

# **BTE. AID USERS A FOLLOW-UP PROGRAM**

***Register No. 8507***

*An Independent project submitted as part fulfilment for  
First year M.Sc (Speech and Hearing)  
to the University of Mysore.*

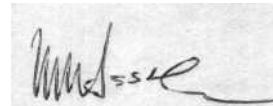
**All India Institute of Speech & Hearing  
MYSORE-570 006.**

***MAY-1986***

TO MY FAMILY

**CERTIFICATE**

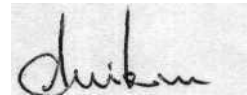
This is to certify that the Independent Project entitled "BTE Aid users: A followup Program" is the bonafide work in part fulfilment for the degree of Master of Science (Speech and Hearing) of the student with Register No.8507.



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**CERTIFICATE**

This is to certify that the Independent Project entitled "BTE Aid users: A Follow-up program" has been prepared under my supervision and guidance.



**"Guide  
Dr.(Miss) S. Nikam,  
Prof. & Head,  
Audiology Department.**

**DECLARATION**

I hereby declare that this Independent Project entitled "BTE Aid Users: A Follow-up Program" is the result of my own study under the guidance of Dr.(Miss) S.Nikam, Prof, and Head, Department of Audiology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier at any University for any other Diploma or Degree.

Mysore

Register No.8507

Dated April 1986.

### ACKNOWLEDGEMENT

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## INTRODUCTION

In man, it is by virtue of his intellectual capacity that HEARING becomes the vital basis for acquisition of speech and language; and these skills in their turn are the most Important tools of constructive thought and communication. For this, the AUDITORY SYSTEM should be intact. The abilities of such an auditory system are:-

- 1) Perception and discrimination of sound in terms of pitch (audio frequency ranging from 20Hz to 20KHz) and loudness (minimum audible pressure being  $0.0002 \text{ dynes/cm}^2$ ).
- 2) Binaural hearing advantage:
  - in localization/lateralization using phase, time, frequency and intensity cues.
  - With two good ears the sensitivity will be 3-4dB better than for either ear alone (i.e. absolute threshold).
- 3) Ability to pick and follow a particular sound sequence while rejecting unwanted sounds.

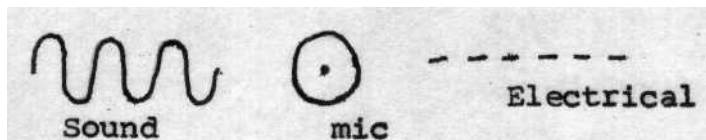
Most of these functions are adversely affected in a person with hearing loss. Hearing loss also affects social adequacy. These effects of hearing loss can be overcome by the process of aural rehabilitation.

Selection of a proper hearing aid is the first step in aural rehabilitation. Hearing aid is an electroacoustic device which makes the sound louder to the listener's ears. The additional energy provided is usually from the battery of an electrical

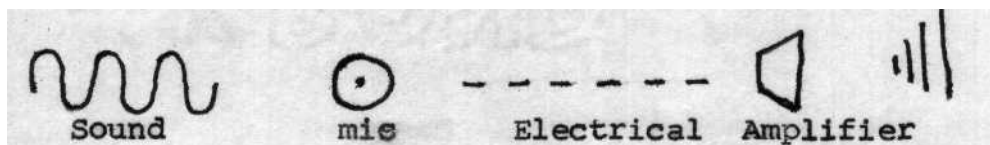


or electronic amplifier. The basic components of the aid are:- Microphone, amplifier and receiver.

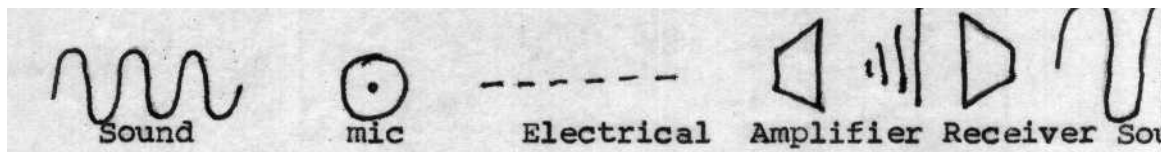
Microphone : Converts sound to electrical energy.



Amplifier: Amplifies electrical energy



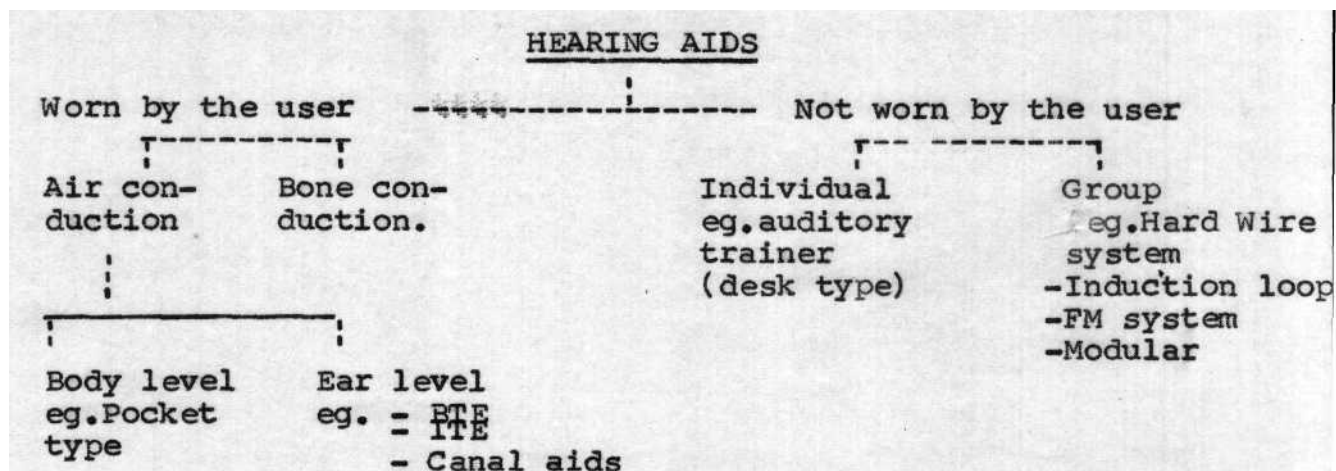
Receiver: Converts electrical to sound energy



Internally, an aid may be adjusted to give more sound in the high or low frequency range and less in low or high frequency range respectively.

There are various types of hearing aids. Earlier, hearing aids were either mechanical and bulky or electrical (i.e. carbon aids). At present, most of the aids are electronic (i.e. tube aids - transistors - integrated circuits - flexible circuits). This aid amplifies sound and makes its wearer, previously heard faintly or not at all, audible.

Classification of the hearing aids can be as follows:



Cochlear implants is the recent rehabilitative device which is in a stage of development in our country. Different types of hearing aids suit different types and degrees of hearing loss.

Traditionally, body worn aids were capable of providing significantly greater gain and power output than ear level aids, and were also more robust and 'childproof'. With ear level aids, despite the apparent disadvantages, ear-level aids have proven to be more popular and are preferred more by the users. The reason being its size which makes the hearing loss less obvious; the mic placement near the ear which simulates some of the acoustic conditions obtained in unaided condition? the ear level aid picke-up the sound at the ear level which is free from extraneous noises that occur at the chest level? and it also enhances localization.

Limitations for using an ear level aid are the amount of hearing loss, age, dexterity, etc. Now, because of newer developments, a person with severe hearing loss can also be fitted with an ear level instrument with a different type of mic or by using two hearing aids.

For fitting an appropriate aid, accurate audiometric evaluations, and hearing aid trial are necessary. The hearing aid thus prescribed can be subjected to wear and tear due to normal usage over a period of time, as the delicate components of the aid is susceptible to unwanted changes in sound handling capacities.

The hearing impaired individual usually will have problems with their aids, some have unrealistic expectations from a hearing aid. This can lead to frustration, disappointment and nonacceptability of the aid (Olsen and Tillman, 1977). The debilities of old age also adds to limited advantage of the aid like poor dexterity, failing memory, etc. Hence careful understanding and maintenance of the aid is required to derive maximum benefit from the aid.

To reduce the magnitude of these problems, a follow-up program is essential to analyse the knowledge of the user regarding the aid, the problems in hearing aid usage, and also to reduce (if feasible) the recurring expenditure on the hearing aid.

Among the ear-level-aid-users, the study by Jerlvall, Almqvist, et al (1985) showed that 72% preferred the ITE aid, 24% preferred the BTE aid, and others expressed no preference. Many patients who preferred ITE aid noted an improvement when listening to speech in background noise and found this aid superior in directional hearing perception. With regard to cosmetic appearance, 62% found ITE aid superior while 17% regarded it as inferior to BTE aid. Feedback and manageability problems were common with ITE aids.

