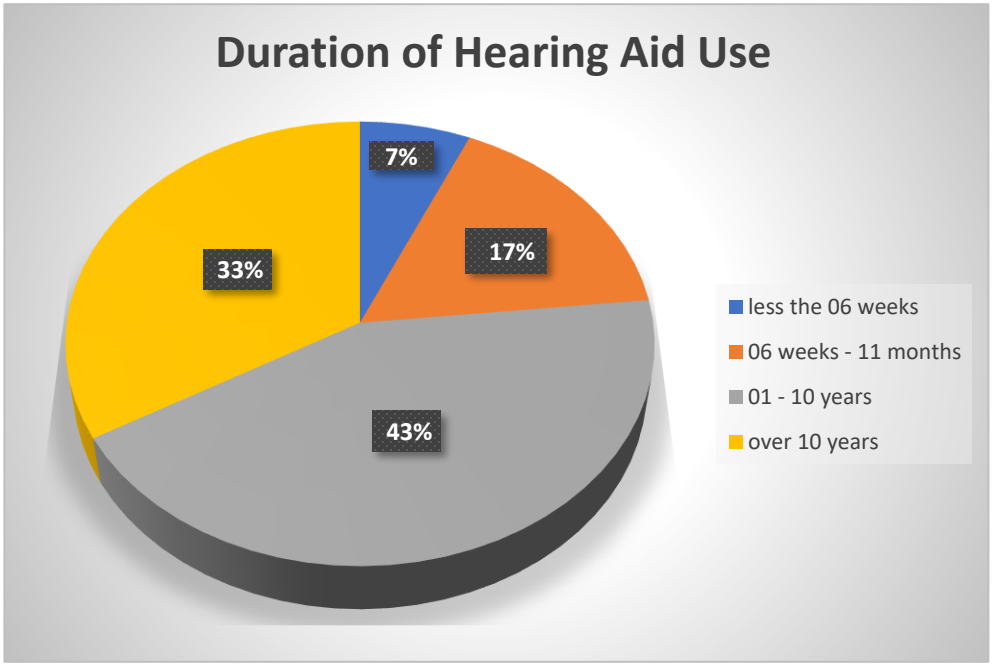
Table 3 and Figure 2 reveal the average mean scores of the questionnaire of adult digital hearing aid users assessed with and without hearing aid conditions. From Table 3 and Figure 2 it can be observed that the average mean and median scores of 24 questions in those with hearing aid conditions were found to be higher than those without hearing aid conditions. It can be concluded that the performance of individuals with hearing aid users were better compared to those without using hearing aids.

The findings reveal a substantial difference in mean scores between hearing aid-free and hearing aid-conditions, demonstrating a measurable benefit of using hearing aids. As a result, the study's findings showed that individuals could accurately evaluate their hearing aid benefits using the APHAB (Gujarati Version). Similar results were documented by (Cox, 1997) for twenty-two older persons who received their earliest hearing aids. The participants completed the Abbreviated Profile of Hearing Aid Benefit after wearing their hearing aids for three months (APHAB). All the participants (N=22) showed a substantial overall advantage with amplification.

Among the 45 participants' 30 participants whose responses were considered; the duration of the hearing aid use varied considerably. Rest of the participants were excluded from the study as they have not filled as per instruction. Most of the participants were regularly using their hearing aid. All the participants hearing aid usage was noted and the participants' period of hearing aid use is depicted in Figure 3

Figure 3

Duration of Hearing Aid usage percentage in adult digital hearing aid users.