There are studies on Ear Protective Device usage which have shown that the users intentionally or unintentionally alter the device which reduces the efficiency of the ear protection (Donald C Gasaway 1984). Similar problems may be present in the practical usage of the hearing aids, which reduces the benefit derived from an aid. Some of the problems with BTE aid users are: shortening of the tubing length or twisting it, without knowing the effects on the sound that is transmitted from the aid. They may not be aware of the problems of their aids and they lack understanding regarding this aspect.

Follow-up studies of body level aid users have been reported by Kamalini (1985) and Vanaja (1985). But information regarding follow-up on BTE-aid-users is limited, and hence the present study.

Aims of the present study:

- To follow-up the BTE aid users and to see the amount of knowledge the users have.
- To evaluate some aspects of aid usage and recurring expenses which will be analyzed and tabulated. Conclusion and recommendation will be made when indicated.

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## METHOD

The present study was undertaken to determine the level of understanding or knowledge of the hearing aids and its usage. The information was collected using a combination of questionnaire and interview methods.

### SUBJECTS:

Seventy subjects to whom the BTE aid was recommended served as subjects. Out of these, thirty were available locally who were made use of for interviewing also.

There were fortythree males and twentyseven females, with the age range of 11 to 82 years. The mean age of the subject was 41.71 years and the median age was 33 years.

The subjects were either students, housewives, employees or retired persons, from middle to high economic groups.

All subjects wore the BTE aid to one ear except for one who was prescribed aids for both ears. However, this binaural aid user did not respond to the questionnaire.

The subjects formed a heterogenous group, with respect to the hearing loss. They either had conductive (11.11 % of the subjects), mixed(30% of the subjects or sensorineural (55.56% of the subjects type of hearing loss with the degree being lesser than severe. They wore the hearing aid in the better ear wherever the loss was asymmetrical.

About eight different models of hearing aids were in use. All subjects who responded had bought the model which was prescribed by professional and were using it.

The period of hearing aid usage varied from a few months to 5 years.

#### **QUESTIONNAIRES USED IN THE STUDY:**

Three questionnaires were employed for the study (See appendix A, B, C). They broadly covered the following areas:

Q.I: dealt with expenditure incurred by the user.

Q.II: dealt with the knowledge about the aid and its usage.

Q.III: dealt with spare parts, components of the aid, usefulness of the aid, its care, and associated problems.

Information regarding identification like name, age, sex, address, education, occupation etc. of the user were included.

The questionnaires were in English, which had been developed earlier for follow-up of the hearing aid users and were used in Kamalini and Vanaja's studies. For the present study, these were modified and some questions relevant to BTE aid and its usage are being added. The questionnaires were given to two of the users before sending them to other users to note down any modification and/or ambiguity.

The Q.I and Q.II were common to all the seventy subjects. Q.III was used when local subjects came in person.

The Q.III was adapted to suit subjects who were conversant with English or in Kannada for those who were not conversant with English.

**PROCEDURE:**

The Q.I and Q.II were accompanied by explanation defining the purpose of the study and instructions for completing the forms. These were sent to the seventy subjects by post, requesting them to send the answered forms within 20-25 days. The local subjects were requested to visit personally with the aid in order to gather more information and also for a hearing aid check-up. The other subjects were also requested to visit personally, if at all they came to Mysore by the specified date. The period of data collection was one-and-a-half months.

Results of the study are tabulated and discussed in the following sessions, and the condition of the hearing aid are also listed.

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## RESULTS AND DISCUSSION

Out of the seventy subjects to whom the hearing aid was being prescribed and hence selected for the study, fifteen subjects responded to the questionnaire - nine -males and six females, with a mean and median age of 42.27 years and 36 years respectively. There were five students, two house-wives, six employees, and two retired persons.

The possible reasons for others not having responded may be - Some of those to whom the aid was prescribed might not have bought the aid, some might have had language problem (for the questionnaires were in English, and, English was selected presuming that all the subjects could understand).

The responses of the subjects were handscored and tabulated.

Information from the different questionnaires have been combined whenever meaningful. Only those items relevant to the present study are analysed. The condition of the hearing aid when they visited was <sup>also</sup> noted and are listed at the end of this section.

Because of the small number of the subjects, analysis for different age groups and sex is not done.

The data yielded information in the following categories

I. Recurring expenditure: To estimate the average/range of expenditure and find out ways and means of reducing this expenditure.

- II. General information: which is important to minimize the hearing aid 'down time', also\* when the aid is stolen, identification information is necessary, and also for any easy replacement of spare parts.
- III. Binaural/ITE/Imported aids: To know the attitudes and ideas of the users.
- IV. Hearing aid controls, parts and place of purchasing spares: Is very important aspect of optimum hearing aid usage.
- V. Rechargeable cells and charger: To know whether they are aware of/using it.
- VI. Usage and usefulness: Tended to elicit differences in the user's auditory behavior with and without the aid in various acoustic environments.
- VII. Trouble Shooting: Basic knowledge on trouble shooting would go a long way in solving minor problems of the aid by the user himself.
- VIII. Care and counselling: Most crucial aspect in the management of the hearing impaired and has a bearing on the degree of success of the rehabilitation.
- IX. Associated problems: To determine any variation in associated problems with the aid usage.

- X. Condition of the aid, which reflects the Maintenance by the user.

For some of the questions, the number of subjects were ten, for whom the Q.III was used in the interview.

I. Recurring Expenditure on the hearing aid:

1. Cost of the aid ..... : Rs.1300 to 1710, \$600
2. Cost of the cell ..... : Rs.10 to 16
3. Cost of the rechargeable cell.....:Rs 50 to 60.
4. Cost of the battery charger.....:Rs200 to 300.
5. Cost of the tubing.....:Rs 10
6. Cost of an eartip.....:Rs 15
7. Cost of an earmold.....:Rs 12
8. Postage and travelling charges  
(for repairs) .....: Rs.2 to 250 or 300
9. Repair charges at a time.....: Rs 20 to 60  
(depends on the problem)
10. Maintaining charges per month
  - a) with ordinary cell usage.....:Rs 40 to 150
  - b) With rechargeable cell usage.....:Rs.20 or lesser

II. General Information:

Table-1: Hearing aid was recommended by:

	Number	Percentage
i) Audiologist	8	53.2
ii) ENT specialist	6	40.1
iii) Audiologist + ENT specialist	1	6.7
iv) Others - specify	nil	0.0

Table-2 Brand name of their aid:

	Number	Percentage
i) Given correctly by	10	66.6
ii) Given incorrectly by	2	20.0
iii) Did not respond	3	13.4

Table-3 Duration for which the aid has to be worn:

	Number	Percentage
i) For a few months/year	1	6.7
ii) As long as the problem exists	3	20.0
iii) Life long	8	53.2
iv) Did not answer	3	20.0

Table-4 Hearing aid needs periodical servicing:

	Number	Percentage
i) Yes	3	20.0
ii) No	9	60.0
iii) Did not answer	3	20.0

Table-5 Hearing aid should be changed after some time:

	Number	Percentage
i) Yes	8	53.2
ii) No	6	40.1
iii) Cannot say	1	6.7

Table-6 Obtained the aid by post/in person:

	Number	Percentage
i) By post	1	10.0
ii) In person	9	90.0

Table-7 There was gap between the purchase of the aid and its usage:

	Number	Percentage
i) Yes	3	30.0
ii) No	7	70.0

Table-8 The users feel that a guarantee card is important while purchasing the aid:

	Number	Percentage
i) Yes	7	70.0
ii) NO	1	10.0
iii) Did not respond	2	20.0

Table-9 Changed the model of the aid:

	Number	Percentage
i) Yes	2	20.0
ii) No	6	60.0
iii) Did not respond	1	10.0
iv) No, but wants to	1	10.0

The general information regarding the model, brand of the aid is important when the users are looking for replacements of the malfunctioning parts. The other advantage is

identifying the aid in case of theft or identifying the aid in a repair shop. For this purpose the users should have a note of the following information.

- Ear being aided, type and degree of loss.
- Make and model of the aid, serial number.
- Use gain and tone control settings.recommended.
- Battery type, its voltage.
- Earmold type.
- Gain of the aid.
- Picture of the aid with different parts labelled and their functions.

Eventhough the hearing aids were recommended by an audiologist, only 59.9% (i.e., 9 out of 15) knew about this. And 26.7% (i.e. 3 out of 15) did not know about the duration for which the aid has to be worn. Among these, some felt that the aid has to be worn till the hearing returned to normal. These misconceptions need to be removed. At the same time, it is interesting to note that, about 73.2% (i.e. 11 out of 15) either said that they have to wear the aid throughout the life or as long as the problem existed.

All the users had bought the aid and they had got it in person, except for one who had received tne aid by registered post.

In about 30% of the case (i.e. 3 out of 10) delay was reported in using the aid after the purchase because of the delay in getting the earmold, or they felt that the aid will make the hearing loss obvious. After purchase, 20% (i.e. 2 out of 10) of the users had changed the type or model of the aid - one from a body level and ear-level aid and the other changed the model within the ear level aid.

about 70% (i.e. 7 out of 10) felt that the guarantee card was important at the time of purchase, in case the aid needed repairs.

Some of the users are of the opinion that the hearing aid needs to be changed (53.2% i.e. 8 out of 15). This change depends on whether the hearing loss is progressive or the aid is irreparable, etc. In the interview when the same question was asked, 90% (9 out of 10) have said that the aid does not need any replacement.

Regarding servicing of the aid, only 20% (i.e. 3 out of 15) have opined that the aid needs servicing periodically. So the users have to be told during counselling that the aid has got too many delicate components with limited life which are susceptible to environmental influences like humidity. If not malfunctioning, these influences will change the electroacoustic characteristics.

III. Information regarding binaural aid/imported/ITE aid:

Table-10 Willing to wear one more aid: -

	Number	Percentage
i) Yes	5	33.3
ii) No	6	40.1
iii) Cannot say	4	26.6

Table-11 Prefer to wear imported aid:

	Number	Percentage
i) Yes	8	53.2
ii) No	7	46.8

Table-12: Parts of the aid if imported;

	Number	Percentage
i) Yes	3	30.0
ii) No	5	50.0
iii) Did not respond	2	20.0

Table-13 Prefer to wear ITE aid:

	Number	Percentage
i) Yes	5	33.3
ii) No	9	60.0
iii) Did not respond	1	6.7

Along with the willingness to wear one more aid severity of hearing loss in the other ear will also play a role.



At present, there is a strong and steady increase in the use of binaural aids. Advantages of this are:

- increase in absolute threshold and suprathreshold, loudness summation (Dermondy and Byrne 1975).
- increased differential sensitivity (MacKeith and Coles 1971)
- Noise squelch (Gelfand and Hochberg 1973),
- delimiting of acoustic head shadow (Briskey 1972),
- Temporal processing (Schubert and schultz, 1962)
- spatial separation of sound source (Perrott and Nelson 1969) and
- improved signal to noise ratio (Gengel 1971).

At the same time, other studies indicate problems with binaural fitting. Studies by Bryden (1971) and Berlin and Hughes (1972) on the dominant ear effect in diotic and dichotic listening suggested that although the ears and their central connections are often well able to handle one set of mildly or moderately distorted signals, the addition of a second set may result in confusion matrix. Rosenberg (1975) warns that it is difficult to predict how amplification systems are going to interact with "defective" ears, and reports clinical experiences where the use of two aids resulted in a degeneration of hearing skills.

In the present study, 33.3% (i.e. 5 out of 15) were willing to wear one more aid, and 40.1% (i.e. 6 out of 15) were not willing. During hearing aid prescription, the users need to be told about the binaural hearing and its feasibility in each case.

Contrary to expectation, 60% (i.e. 9 out of 15) did not prefer to wear an ITE aid. The reason being that it is better to have the parts of the hearing aid outside the ear than inside, others have stated that they are satisfied with the BTE aid. Out of these, one of the subjects wanted to wear a spectacle type as he had visual problem also.

About 53.2% (i.e. 8 out of 15) preferred to wear an imported aid, others did not because of the problems in repairs and in buying the spares. Already 30% (3 out of 10) were using imported aids.

#### **IV. Hearing aid control spare parts, place of buying the spares and repairs:**

Table-14 Number of switches in the aid and their functions:

	Number	Percentage
i) Given correctly by	4	26.6
ii) Given incorrectly by	9	60.0
iii) Did not respond	2	13.4

Table-15: When the aid is not working properly, can identify the part not working.

	Number	Percentage
i) Yes	4	26.6
ii) No	11	70.4

Table-16 Frequency of cleaning the earmolds:

	Number	Percentage
i) Once in a day/week	6	40*0
ii) Once in a month or more	4	26.6
iii) Do not clean	2	13.4
iv) Did not answer	2	13.4
v) Do not use the mold(Using ear	1	6.7

Volume control:

Table-17 Setting of volume control used most of the time is:

	Number	Percentage
i) High	6	40.1
ii) Low	1	6.7
iii) Moderate	5	33.3
iv) Did not respond	3	20.0

Table-18 Change the volume control towards maximum:

	Number	Percentage
i) When cell is weak	7	46.6
ii) When cell is new	3	20.0
iii) In noisy places	1	6.7
iv) In situations (specify)	nil	0.0
v) Not at all	4	26.6

Table-19: Change in volume control towards minimum:

	Number	Percentage
i) When the cell is weak	nil	0.0
ii) When the cell is new	9	60.0
iii) In noisy places	nil	0.0
iv) In situations (specify)	nil	0.0
v) Not at all	6	40.0

Table-20 Using 'T' switch;

	Number	Percentage
i) Yes	nil	0.0
ii) No	2	20.0
iii) Did not respond	8	80.0

## Microphone:

Table-21 Placement of mic:

		Number	Percentage
i)	Top mounted	nil	0.0
ii)	Rear mounted	nil	0.0
iii)	Do not know	10	100.00

## Switch:

Table-22 Aid is switched 'on' by:

		Number	Percentage
i)	Turning the switch to right side	3	20.10
ii)	Turning the switch to 'on' or 'M' position	7	70-0
iii)	Did not respond	1	10.0

## Tubing:

Table-23 Check the tubing by:

		Number	Percentage
i)	By listening	nil	0.0
ii)	Do not check	6	60.0
iii)	Do not know how to check	4	40.0

Table-24 New tubing is got when:

		Number	Percentage
i)	Torn/loose	2	20.0
ii)	Sound not clear/no sound	nil	0.0
iii)	Advised to change	1	10.0
iv)	Not changed at all	7	70.0

**Cell :**

Table-25 Ask for particular voltage while purchasing the cell:

	Number	Percentage
i) Yes	nil	0.0
ii) No	8	80.0
iii) Not purchased yet	1	10.0
iv) Did not respond	1	10.0

Table-26 Frequency of checking the cell:

	Number	Percentage
i) Once in 1-3 days	6	60.0
ii) Do not check	3	30.0
iii) When it becomes weak	1	10.0

Table-27 Check the cell while purchasing (at the shop) by:

	Number	Percentage
i) Listening	6	60.0
ii) Voltmeter at home/shop		10.0
iii) Did not respond	2	20.0
iv) Do not check	1	10.0

Table-28 Change the cell when there is;

	Number	Percentage
i) No sound from the aid	1	10.0
ii) Weak sound from the aid	6	60.0
iii) 'Not clear' sound from the aid or no change in loudness when volume control is rotated.	nil	0.0
iv) Not changed so far	1	10.0
v) Others	1	10.0
vi) Combination of above (i, ii, iii)	1	10.0

Table No.29 Frequency of changing the cell:

	Number	Percentage
i) Once in 1-5 days	2	20.0
ii) Once in 1-2 weeks	4	40.0
iii) Once in 1-12 months	3	30.0
iv) Not at all	1	10.0

Table-30 Additional spare parts kept:

		Number	Percentage
Cell, ear mold:	Yes	9	90.0
	No	1	10.0
<u>Tubing</u> :	Yes	2	20.0
	No	8	80.0

Table-31 Spares are purchased from the same place always:

	Number	Percentage
i) Yes	8	20.0
ii) No	nil	0.0
iii) Not purchased	2	20.0

The users ought to know the various parts of the aid and their functions to derive maximum benefit from the aid. It was found in the present study that only 26.6% (i.e. 4 out of 15) knew about the number of parts/controls and among these, only one had given the functions correctly. This reflects the ignorance on the part of the user. It is also possible that the users are using the various controls appropriately without knowing its name and also the exact functioning of each part.

About identifying the parts not working, 26.6% (i.e. 4 out of 15) could identify the cell condition or loose contact. Since all the components are housed in a case, it is difficult to identify the parts not working, but condition of other parts such as volume control, on-off switch could be checked, which is lacking in all the respondents.

Only 67% (10 out of 15) cleaned the earmold once in a week or a month. Cotton or cloth or a pin was used to wipe the dirt and/or wax in the earmold. One subject used an eartip to serve the purpose of the earmold as the ordinary earmold was uncomfortable. The information yielded by follow-up programs will tell us whether to change the material of the earmold or to change the type of earmold or if venting is needed.

Regarding tone control and microphone of the aid, none of the users knew about. Users need to be educated regarding this aspect.