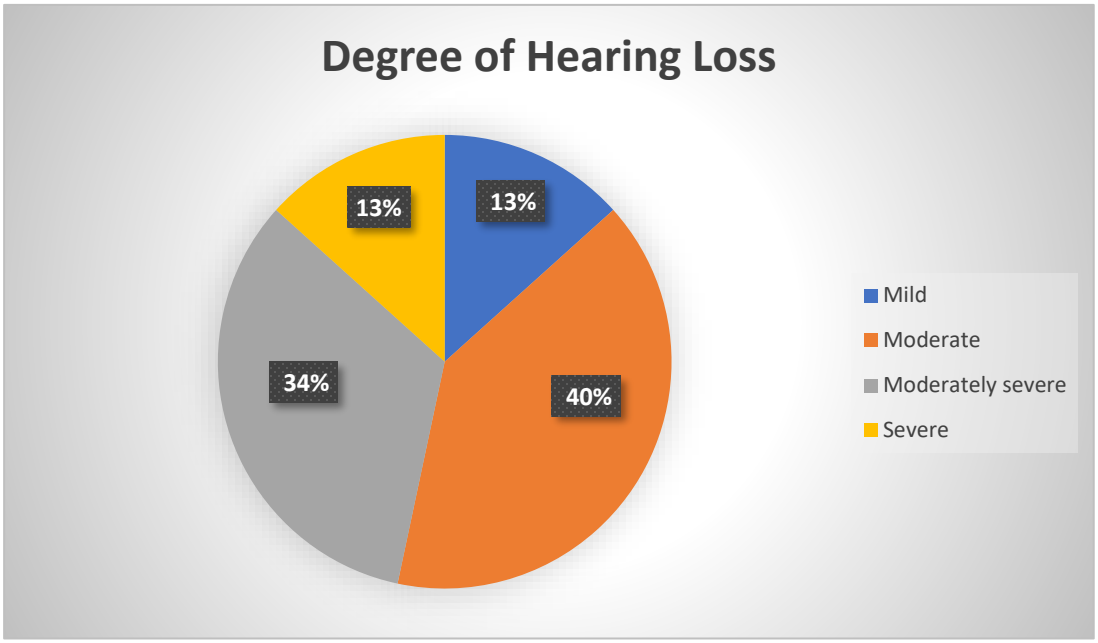
From Figure 3 it is evident that among 30 participants, two participant (7%) was using the hearing aid for less than six weeks because he was newly fitted hearing aid user. Whereas 05 participants (17%) were using the hearing aid for six weeks to 11 months (6.7%). About 13 participants (43%) were using their hearing aids for a duration between 1-10 years. 33% of the participants have been using a hearing aid for over ten years. The current study results are supported by (Cox, 2003) who has stated that the hearing device's outcome duration indicates real-world hearing aid outcome. According to data published by (Saunders & Jutai, 2004), there is a substantial correlation between lifetime hearing aid

usage (>10 years) and daily use, which means that with time, people gradually utilize their hearing aids more frequently. That is hearing aid usage helps the individual to deal with the worse listening settings and hence pushing him to wear it for longer duration.

Among the 30 participants it was noted that there were four participants (13%) who had mild hearing loss, twelve participants (40%) had moderate hearing loss, ten (33%) had moderately severe and four (13%) had severe hearing loss. Information about distribution of degree of hearing loss in 30 individuals are given in Figure 4.

Figure 4

Percentage for Degree of Hearing loss and adult digital hearing aid users.



The average mean scores obtained for each domain of the hearing aid benefit questionnaire (Gujarati Version) for 4 domains: Ease of Communication, Reverberation, Background noise, Aversiveness with and without hearing aid condition is given in Table 4. Each domain (sub scale) consists of six questions related to the listening situation. The first subscale, Ease of communication, contains six questions that was randomly assigned in the questionnaire. Similarly, all other three subscales (Reverberation, Background noise, Aversiveness) consisted of six questions which was random in order. Participants' mean scores to each question were averaged for the "with hearing aid" and "without hearing aid" sections. The average Mean scores for all the 24 questions were calculated for both domains: "with hearing aid" and "without hearing aid" and are tabulated in Table 4

Table 4

Mean scores (With & Without Hearing Aid) and distribution characteristics for Without hearing Aid and With Hearing Aid each question (4 domains) in the APHAB (Gujarati Version)

Subscale (Question number)	**Mean (Without Hearing Aid)**	**Mean (With Hearing Aid)**
EC (4)	3.83	5.46
EC (10)	3.9	4.43
EC (12)	4.26	5.76
EC (14)	2.93	5.26

EC (15)	4.1	5.46
EC (23)	3.63	5.63
RV (02)	3.83	4.86
RV (05)	3.6	4.93
RV (09)	4.2	2.33
RV (11)	4.63	3.8
RV (18)	3.46	5.06
RV (21)	3.63	2.96
BN (01)	4.1	2.63
BN (6)	3.5	4.86
BN (07)	3.8	5.36
BN (16)	4.4	2.63
BN (19)	4.3	3.2
BN (24)	3.9	5.23
AV (03)	5.16	5.5
AV (08)	6.93	5.3