The volume control of the aid should not be used at high levels as there will be more of harmonic distortion. In this study, 40% (i.e. 6 out of 15) were using the control below the medium level setting of the aid most of the time. Other 20% (i.e. 3 out of 15) did not answer, probably because the volume control on their aids may not be marked.

However, if the volume control is used beyond a 50% rotation, the individual may encounter high increase in harmonic distortion. Maximum levels were used occasionally when the cell was weak, and some of the respondents reported that this setting was used even when the cell was new and when the environment was noisy. Lower levels of volume control was used when the cell was new, by other users. None of the respondents had any problem with the volume control.

The 'T' switch was not at all used by most of them and some were not aware of the 'T' switch and its function. Those who use telephones, can be educated regarding this aspect. Generally, when switching from 'M' to 'T' position, the volume control is raised. The orientation of the telecoil in the aid also has an effect on the output sound i.e., the coil is more sensitive when the head is in one particular direction. The disadvantage of using T4 switch is that it allows the user to receive the signal but the user cannot monitor his own speech (Rubin). This can be overcome by an 'MT' provision.

Although none of the ten subjects knew about the mic in the aid, after having told about it, about 50% (5 out of 10) felt that the hair covering the mic would affect the sound and 20% (i.e. 2 out of 10) covered the mic with hair. None of the users gave any opinion about the mic placement in the aid.



Regarding the mic placement in the aid, Lybarger and Barron (1965) examined four hearing aid mic locations at four angles of incidence. They noted that the ratio of sound from front as compared to that of the back is about 5dB better when the front of ear position is used as compared to the back of the ear position.

Pollack (1980) has said that there is an advantage of 8-10 dB, with the mic placed at the top rather than at the bottom of the aid at 1500-3000Hz range. This is <sup>an</sup> effective means of providing high frequency gain. Directional mic also improves the signal to noise ratio.

The length and diameter of the tubing will effect the sound output. Andy and Harvey (1969) have said that length and size of the tubing have an effect on frequency response, and use of tubing creates peaks in response curve which is not present in the hearing aid response alone. An average SPL over the frequency range varies inversely with the tubing length. For a given length of tubing, when the inside diameter is decreased, it will drop the average SPL and shift the peaks.

Of the ten subjects in this study, none were in the habit of checking the tubing. The subjects should be advised to, at least, visually check for any tear or twisting in tubing. About 70% (i.e. 7 out of 10) had not changed the tubing at all. The others

changed the tubing when it was torn or when advised to change by a professional. The tubing was kept along with the aid and not separated when the aid was not worn. The tubing lasted for 6 months or even more.

The most important part of the aid is the cell which supplies the energy for amplification. The users do not check the voltage of the cell while buying. They checked it by listening once in a day or more. The cell was checked by listening and changed whenever there was no sound or weak sound from the aid by 60% (i.e., 6 out of 10) of the users. The cells were changed between 5 days to 2 weeks. The intermittent users of the hearing aid, changed the cell rarely. The cells were easily available for 30% of the subjects either indigenously or imported. Indegenous like manufacturers of the aid or retail sellers etc. Some subjects have reported that Toshiba lasts lesser than other cells like National LR44. The other cells in use were: Varta, National LP44, Maxell LR44, 300K Varta, B-26 Dial Pak, Rayo-Vac, V675 HP.

The life of the cell was one week to one month. The life depends on the duration and also the type of environment in which the aid is put to use.

Many of the users kept spare cells which was stored in the hearing aid box. Others did not remove the cell from the aid and also did not switch the hearing aid off when not in use. The spares were purchased from the same place always as they were easily available.

Table-V Rechargeable cells and battery charger:

Table-32 Aware of chargeable cells and charger:

	Number	Percentage
i) Yes	6	60.0
ii) No	4	40.0

Table-33 Use of chargeable cells and charger:

	Number	Percentage
i) Yes	6	60.0
ii) No	4	40.0

Table-34 Keep spare cell or cells:

	Number	Percentage
i) Yes	9	90.0
ii) No	1	10.0

Regarding rechargeable cell and the battery charger, about 60% of the subjects (i.e. 6 out of 10) were aware. Most of these, kept a spare cell and all of them charged their cells after each day's use. Whereas, about 40% were not aware and were not using the rechargeable cell and the battery charger.

Information regarding Rechargeable cells and battery charger should be given to the BTE aid users, though it is expensive initially, it is economical in the long run.

VI.Usage and usefulness of the aid:Table-35 satisfaction with the aid:

	Number	Percentage
i. Completely satisfied	nil	0.0
ii. Find it adequate	9	60.0
iii. Not satisfied	4	26.6
iv. Little satisfaction	2	13.4
v. Did not respond	nil	0.0

Table-36 Feelings about wearing a hearing aid:

	Number	Percentage
i. Happy because it helps to hear speech and/or other sound	1	6.7
ii. Wear an aid as there is no other medical or surgical alternatives.	4	26.6
iii. Not happy because it makes the hearing loss obvious	nil	0.0
iv. Others - cannot discriminate even with the aid	1	6.7
v. Combination of i, ii, iii.	9	60.0

Table-37 Find it difficult to hear a person speaking, if the speaker is in the side of unaided ear

	Number	Percentage
i) Yes	6	40.0
ii) No	8	53.2
iii) Did not respond	1	6.7

Table-38 Frequency of checking the aid:

	Number	Percentage
i. Once or twice in day	6	60.0
ii. Not at all	2	20.0
iii. Do not know how to check	nil	0.0
iv. Others (before wearing)	1	10.0
v. Did not respond	1	10.0

Table-39 Keep/the aid when not worn:

	Number	Percentage
i. In the case provided	10	100.0
ii. Others	nil	0.0

Table-40 The aid is being worn throughout the day:

	Number	Percentage
i. Yes	5	50.0
ii. No	5	50.0

Table-41 Wear the aid in following situations:

	Number	Percentage
(1) At home:		
(i) With family members:		
Yes	7	70.0
No	3	30.0
(ii) Listening to radio, TV:		
Yes	7	70.0
No	3	30.0
(2) Outside:		
(i) School/work place:		
Yes	7	70.0
No	2	20.0
Did not respond	1	10.0

(ii) Functions, close relatives, & friends:	Yes	5	50.0
	No	5	50.0
[iii) Distant relatives and others.	Yes	4	40.0
	No	5	50.0
	Did not respond	1	10.0

Table-42 Switch off the aid:

	Number	Percentage
i. At night times	3	30.0
ii. In noisy situations	1	10.0
iii,, When it is being removed	3	30.0
iv. Not at all	1	10.0
v. When not needed	2	20.0

Table-43 Change in usefulness of the aid:

	Number	Percentage
i. For better	6	60.0
ii. For worse	1	10.0
iii,,. No change	3	30.0

Table-44 Change in understanding of speech:

	Number	Percentage
i. For better	6	60.0
ii. For worse	4	40.0
iii,,. No. change	nil	0.0

Table-45 Aid has helped the user:

	Number	Percentage
i. More than anticipated	4	40.0
ii. Less than anticipated	3	30.0
iii. Adequate	2	20.0
iv. Not at all	1	10.0

Table-46 Enjoy wearing the aid sometimes:

	Number	Percentage
i. Yes	7	70.0
ii. No	2	20.0
iii Others	1	10.0

Table-47 Changes noticed with aid usage:

	Yes		No		Dis not respond	
	No.	%	No.	%	No.	%
1) 1.Speak more	7	70	-	-	2	20
2.No change	1	10	-	-	-	-
ii) 1.Lowered/raised the voice	4	40	3	30	3	30
2.No need of repetitions	5	50	4	40	1	10
3.Willlngness to attend functions	3	30	4	40	3	30
4.Use of less signs	3	30	2	20	5	50

Table-48: Can hear the following sounds when the aid is:

		worn	not worn	Did not respond
i) Environmental sounds:				
a) Door bell	No.	5	4	1
	%	50	40	10
b) Telephone ring	No.	4	1	5
	%	40	10	50
c) Bus horn and other traffic noise	No.	6	4	-
	%	60	40	
d) Dog barking and other animal sounds.	No.	7	3	-
	%	70	30	
e) Other sounds like vegetable vender's, rain, vessles falling, radio.etc.	No.	10	-	-
	%	100		
ii)a) Hear a person calling from same room	No.	8	2	-
	%	80	20	
b) Hear a person calling from next room	No.	5	1	4 (cannot locate)
	%	50	10	40 "
c) Hear when called from near	No.	7	3	-
	%	70	30	
iii) Locate a speaker when not looking at the speaker.	No.	2	1	7 (cannot locate)
	%	20	10	70 "
iv) Can converse when:				
a) Watching the speaker	No.	4	5	1
	%	40	50	10
b) Not watching the speaker	No.	2	3	5
	%	20	30	50
c) In Noisy environment	No.	4	1	5
	%	40	10	50
d) In quiet	No.	5	3	2
	%	50	30	20



The use of aid reflects the users' satisfaction with the aid. Many users have different concepts about the hearing aid. In reality, anticipation and actuality are different. The satisfaction with the aid depends on adjustment which in turn depends on the degree of hearing loss, length of time the subject has had hearing loss before using the aid, mental attitude, age, and hearing aid fitting (Mandl, 1953).

The relation between satisfaction, and the degree of hearing loss and discrimination loss is very weak, i.e., the population consists of sub-population in which different criteria apply to hearing aid satisfaction, which may be more closely related to psychosocial than to technical aspects (Kapteyn, 1977).

The subject with conductive loss wear the aid more than those with sensorineural loss. The aid reduces the attenuation caused by the hearing loss but does not aid in reducing the distortion caused by hearing loss, instead it may add more distortion (Reinier Plomp 1978). These limitations of the aid should be explained before the user starts to wear the aid.

In the present study, 60% (i.e. 9 out of 15) of the respondents found it adequate but none were completely satisfied, and 26.6% (i.e. 4 out of 15) were not satisfied at all though 13.4% ( i.e. 2 out of 15) were satisfied a little. This reflects the anticipation of the user. The users mustjbe told that hearing aid itself is no electronic drug and that they have to accept the aid as a crutch and not as a cure.

The aid helped 40% of the users (i.e. 4 out of 10) more than anticipated and less than anticipated for 30% (i.e. 3 out of 10). Only 20% (i.e. 2 out of 10) found the aid to be adequate. This anticipation reflects the satisfaction of the user. Eventhough the users are not completely satisfied some of them felt that the aid helped then more than anticipated.

The users seem to be knowledgeable regarding hearing aid function, they felt happy because the aid helped them in hearing speech and/or other sounds and they continued to put up with it as there is no other altemative-either medial or surgical. Some of the users were not happy as the aid makes their problem obvious.

Only 40% (i.e. 6 out of 15) had problems in hearing especially speech originated from the side of the unaided ear. This is theoretically correct as the head acts as a barrier for the sound. It is surprising to know that 53% (i.e. 8 out of 15) did not face any such problems (The head shadow effect is more in high frequency region).

Regarding checking the aid, 50% (i.e. 5 out of 10) of the users checked the aid once in a day, and 10% (i.e. 1 cut of 10) who used the aid intermittently, checked the aid before wearing. About 20% (i.e. 2 out of 10) did not check the aid at all. The users kept the aid in the case provided when not in use, which in turn was kept either in the bag, almirah, table, window sill, etc.

The users must be told that the aid should not be kept on the window sill where the sun rays fall directly or where it is too humid.

Only 50% of the users (i.e. 5 out of 10) wore the aid throughout the day, but most of them were not completely satisfied. Others have not specified the situations where they use the aid. This is in consistence with the report of Kodman 1969 i.e. though the people wear their aids most of the time, they are not always completely satisfied.

The aid was used in certain situations as specified in Table-40. The aid was switched off only at night by 30% (i.e. 3 out of 10) of the respondents, in noisy situation by 10% (i.e. 1 out of 10). One of the ten subjects did not switch off the aid at all.

For 60% of the users the usefulness of the aid had changed for the better (i.e., for 6 out of 10), for the worse by 10% (i.e. 1 out of 10), and no change was observed by others. Change in usefulness for the better can be attributed to the practice in listening, lipreading, use of external cues, etc.

Understanding of speech had improved since the date of purchase for 60% (i.e. 6 out of 10) and for the others, it had worsened. This may be because of progression of hearing loss or associated problems like tinnitus, etc.

The following changes were noticed since the hearing aid usage:

- About 70% of the subjects (i.e. 7 out of 10) enjoy wearing the aid when listening to music or others' speech. Again 70% of the subjects noticed that they speak more when they wore the aid. This may be because they can respond better to others in conversation without feeling guilty or feeling paranoid.
- About 40% (i.e. 4 out of 10) of the users have lowered or raised their voice level since hearing aid usage. This aspect is related to some extent to the type of hearing loss.
- Only 50% (i.e. 5 out of 10) of the users do not need repetitions in conversation. \*
- 40% (i.e. 4 out of 10) vouched reluctance to attend social functions. It is likely that they feel that the aid will point to the handicapped or that it would be difficult to hear in the background noise or when more than one person speaks. 30% (i.e. 3 out of 10) did not answer, this question, this reflects the conflict of the subjects.
- Only 30% (i.e. 3 out of 10) used fewer signs when wearing the aid. This shows that the aids help in communication through the primary mode i.e. speech.

When the aid is worn, most of the following sounds were heard by atleast 50% (i.e. 5 out of 10) of the subjects: door bell, telephone ring, horn of vehicles, dog barking etc. However these sounds were audible even when unaided by 30-40% of the subjects. This is because of high levels of these sounds.

When the aid was worn, 80% (i.e. 8 out of 10) could hear a person calling from the same room, and others could hear it without the aid. With the aid, 50% (i.e. 5 out of 10) could hear a person calling from next room, though 40% (i.e. 4 out of 10) could not hear even with the aid on.

When the aid was not worn, 70% (i.e. 7 out of 10) could hear a person call at a close distance. These responses depend on the type of severity of the hearing loss, discrimination score, distance of the stimuli, from the user of the aid, the gain of the aid, etc.

Location of the speaker and conversing with the speaker (without watching the speaker and in noisy environment) were difficult for most of the users even with the aid. This is as expected as they used only one hearing aid. In quiet, 30% of the users (i.e. 3 out of 10) could converse without an aid.

In general, patients reported significantly more benefit from their aids in quiet situations than in noise (Brain, Marilyn, Ernest, 1984).

The users have listed the following characteristics to be important for an aid:

- less conspicuous, small, minimal weight, more gain, etc.
- The other desirable requirements would be:

High fidelity, low power consumption, low cost (both initial and

maintaining), adequate range of frequencies, features which increase signal-to-noise ratio like directional microphone etc.

Incorporating suggestions from the users would be an asset from a practical point of view, as there is always a scope for improvement of any instrument.

### **VII. Trouble Shooting:**

Table-49 The hearing aids working condition is checked by:

	Number	Percentage
i. By listening to squeal or to speech	13	86.6
ii. Did not respond	2	13.4

Table-50: When would you think of sending the aid for repairs:

	Number	Percentage
i. When it is not working (no sound)	7	70.0
ii. Not yet sent for repair	1	10.0
iii. Do not know	1	10.0
iv. Not necessary	1	10.0

Information from tables like 4, 15, 23, 25, 27, 37 are related to this category.

The simple techniques of trouble shooting will be of great help to the users and they should be educated regarding this during counselling with demonstration. This will be advantageous in terms of time and money spent for simple problems in the aid.



Table-53 Read books (on hearing aid) on their own:

	Number	Percentage
i. Yes, and found it helpful	2	20.0
ii. Yes, but not helpful	1	10.0
iii. No	7	70.00

Table-54 Interested to know more about the aid:

	Number	Percentage
i. Yes	12	80.0
ii. No	1	6.7
iii. Did not answer	4	13.4

Table-55 Visited professionals subsequent to hearing aid purchase:

	Number	Percentage
i. Yes, advice was given	nil	0.0
ii. Yes, no advice was given	4	26.7
iii. No	6	40.0
iv. Did not answer	5	33.3

Table-56 Advice regarding ear surgery;

	Number	Percentage
i. Being operated	2	20.0
ii. Not advised	2	20.0
iii. Not useful	1	10.0
iv. Did not respond an	1	10.0
v. Recommended for operation	4	40.0

Counselling is the most important part of hearing aid prescription. The quality of counselling reflects the quantity of



benefit one gets from the aid. The aided and unaided profiles should be used during this session. There should be a continuous contact between the user and the professional especially in the period immediately after the purchase of the aid.

The users will be ignorant of aspects relating to hearing aids such as battery life expectancy, earmold fitting, feedback, operation, care of the aid, etc. There should be a trial period for a week during which the subject can be exposed to a variety of demanding acoustic situations and practical problems. Later the professional should again see the subject.

Counselling involves much more than simply showing the users where the controls are and how to put the aid on and take it off. Discussion in a realistic manner to adjust to the new and often abrasive sound of the aid, and to identification of and remediation of the tangential psychologic aspects of hearing loss is very important (Derek A.Sanders, 1980).