AV (13)	5.66	5.13
AV (17)	5.03	2.76
AV (20)	5.03	4.7
AV (22)	5.56	5.16

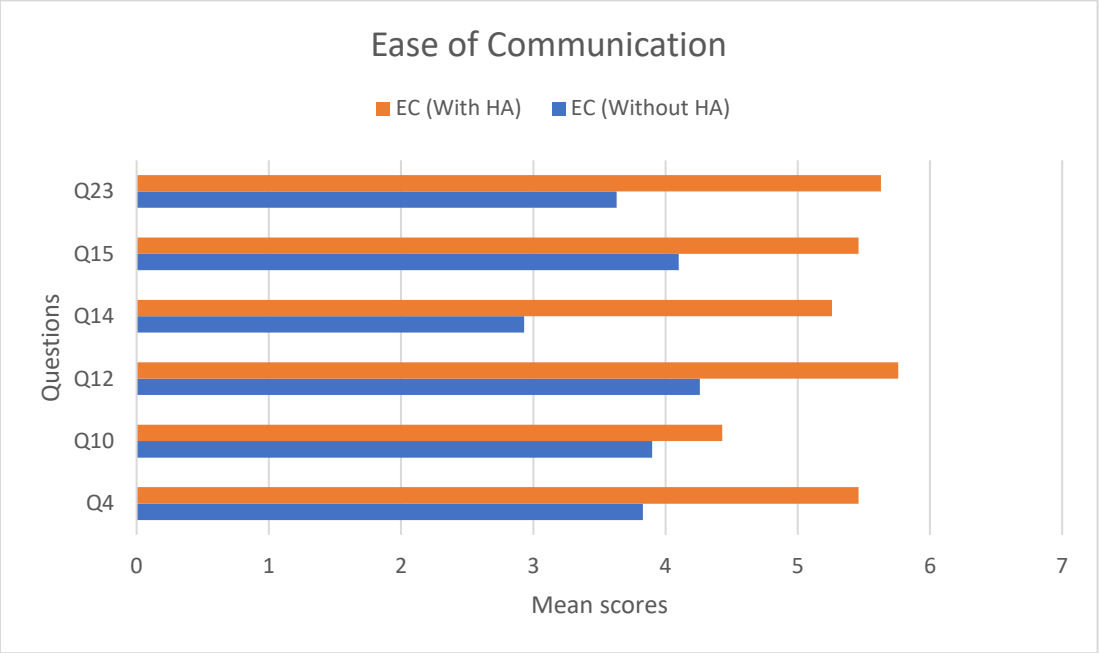
EC = Ease of communication; RV = Reverberation; BN = Background Noise; AV = Aversiveness

From Table 4 it can be noted that the individual mean scores for most of the questions in all four domains for hearing aid condition is found to be higher compared to without hearing aid condition. From these results it can be concluded that the participants were getting benefit from the hearing aids. However for some of the domains such as, reverberation (question 9, 21) and background noise (question 16, 19) mean scores were higher for without hearing aid condition. The mean scores obtained for aversiveness with hearing aid condition (question 8, 13, 17, 20 & 22) was found to be lesser which indicates that there was less negative reaction for the uncomfortable sounds for the participants when they wore the hearing aid. Whereas for question 3 (for alarm bell/smoke detector), there was slightly higher mean scores for with hearing aid condition compared to without hearing aid conditions.

The APHAB (Gujarati version) questionnaire's responses were collected for four domains; Ease of communication, Reverberation, background noise, and aversiveness are depicted in Figure 5, 6, 7 and 8 respectively.