In the present study, 60% (i.e. 9 out of 15) felt that the advice regarding the aid and its care was adequate. Periodical checking was found to be essential by 50% (i.e. 5 out of 10). The others might not have had any obvious problem with the aid. Even then, the users must be told that the aid needs periodical servicing. A hearing aid has many parts which are subject to wear. This may be wear and tear due to normal use over a period of time. So servicing of the aid is very essential.

Eighty percent of the users (i.e. 12 out of 15) are interested to know more about the aid through either or combination of the following media; pamphlets, audiovisual media, lectures and demonstration, magazines, etc. None of the users wanted information through tapes, most of them preferred lectures and demonstrations as they could get their doubts cleared, if any.

In the post prescriptive period, 26.7% (i.e. 4 out of 15) visited the professionals, but got no additional information regarding the aid. Very few/<sup>20%</sup>(i.e. 2 out of 10) of the subjects read something on hearing aids from magazines and found it useful.

During counselling, new developments should be made known along with reasonable expectation from the aid, other avenues of aural rehabilitation, etc. Another session of counselling should be given after a week's hearing aid usage.

#### **IX. Associated Problems:**

Table-57 Have any associated problems like tinnitus, vertigo, ear discharge:

	Number	Percentage
i. Yes	3	30.0
ii. No	7	70.0

Table-58 Wear the aid when there is associated problems (out of 3):

	Number	Percentage
i. Yds	2	66.6
ii. No	1	33.4

Table-59 Aid is helpful in the presence of associated problems:

	Number	Percentage
i. Yes	nil	0.0
ii. No	2	66.6
iii. Cannot make out	1	33.3

Table-60 Change in volume/tone control when there is problem:

	Number	Percentage
i) Yes	nil	0.0
ii) No	3	100.0

In general, subjects with ear discharge had less difficulty in communication and subjects with vertigo derived less benefits. The use of hearing aid made no difference to ear discharge and vertigo whereas it reduce tinnitus is some (Vanaja, 1985).

In the present study, 30% (i.e. 3 out of 10) of the users had associated problems like tinnitus and ear discharge; out of these, 66.6% (i.e. 2 out of 3) wore the aid when they had associated problem. Both were not helped by the use of the aid. Of the three who had associated problems, no one attempted to alter the volume of tone control, position when they had problem.

#### **X. The condition of the aid when the subjects visited personally:**

Among ten subjects who visited, nine aids were in working condition, but still with following:

1. Tubing: Change in colour(red, brown),hard, could not be separated from the hearing aid hook, twisted.
2. Hook: good.
3. Switch: loose contact.
4. Mic port: either removed/lost.
5. earmold: wax, brown in colour in the canal portion.
6. Battery compartment: loose.
7. Cell: bigger, voltage rundown.
8. Screw vicinity: crack.
9. Aid: broken and plastered.
10. Mic: Without mic pot.

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## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### SUMMARY:

The study was aimed at evaluating the usefulness of BTE hearing aids and the level of understanding about the aid through the use of questionnaires and interview.

70 subjects who were using BTE hearing aids were included in the study. Questionnaires were sent to each subject to answer. Out of seventy only fifteen responded, and ten were interviewed. The subjects were in the age range of 11 to 82 years with the mean age of 41.71 years. Responses of the subjects were tabulated in percentage.

On the basis of response from the fifteen subjects, information regarding recurring expenditure, hearing aid usage, its care and information on associated problems were collected. On this basis, certain conclusions have been made.

### CONCLUSIONS:

It was found that the users had some knowledge about the hearing aid, its care and usage, they still lack the full understanding which is very essential to derive maximum benefit from the aid.

1. Majority of the users seem to be knowledgeable regarding the period for which the aid has to be worn.

2. The users lack knowledge regarding general information of the aid.
3. Most of the subjects did not know about mic, and 'T' switch in the aid and also they did not know the correct method of cleaning the earmold.
4. Anticipation from the aid was more which was reflected in the limited amount of satisfaction they had.
5. Half of the users had problems because of head shadow effect.
6. Hearing aid did not help the persons who had associated problems.

**RECOMMENDATIONS:**

Based on the results, and conclusions the following recommendations are made:

1. The user of the aid should keep in contact with the professional in the post prescriptive period.
2. Initially the follow-ups should be spaced closer till the user adjusts to the hearing aid usage.
3. To get the hearing and hearing aid checked periodically.
4. On-going education programmes or workshops on hearing aids need to be carried out, when additional information regarding new developments can be explained, difficulty in adjustment and other problems can find a solution.
5. To have a note of all the information regarding the problem, type of aid in use, etc.

6. The picture of the aid labelled and the functions of different parts should be provided to each user.
7. To explain the basis of trouble shooting - sometimes the problem will be very simple, for that the user will waste time and money for which he can rectify by himself.
8. Those who are not using a rechargeable cell and a charger can start using it. Eventhough the initial cost is more, it is economical in the long run when compared to an ordinary cell.
9. Limitations of the type of aid being used and benefit from other cues like lip reading,etc. should be told during counselling.
10. To explain about anticipation vs actuality from of an aid.
11. The manufacturer should provide addresses for spare parts purchasal, postal services available for repairs and also the price lists.

**RECOMMENDATION FOR FURTHER STUDY:**

1. To use questionnaires in other languages, other than English and on a larger population, so that definitive conclusion can be drawn.
2. To follow-up binaural BTE users and subjsets with associated hearing problems and systemic disorders.

3. Using the follow up information in order to make modifications like - changing the type of mold, its material, use of venting,etc., changing the instrument for one that will allow volume setting at approximately less than 50% of rotation.
4. To test the advantageous position of the mic.(top or rear mounted).
5. A device should be set up to find out which battery has longer life.
6. A record should be maintained of the aids repaired, and thus it can be seen that a particular hearing aid has a particular problem. With statistics manufacturers can look into these problems and improve the efficiency of the instrument.

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Dt:21-12-85

Dear Sir/Madam,

Sub:- Followup program for hearing aid users.

Hearing aid usage requires some knowledge and skill. So we are interested to follow-up the hearing aid users. We have prepared questionnaires regarding the hearing aid and its usage. Please fill in the questionnaire and send it to the following address on or before.....1986.

Thanking you,

Yours sincerely,

Mailing address:

Manjula P

I M.Sc, Student

(Manjula P)

All India Institute of

Speech and Hearing,

Manasagangothri,

Mysore - 570 006.

**RECURRING EXPENDITURE INCURRED FOR THE MAINTENANCE OF  
HEARING AID**

Dear Sir/Madam,

We are interested to know the annual/monthly expenditure incurred by users of hearing aids. For this purpose, we have given a format on this paper. Please note down the details in the space provided and mail it to us at the end of each month. Please record the information in as much details as possible, so that we can fine out ways and means to cut down the recurring expenditure incurred by the hearing aid users. If there are 2 or more aid users in the family, please write and obtain additional sheets.

Thanking you,

Sincerely yours,

Give the particulars below:

Name of the hearing aid user:

Case No. at AIISH :

Age and Sex :

Hearing aid in use  
(Specify the model) :

Occupation of the hearing aid user Please write in, brief the type of occupation,):

Is the hearing aid worn at the work spot? Yes/No

If not, why? Month . . . . .

Year . . . . .

1) Complaint with your Hearing Aid:

2) Date when the problem was noticed:

3) When did you consult the repair-center? (Approximate date and address of the repair centre)

4.) Replacement/s suggested :

5.) Repair/s suggested ;

6) Spares purchased with address of shop and cost:

	Place	Cost
i. Battery		
ii. Tubing		
iii. Switch		
iv.. Battery charges		
v. Others		

7) The hearing aid repaired :  
on (Approximate date)

3) Expenditure

1. To buy the spares; Battery

Tubing:

Battery Charger:

Switch:

Others

2. Charge for the repair service's:

3. For writing letters to the repair center:

4. For sending the hearing aid by post:

5. Total travelling charges(if any, if the repair center was contacted in person):

6. Others:

7. Total expenditure Rs.....per month

... - Rs..... per month

8. Once in how many days do you change a new Cell:

Tubing

Switches:

9. ED you have rechargeable batteries: Yes/No

Battery charger Yes/No

If yes, what is the cost of each? is .....

10. If you don't have a battery charger, how much does recharging the battery at a time cost?

Appendix -BQUESTIONNAIRE-II

Date:

Name of the hearing aid user :

Case Number at AIISH :

Age and Sex :

Education :

Employment :

Please Note: (TICK) The answer or the answers suitable for your"chOICE wherever essential. If you have any other answer/s write below the corresponding QueStion. If more than one hearing aid is used indicate the performance/s of each under the following questions:

1. when did the hearing problem start(Write approximate month and year)
2. who recommended the hearing aid/s? When
  - a) Audiologists
  - b) ENT Specialists
  - b) Others(Specify)
3. How did you get the hearing aid?
  - i) Purchased paying the full cost
  - ii) Purchased paying the 50% of the cost
  - iii) Free/DOnation(Specify the source)
  - iv) Others . . . .
4. Since when is the hearing aid being used?
  - i) From (date of purchase)
  - ii) Sometimes after purchase (if there wAs a delay, specify the reasons)
5. For how many years do you think the hearing aid is to be worn? Give reasons?
  - 1) For a few months/years

more hearing aid is found useful, (anc if you are one hearing aid) are you willing to wear one more?