Figure 5

Mean *scores of Ease of communication domain for adult digital hearing aid use*

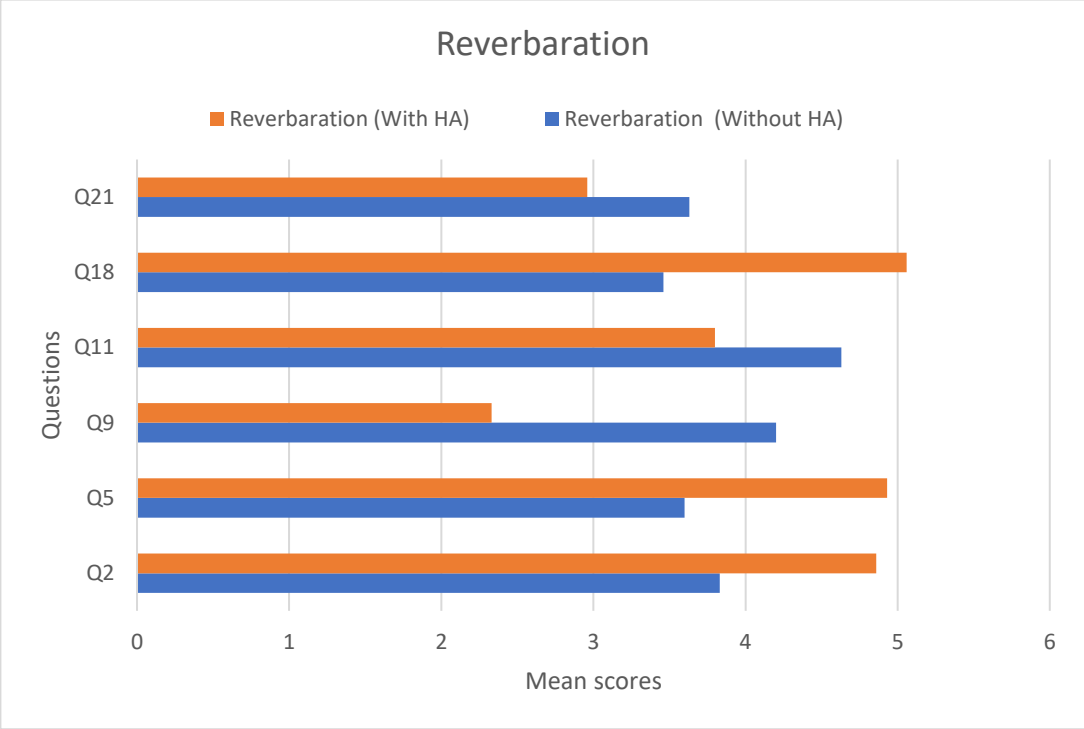


From the Figure 5, it is evident that the mean scores of all the questions (question number 4, 10, 12, 14, 15 & 23) of adult digital hearing aid users of Ease of Communication were found to be better for those with hearing aid conditions (5.33) compared to those without hearing aid conditions (3.77). Here, the questions of this domain mainly assessed about how well and clearly the participants can communicate with peers, known and any novel individuals with hearing aid condition. The difference in the mean scores suggests that there is considerable amount of benefit in understanding speech in real life communication in Gujarati adult digital hearing aid users.

The results with regard to ease of communication obtained in current study is supported in a pilot study done by (Weinstein, 1996b) on seven participants who were wearing linear hearing aids. As per the replies to the Knowles Satisfaction Survey, 71% of their participants were found to be happy with their hearing aids. Also, their results showed statistically and clinically significant reduction in the perceived handicap on the Hearing Handicap Inventory for Elders that was experienced by 71% of the patients.

Figure 6

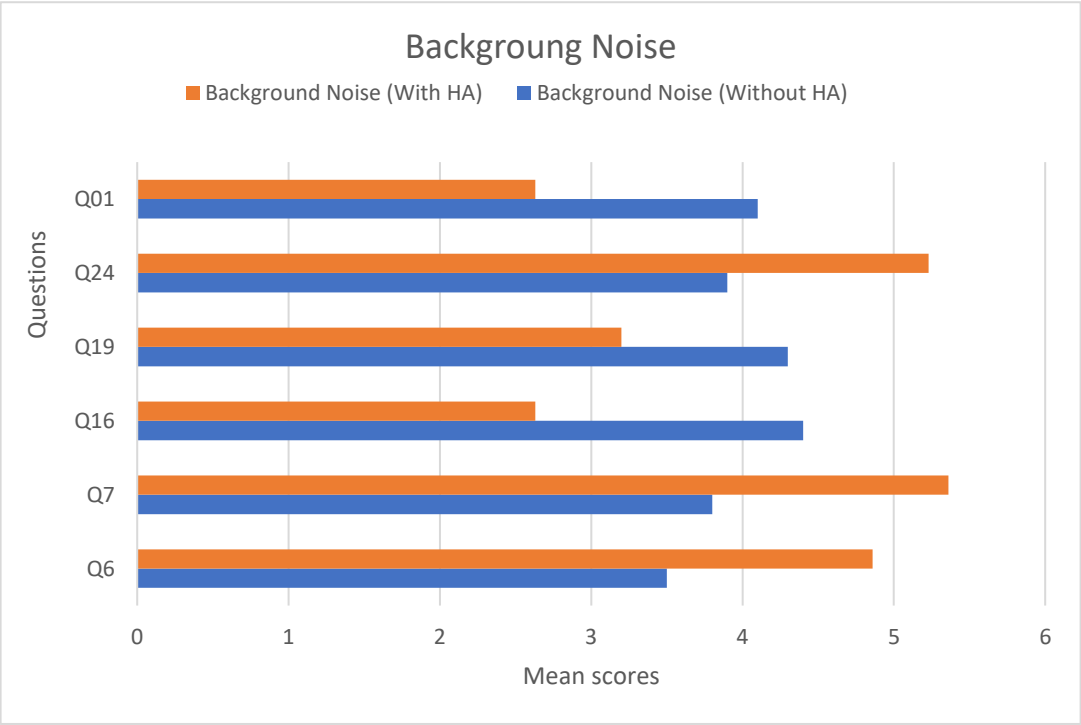
*Mean scores of Reverberation domain for adult digital hearing aid us*ers



From the Figure 6, it is clear that, the mean scores of all the questions (question number 2, 5 & 18) for Reverberation condition were found to be higher/better (4.95) with hearing aids compared to without hearing aid in adult hearing aid users (3.63). However, for few questions (question number 09, 11, 21), the mean scores obtained for without hearing aid conditions were found to be better/higher (4.15) compared to with hearing aid condition (3.03). This indicates that there was not much difference between both, with and without hearing aid conditions, for the reverberation situation. This indicates that individuals did not have difficulty in understanding speech in larger room while not using any hearing aids.