Yes(give: reasons)

No (give reasons)

Can't say

7. If a behind -the-ear(BTE) hearing aid is in use, would you prefer to use a in-the-ear (ITE) hearing aid?
- i) Yes(give reasons)
  - ii) No (give reasons)
  - iii)
8. Do you think it would be difficult in using an imported hearing aid?
- i) Yes(what difficulties)
  - ii) No (why?)
9. Do you think the hearing aid being worn at present may become less useful after sometime and different one (more powerful model/ different model) is to be used? Give reasons.
- i) Yes(give reasons)
  - ii) No (give reasons)
  - iii)
10. Do you think the hearing aid needs to be serviced frequently even though it seems to be working alright?
- i) Yes(give reasons)
  - ii) No(give reasons)
  - iii).
11. How do you find out if the hearing aid is working properly or not?
12. When the hearing aid is not working can you identify the part/s not working?
- i) Yes(write which parts?)
  - ii) No
  - iii)
13. How many different switches are there on the hearing aid What do they do?
14. At what setting do you keep the volume control when you use the aid.
- i) Most of the time
  - ii) Occasionally (in situations such as . . . . . to setting)

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15. When do you change the volume control settings to a higher number? Specify to which number?
- i) when battery is weak
  - ii) When battery is new
  - iii) In a noisy place
  - iv) Also in situations such as
  - v. Not at all
16. When do you change the volume control setting to a lower number? Specify to which number?
- i) When the battery is weak:
  - ii) When the battery is new:
  - iii) In a noisy place
  - iv) Also in situation such as
  - v) Not at all
17. At what setting do you keep the tone control, when you use the aid?
18. How often do you clean the ear molds and how?
19. For how many days weeks/months do the following parts of the hearing aid last in your experience?
- i) Cell
  - ii) Tubing
  - iii) Switches(specify the switches)
  - iv) Earmolds
20. From where do you buy the following spare parts when necessary?
- |               | Cost | Place of<br>Purchased | Easily<br>available |
|---------------|------|-----------------------|---------------------|
| i) Cell       |      |                       | Yes/No              |
| ii) Tubing    |      |                       | Yes/No              |
| iii) Switches |      |                       | Yes/No              |



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22. If you have visited the professionals subsequent to acquiring the hearing aid, was any additional useful information regarding 'hearing aid' given to you that you were not already given? If yes, what?
23. Was the advice given about the hearing aid and its care adequate?
- i) Yes(give reasons)
  - ii) No (give reasons)
24. Have you on your own read books, magazines, etc. , on hearing aids?
- i) Yes(specify sources)
  - ii) No(give reasons)
25. To what extent are you satisfied with your hearing aid?
- i) Completely satisfied
  - ii) Find it adequate
  - iii) Not satisfied
- Explain in what ways
26. When you are not wearing your hearing aid, have other people noticed a change in your speech or other behaviour?
27. How do you feel about wearing a hearing aid?

Happy because it helps  
you to hear speech and/or  
other sounds

Yes/No

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28. Are you interested in knowing more about the hearing aid?

Yes/No

29. If yes, do you prefer to know through

- i) Pamphlets
- ii) Tapes
- iii) Audiovisual media
- iv) Lectures and demonstration
- v) Others

30. Do you find it difficult to hear a person speaking or sound source, if it is situated on the opposite side of the ear in which you are wearing the hearing aid?

Yes/No.

APPENDIXE-CQUESTIONNAIRE-III:

Name of the hearing aid user :

Case Number at AIISH :

- 1) Why was a hearing aid recommended for you?
- 2) When was the hearing aid/s obtained?
- 3) Since when is the hearing aid being used?
  - i) From date of purchase?) . . . .
  - ii) Sometimes after purchase (If there was a delay, specify the reasons\*..\*
- 4) Did you get the hearing aid by post or in person?
  - i) If in person, how many times did you have to visit the place before getting it?.....
  - ii) If by post, was it sent by Registered post? Yes/No.
- 5) What was the deposit made when the hearing aid was purchased?
  - i. 25% of the total cost.
  - ii. 50% of the total cost,
  - iii. others.
- 6) Do you think it is important to get the guarantee card when you get the hearing aid? Give reasons.
- 7) Do you think after wearing a hearing aid the hearing improves for it gets worse? Explain how.
- 8) What type of hearing aid/hearing aids is being used? (If more than one hearing aid is being used, specify below for each).
  - i. BTE, its model and brand:
  - ii. Indian or imported
  - iii. BTE type to one ear
  - iv. BTE type to both ears,
  - v. BTE type to one ear and body level type to the other.
- 9) Why is this type of hearing aid/s used by you?
- 10) Why do you have more than one hearing aid? (Answer only if you have more than one).

- 11) Do you think having the hearing aid in both ears (binaural) is more helpful to you?
- i) Yes (give reasons)
  - ii) No (give reasons)
  - iii) Dont know
  - iv) Not tried.
  - v) . . . . .
- 12) Would you prefer to wear an Indian hearing aid?
- i) Yes (give reasons)
  - ii) No (give reasons)
- 13) Are any part/s of the hearing aid/s that is used imported? specify.
- i. Tubing ... Yes/No/Don't know.
  - ii. Battery ... Yes/No/Don't know.
  - iii. Battery charger ... Yes/No/Don't know
  - iv. Earrnolds ... Yes/No/Don't know
  - v. Others . . . . .
- 14) How do you make out that the hearing aid is very powerful or less powerful?
- 15) Do you think that the most powerful hearing aid is, most useful?
- i) Yes (give reasons)
  - ii) No (give reasons)
  - iii) . . . . .
- 16) In addition to being powerful what are the other characteristics of hearing aid you would consider important?
- 17) Do you think the hearing aid is to be replaced by a new one, periodically?
- i) Yes(give reasons)
  - ii) No (give reasons)
  - iii) . . . . .

- 18) When would you think of sending the hearing aid for repair?
- 19) How often do you check the hearing aid?
- i) . . . . times in a day . . .
  - ii. Once in . . . . days
  - iii. Once in . . . . weeks
  - iv. Not at all
  - v. Don't know how to check
  - vi. Others.
- 20) Where do you keep the hearing aid when it is not worn?

**CELLS:**

- 21) What voltage do you ask for when you buy the cell?
- 22) Which cell have you tried? Specify the name (like Toshiba—) why?
- 23) How do you check the cell(battery)?
- i. By listening to the aid.
  - ii. By using a voltmeter at home.
  - iii. By using a voltmeter at shop,
  - iv. Others.
- 24) How often do you check the cell?
- i) once in . . . . . days
  - ii) once in . . . . weeks
  - iii) once in . . . . months
  - iv) Don't check.
  - v)
- 25) When do you change the cell?
- i) When there is no sound at all from the hearing aid.
  - ii) When the sound coming from the hearing aid is weak.
  - iii) When the sound from the hearing aid is not clear.
  - iv) When there is no change in loudness when the volume control  
Is turned to higher numbers,
  - v) Not changed so far.
  - vi) Others.

- 26) How often do you change the cell?  
i) Once in -- day  
ii) once in --- weeks  
iii) once in --- months  
iv) Not at all-  
v) .....
- 27) Are you aware of chargeable batteries?  
Yes/No
- 28) Do you use chargeable batteries?  
Yes/No
- 29) If yes, from where do you get them? What is the cost of each?
- 30) Do you have battery charger? Yes/No  
if yes, which one? From where did you get It? What was the cost?
- 31) Do you check for voltage at the shop when you buy the cells?  
(i) Yes (ii) No (iii) Did not know (iv)....
- 32) How many batteries do you purchase at a time? ....
- 33) If you purchase more than one battery where do you store them?
- 34) Where do you keep the cell when the hearing aid is not worn?

**TUBING:**

- 35) Do you check the tubing?  
i) By listening.  
ii) By means of an instrument (name the instrument)  
iii) Don't check  
iv) Did not know how to check
- 36) How often do you check the tubing?  
i).... times in a day.  
ii) Once in . . . days.  
iii) Once in .... days.  
iv) Once in . . . months  
v) Not at all  
vi) .....

37) When do you get a new tubing?

- i) When the tubing gets torn.
- ii) When the sound comes on-and-off from a tubing
- iii) When there is no sound from the tubing.
- ivi) When advised by the audiologist/speech pathologist/  
electronic engineer/electrical shops,
- v) Not changed even once
- vi) Others....