Figure 7

Mean scores of Background noise domain for adult digital hearing aid users

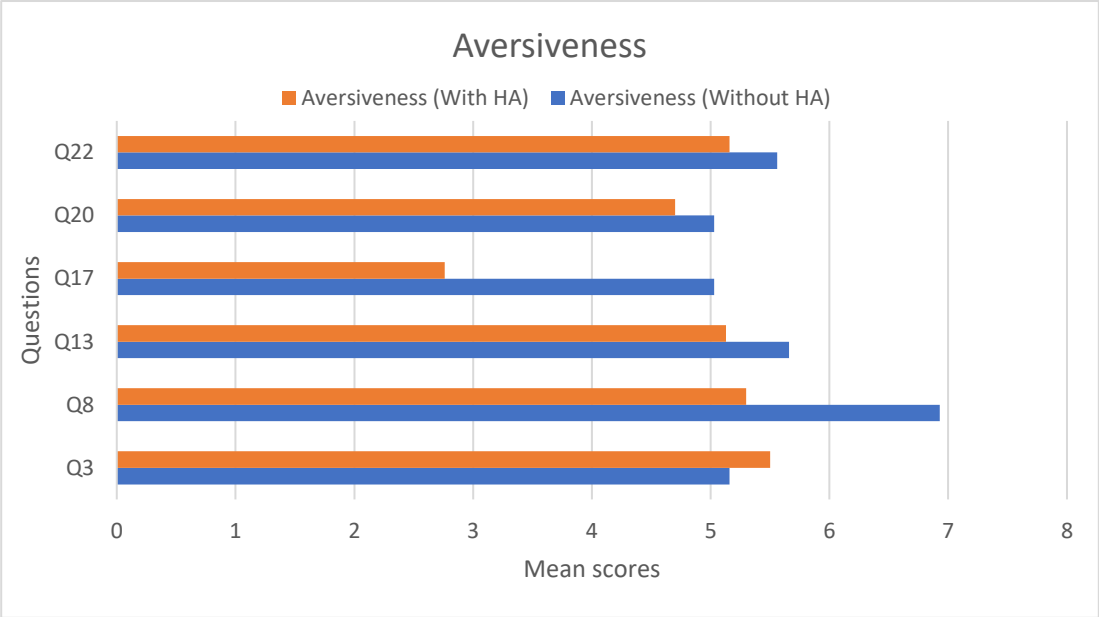


From Figure 7, it is evident that, the mean scores of the questions (question number 06, 07, 24) for Background noise condition were noted to be better (5.15) with the hearing aid condition compared to without a hearing aid condition (2.82). These results obtained could be due to advanced hearing aid technology. A directional microphone and specialized digital noise reduction algorithms are used in the majority of hearing aids are found to lessen irritation from noise Bentler et al., 2006; Bentler et al., 2009. These algorithms may, in certain cases, lead to better results. However, for few of the questions (question number 01, 16, 19) the mean scores were better in without hearing aid condition (4.26) compared to with hearing aid condition (2.82). The lesser total mean scores obtained with hearing aid condition in presence of background noise could be due to naïve hearing aid users, poor acclimatization with hearing aid.

The results of the current findings with regard to better scores obtained for background noise and reverberation condition without hearing aid condition correlates with recent research that has utilized subjective measurements and revealed a decrease in the perceived benefit of hearing aids under challenging situations and discomfort with the hearing aid (Cox & Alexander, 1995).

Figure 8

Mean scores of Aversiveness domain for adult digital hearing aid users



From Figure 8, it is evident that, the mean scores of the questions (question 8, 13, 17, 20 & 22) for adult digital hearing aid users for aversiveness condition with hearing aid was observed to be lesser compared to without hearing aid conditions. This indicates that individuals with hearing aids had no aversiveness to any adverse reaction toward the environment or avoiding such irritative situations (e.g., loud sounds such as passing an ambulance or vessel dropdown). However, for question 3, individuals showed slightly more aversiveness with hearing aid condition.

From the above results it can be noted that the mean scores obtained for most of the questions in all the 4 domains: Ease of communication, reverberation, background noise

and aversiveness was found to be better with hearing aid condition compared to without hearing aid condition. Hence, to check whether there is any statistically significant difference present for 4 domains with and without hearing aid condition Wilcoxon Sign Rank test was carried out. The Wilcoxon Sign Rank test results revealed a statistically significant difference in APHAB (Gujarati Version) scores between the two conditions with and without hearing aid ($Z= 2.088$, $p= 0.037$; $p < 0.05$) that the APHAB (Gujarati Version). The results obtained in the current study is supported by various research that has showed that digital hearing aid users benefited more favorably from their devices in noisy or distracting environments, which were more challenging to hear.