38) How do you keep the tubing when hearing aid is not in use?

- i) Removing the tubing from the hearing aid and keeping it in  
a box.
- ii) Others.

**SWITCHES:**

39) How many different switches are there on the hearing aid?  
What do they do?

40) How do you switch 'on' the hearing aid?  
By turning the switch to\_\_\_\_\_pos&tion.

41) At which setting of tone and volume controls have you been  
advised to use the hearing aid?

Volume control .....

Tone control....

**VOLUME CONTROL:**

42) Have you tried other settings of volume control?

i) Yes (which settings)

ii) No

iii)....

43) If yes, have you find this/these setting/s to be more useful?

44) At what setting do you keep the volume control when you use  
the aid .

i) Most of the time...

ii) Occasionally (insituations such as .... to .... setting).

- 45) At what maximum setting of volume control do you use the aid? When?
- i) How frequently do you use this setting.
- 46) When do you change the volume setting to a higher/lower number. Specify to which number.
- i) when battery is weak
- ii) When battery is new.
- iii) In a noisy place.
- iv) Also in situation such as .... to ....
- v) Not at all.

**TONE CONTROL:**

- 47) At what setting do you keep the tone control when you use the aid?
- 48) What do L/N/H indicate
- Write L.....
- Write N.....
- Write H.....
- 49) When do you change the tone control settings?
- i) When interested in listening to speech, music and other sounds such as....
- ii) When not interested in listening
- iii) never
- iv).....
- 50) Do you use the 'T' switch?
- i) Yes.
- ii) No
- iii) .....
- If yes, for what purpose?
- 51) How do you use the 'T' switch?

**MICROPHONE:**

- 52) Where is the mic placed in your hearing aid?
- i) on the top of the aid.
- ii) At the back of the aid
- iii) Don't know
- iv) .....



- 53) Where do you think the mic should be placed?
- i) Top of the aid
  - ii. Back of the aid
  - iii) Don't know
  - iv) Doesn't make a difference where it is placed,
  - v) ....
- 54) Is the mic covered by hair often? why?
- 55) Do you think covering the mic with hairs affects the sound reaching the ear?
- i. Yes (give reasons)
  - ii. Yes (give reasons)
  - iii. Don't know
  - iv. ....

**SPARE PARTS:**

- 56) For how many days/weeks/months do the following parts of the hearing aid last in your experience?
- i) cell.....(ii) tubing.....
  - iii) Switches (specify the switches).....(iv) Earmolds.....
- 57) Do you keep the following additional spare parts with you?
- i) cell - yes/no
  - ii) tubing - yes/no
  - iii. switches - yes/no
  - iv) Earmold - yes/no.
58. From where do you buy the following spare parts when necessary

<u>Cost</u>	<u>Place of purchase</u>	<u>Easily available</u>
-------------	--------------------------	-------------------------

- i. cell
- ii. tubing
- iii. switches
- iv. battery charger
- v. rechargeable battery

If not purchased any of them, write "not purchased" against each item.

- 59) Do you-have always purchase the spare parts (cells, tubing, others-switches) from the same place? Why?
- 60) If more than one hearing aid is being use, can you specify the good qualities and bad qualities of each below.
- 61) Do you think periodical ENT/hearing evaluation is necessary even after a hearing aid is obtained?
- i) Yes (give reasons)
  - ii) No (give reasons)
  - iii) Do not know.
  - iv) . . . . .
- 62) Was the advice given about the hearing aid and its care adequate?
- i) Yes (give reasons)
  - ii) No (give reasons)
- 63) Have you on your own read books, magazines etc. on hearing aid?
- i) Yes (specify sources)
  - ii) No (give reasons)
- 64) If yes, were the sources:
- ii Helpful
  - iii Helpful only to some extent,
  - iii) Not at all helpful
  - iv) . . . . .
- 65) Are you interested in knowing more about the hearing aia?  
Yes/No.
- If yes, do you prefer to know through:
- i) Pamphlets.
  - ii) Tapes.
  - iii) Audiovisual media
  - iv) Lectures and demonstration,
  - v) . . . . .

**USEFULNESS OF HEARING AID:**

- 66) Is the hearing aid being worn throughout the day or only sometimes?

67) If only sometimes, specify the situations and approximate duration in hours below:

<u>Situation</u>	<u>No. of hours/days/week</u>
i.	
ii.	
iii.	

68) Do you wear the hearing aid.

1) At home

(i) with family members - Yes/No

(ii) Listening to the radio - Yes/No

(iii) The T.V. is on - Yes/No

(iv) others . . . . .

2) Do you wear it in :

i. School/work place - yes/no

ii. Friends house - Yes/no

iii. Relatives house - yes/no

iv. Functions/marriages/parties - yes/no

v. Far relatives - Yes/No

vi. Near relatives - yes/no.

vii. Others - Market/temple/church/mosque/theatre etc.

69) When do you switch 'off' the hearing aid?

i) When . . . . . why? . . . . .

ii) When . . . . . why? . . . . .

70) Have you get your hearing aid changed to a different model?

which hearing aid do you have now?

Which hearing aid did you have earlier?

a. How many times have you changed? . . . . .

b. From which aid to which aid? . . . . .

i) One body level to ear level aid (specify name and model)

. . . . . & . . . . .

ii) Ear level to body level

iii) Monaural from one ear to the other ear (or both ears - binaural)

iv) Imported to indigenous or vice versa.

71) Have you noticed any change in the usefulness of hearing aid from the day you started using an aid?

- i) Better
- ii) Worse
- iii) No change.

give Retails.

72) Since you started using the hearing aid, is there any change in your understanding of other's speech?

- a) For better
- b) For' worse
- c) No change

73)- To what extent are you satisfied with your hearing aid?

- i) completely satisfied,
- ii) Find it adequate.
- iii) Not satisfied.

Explain in what ways?

74) Do you feel that hearing aid has helped you:

- i) More than anticipated.
- ii) Less than anticipated,
- iii) Not at all

Explain in what ways.

75) Which of the following have you noticed in yourself when the hearing aid is worn and when it is not worn?

When it's worn	When it's not worn
-------------------	-----------------------

1. Can hear the following environmental sounds:
  - a. Door bell
  - b. Telephone ring
  - c. Bus horn and other traffic noise
  - d. Dog barking and other animal sounds.
  - e. Other sounds such as:

ii.

- (a) you hear a person calling from same room.
- (b) Hear a person calling from next room.
- (c) Don't hear even when called from near.

iii.

- (a) Can locate the speaker when you are not looking at the speaker.
- (b) Can locate other sounds such as

iv. Can converse easily when -

- a. You are watching the speaker
- b. You are not looking at the speaker.
- c. In noisy situations.
- d. In quiet situations.

76. Do you enjoy wearing the hearing aid sometimes,

(i) Yes (ii) no (iii).....

If yea, in which situations

(a) when the music is on .... Yes/No

(b)

(c)

77. When you are not wearing your hearing aid, have other people noticed a change in your speech or other behavior?

78. Do you have problems (ear discharge/tinnitus/vertigo)? If so, how often?

i. Throughout the day,daily (a) continuous

ii. Sometimes - specify (b) Episodic

(If you have more than one problem, give information about all the problems)

79. Do you use your hearing aid when you have the problem(tinnitus/ear discharge/vertigo).

- 80) Do you notice any change in the usefulness of the hearing aid when you have the problem (tinnitus/ear discharge/vertigo).
- i. Less useful
  - ii. More useful
  - iii. No change.
- (give details such as . . . . . speech is not clear.
- 81) Do you change the volume control or tone control of the hearing aid when you have the problem (tinnitus/ear discharge/vertigo) specify the change -
- 82) Have you noticed any changes in the following since you started wearing a hearing aid?
- i. Tinnitus,
  - ii. Vertigo
  - iii. Ear discharge.
  - iv. Any other problems like head ache.
- S3) Do you change the volume control? Yes/No  
If yes, is it to a higher number/lower number/direction?
- | <u>situations</u> | <u>Volume control setting</u> |
|-------------------|-------------------------------|
| (i)               |                               |
| (ii)              |                               |
| (iii)             |                               |
84. What changes have you noticed in yourself since the time the hearing aid is worn?
- i. 1. you have started speaking more - Yes/no.  
2. No change. - Yes/No.
  - ii. 1. lowered your voice - yes/no  
2. No need of repetitions in conversation - Yes/No  
3. Other changes like -  
- greater willingness to attend social gatherings - Yes/No  
- Use of less signs - yes/No.
85. What are the latest diagnostic findings and advice?
86. What was the advice given with regard to ear surgery for the hearing loss.