From the current study results it can be observed that there is a noticeable difference in mean scores obtained for Ease of communication and aversiveness conditions when compared between with and without hearing aid condition. The difference in scores obtained was found to be more significant for ease of communication and aversiveness conditions compared to background noise and reverberation conditions. It showed that hearing aid wearers benefited more in real life communication and improved their communication due to advancement in digital hearing aid technology. The APHAB – (Gujarati version) got maximum of more appropriate response form validators on the Likert scale, which indicates higher content validity of the questionnaire as a clinical tool. The results obtained from the current study indicates has been supported by (Stelmachowicz, 1999) and (Harrison et al., 2003) who has indicated that the importance of combining subjective and objective evaluations while assessing the effectiveness of a hearing aid as

well as cochlear implant in children and is becoming more widely acknowledged. Also, it has been evidenced that using hearing aids is found to have a significant long-term subjective advantages and satisfaction (Takahashi et al., 2007).

Hence, it can be concluded that Abbreviated profile of hearing aid benefit (Gujarati version) is an efficient tool in quantifying hearing aid benefit in adults.

Chapter 5

SUMMARY AND CONCLUSIONS

Hearing is highly crucial when it comes to the rehabilitation of people with hearing impairment. Similarly, the degree of benefit experienced when using a hearing aid is just as crucial as proper fitting and use. Therefore, a standardized questionnaire is vital for evaluating the overall benefit of hearing aids in individuals with hearing impairment. The current study translated and validated a self-assessment instrument for hearing aid users of digital hearing aids who speak Gujarati. Based on the current study's findings, it can be concluded that the translated and validated hearing aid benefit questionnaire is a crucial instrument for evaluating the benefits of hearing aids in adults. With the assistance of an audiologist and a speech-language pathologist, the Gujarati version of the APHAB English version has been validated for the current study. A validation check was made to ensure that the questions' meanings, spelling, grammatical rules, and simplicity in Gujarati and English were equivalent. The validated questionnaire was administered to participants from respected hearing centers in Ahmedabad, Gujarat, as well as from various other clinics around Gujarat. Data were gathered utilizing a google form, with a sample size (n = 30) consisting of 10 females and 20 males aged between 18 and 60 years.

During validation, all the validators gave good scores that ranged from more appropriate to somewhat appropriate for all the twenty-four questions of the APHAB (Gujarati Version). Most of the participants regularly used the hearing aid, and 43% of the participants had been using the hearing aid over the past ten years. Among all the

participants included in the study, all participants had different degrees of hearing loss that ranged from mild to severe. Most of the participants included in the study had a moderate degree of hearing loss (40%) compared to other degree of hearing loss. The current study's findings reveal that there was better mean scores obtained in all the 4 domains (ease of communication, reverberation, background noise & averseness) in hearing aid condition compared to without hearing aid condition. Participants benefitted in the scenario, such as ease of communication and aversive condition, which directly correlates with higher satisfaction with using a hearing aid. Hearing in the presence of background noise and reverberation conditions is the biggest problem encountered by hearing aid users; in the current study, mixed results were obtained for these two conditions. As there was significant benefit with the hearing aid condition compared to without hearing aid condition in all the domains (ease of communication, reverberation, background noise & averseness) for APHAB (Gujarati Version), this can be utilized as a tool for evaluating hearing aid benefit in Gujarati adults.

APHAB has already been translated into a wide variety of languages worldwide in Hindi, Tamil, Italian, German, French, Chinese, Danish, Croatian, Farsi, Russian, Spanish, Swedish, and Turkish. Therefore, this translation in Gujarati has made it simple to compare the effectiveness of hearing aids in the real-life situation in Gujarati-speaking people. The four APHAB domains allow audiologists to concentrate on improving their patients' hearing status depending on the individual domains and can be used for fine tuning of hearing aids as well as providing guidelines for constructing a hearing aid programs.

Implication of the study

- It can assist a clinician or audiological professional in comprehending the issues experienced by Gujarati hearing aid users, offering recommendations for counseling, and identifying the advantages of using hearing aids.
- It increases the Audiologist's awareness of the listening requirements and standards for hard-of-hearing people during and after hearing aid fitting.
- The present study's findings can be applied to raise hearing aid fitting standards for Audiologist.

Future research

- Results of the current study may be compared nationwide among hearing aid users by translating the questionnaire into other regional Indian languages.
- The effect of the variety of factors of hearing aids in Gujarati speakers could be studied, such as the different types of hearing aid, advancements used in hearing aids, unilateral vs. bilateral use, age at which hearing loss first appeared, attitudes, personalities, and demands, socio-economic status, dexterity, expense, and clinic type.
- Appropriate modification in the questionnaire can be done to assess the benefit of cochlear implants in Gujarati-speaking children.
- Further research is required to assess the benefits of more Gujarati hearing aid users using advanced digital features.

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APPENDIX A

ABBRAVAITED PROFILE OF HEARING AID BENEFIT (GUJARATI)

નામ :_____ ☐ પુરુષ ☐ સ્ત્રી તારીખ __/__/_____

સૂચના: કૃપા કરીને આપના રોજીંદા અનુભવો ને ધ્યાનમાં રાખીને સૌથી નજીક ના ઉત્તર ઉપર ખરું કરો. દરેક પસંદગી ચોક્કસ ટકાવારી ધરાવે છે જેનું ધ્યાન રાખવું. આપ આપના ઉત્તરો ચકાસવા તેનો ઉપયોગ કરી શકો છો. ઉદાહરણ તરીકે, આપેલ વિધાન ૭૫% સાચું છે, તે વિધાન માટે "સી" ઉપર ખરું કરવું. જો આપે આપેલી પરિસ્થિતી ના અનુભવેલી હોય તો , યોગ્ય લાગુ પડતી પરિસ્થિતી નો વિચાર કરી તે પરિસ્થિતી માટે પ્રત્યુત્તર આપવો. જો આપણે છતાં સમજ ના પડે, આપેલ વિધાન ને ખાલી રેહવા દેવું

A હંમેશા (99%)
B લગભગ દરવખતે (87%)
C સામાન્યપણે (75%)
D અડધા ભાગે (50%)
E પ્રસંગોપાત (25%)
F ભાગ્યેજ (12%)
G ક્યારેય નહીં (1%)

	Without Hearing Aid	With Hearing Aid
1. જયારે તમે ભીડવાળી દુકાન પર હોય અને દુકાનદાર સાથે વાત કરતા હોય ત્યારે તમે વાતચીત સમજી શકો છો?	A B C D E F G	A B C D E F G
2. જયારે તમે કોઈ પ્રવચન સાંભળતા હોય ત્યારે ઘણી બધી માહિતી ચૂકી જાઓ છો?	A B C D E F G	A B C D E F G
3. ભય ચેતવણી કે ભય સંકેત જેવો અણધાર્યો અવાજો તમને અસ્વસ્થ લાગે છે?	A B C D E F G	A B C D E F G
4. જયારે તમે પરિવાર સાથે વાતચીત કરતા હોય ત્યારે તમને સાંભળવામાં મુશ્કેલી લાગે છે?	A B C D E F G	A B C D E F G
5. તમને ફિલ્મો ના સંવાદ સમજવા માં મુશ્કેલી લાગે છે?	A B C D E F G	A B C D E F G
6. જયારે તમે રેડિયો પર સમાચાર સાંભળતા હોય અને પરિવારજનો વાત કરતા હોય ત્યારે તમને સમાચાર સાંભળવા માં તકલીફ પડે છે?	A B C D E F G	A B C D E F G
7. જયારે તમે થોડા લોકો સાથે જમવા બેસ્યા હોય અને તમે કોઈ એક વ્યક્તિ સાથે વાત કરવાનો પ્રયત્ન કરતા હોય ત્યારે તમને તેની વાત સમજવા માં તકલીફ પડે છે?	A B C D E F G	A B C D E F G

8. શું તમને ટ્રાફિકનાં અવાજો ખૂબ જ વધારે ઊંચા લાગે છે?	**A B C D E F G**	**A B C D E F G**
9. જયારે તમે કોઈ સાથે મોટા અને ખાલી રૂમ માં વાત કરતા હોય ત્યારે તમને શબ્દો સમજાય જાય છે?	**A B C D E F G**	**A B C D E F G**
10. જયારે તમે નાની ઓફિસે માં હોઈ અને પ્રશ્ન નો જવાબ આપતા હોય તો તમને વાતચીત સમજવા માં તકલીફ પડે છે ?	**A B C D E F G**	**A B C D E F G**
11. જયારે તમે ફિલ્મ જોતા હોય અને આજુ બાજુ ના લોકો વાતો કરતા હોય અને અવાજ કરતા હોય તો પણ તમને ફિલ્મ ની વાતો સમજાય જાય છે ?	**A B C D E F G**	**A B C D E F G**
12. જયારે તમે કોઈ મિત્ર સાથે શાંત વાતચીત કરતા હોય ત્યારે તમને સમજવામાં તકલીફ પડે છે?	**A B C D E F G**	**A B C D E F G**
13. વહેતા પાણીનો અવાજ જેમ કે ફૂવારા નો અવાજ તમને ખુબ મોટો લાગે છે?	**A B C D E F G**	**A B C D E F G**
14. જયારે કોઈ નાની ટોળકી વચ્ચે વાત કરતુ હોય અને બધા વાત ને શાંતિથી સાંભળતા હોય ત્યારે તમને સમજવા માટે વધારે ધ્યાન દેવું પડે છે?	**A B C D E F G**	**A B C D E F G**
15. જયારે તમે ડોક્ટર સાથે શાંત વાતાવરણ માં વાત કરતા હોય ત્યારે તમને વાત ને સમજવું અઘરું લાગે છે?	**A B C D E F G**	**A B C D E F G**
16. જયારે આજુબાજુ થોડા લોકો વાત કરતા હોય ત્યારે પણ તમે વાત ને સમજી શકો છો?	**A B C D E F G**	**A B C D E F G**
17. શું બાંધકામ નો અવાજ તમને ખૂબ જ અસહ્ય મોટો લાગે છે?	**A B C D E F G**	**A B C D E F G**
18. શું ભાષણ અથવા ધાર્મિક જગ્યા એ કોઈ શું કહી રહ્યું છે તે સમજવું તમને અઘરું લાગે છે?	**A B C D E F G**	**A B C D E F G**
19. શું તમે લોકો સાથે ભીડ માં હોય ત્યારે વાતચીત કરી શકોછો?	**A B C D E F G**	**A B C D E F G**

20. અગ્નિશામક દળનું સાયરન જયારે તમારી આજુ બાજુ માં હોઇ તો તમને તે ઘણું મોટું લાગે છે અને શું તમારે કાન પર હાથ મૂકી દેવો પડે છે?	A B C D E F G	A B C D E F G
21. કોઈ ધાર્મિક જગ્યા એ પ્રવચન અપાતું હોય તો શું તમે તે સમજી શકો છો?	A B C D E F G	A B C D E F G
22. શું ટાયર ઘસવાથી જે અવાજ થાય તે તમને ખૂબ જ અસહ્ય મોટો લાગે છે?	A B C D E F G	A B C D E F G
23. જયારે તમે કોઈ વ્યક્તિ સાથે એકલામાં વાત કરતા હોય ત્યારે તમને તેની વાત ફરી વાર કહેવા માટે કહેવું પડે છે?	A B C D E F G	A B C D E F G
24. જયારે પંખો કે એસી ચાલતું હોય ત્યારે તમને લોકો ની વાત સમજવા માં તકલીફ પડે છે?	A B C D E F G	A B C D E F G

મશીન વપરાશ નો સમયગાળો	દરરોજ મશીન વપરાશ નો સમયગાળો	બહેરાશ નું પ્રમાણ (મશીન પહેર્યા વગર)
☐ કોઈ નહીં	☐ કોઈ નહીં	☐ કોઈ નહીં
☐ ૦૬ અઠવાડિયાથી ઓછો	☐ દરરોજ ૦૧ કલાક થી ઓછો	☐ હળવું
☐ ૦૬ અઠવાડિયાથી ૧૧ મહિના	☐ દરરોજ ૦૧ થી ૦૪ કલાક	☐ મધ્યમ
☐ ૦૧ થી ૧૦ વર્ષ	☐ દરરોજ ૦૪ થી ૦૮ કલાક	☐ સાધારણ ગંભીર
☐ ૧૦ વર્ષ થી વધારે	☐ દરરોજ ૦૮ થી ૧૬ કલાક	☐ ગંભીર

APPENDIX B

Validation form used for the content validation test

VALIDATION SHEET

Name:

Designation:

Proposed Title: Translation and Validation of Abbreviated Profile of Hearing Aid Benefit (Gujarati Version) For Evaluating Hearing Aid Benefit in Adults

Aim of the study: To translate and validate the APHAB questionnaire in Gujarati for individuals with hearing loss

Questions No.	More appropriate	Inappropriate	Somewhat appropriate (specify remarks)
Demographic details			
Questions no. 1			
Questions no. 2			
Questions no. 3			
Questions no. 4			
Questions no. 5			
Questions no. 6			
Questions no. 7			
Questions no. 8			

Questions no. 9
Questions no. 10
Questions no. 11
Questions no. 12
Questions no. 13
Questions no. 14
Questions no. 15
Questions no. 16
Questions no. 17
Questions no. 18
Questions no. 19
Questions no. 20
Questions no. 21
Questions no. 22
Questions no. 23
Questions no. 24