

A COMPREHENSIVE COST ANALYSIS OF EXPENDITURE FOR PARENTS OF CHILDREN WITH HEARING LOSS

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ALL INDIA INSTITUTE OF SPEECH AND HEARING

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JUNE, 2026

CERTIFICATE

This is to certify that this dissertation entitled "**A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss**" is a bonafide work submitted as part of fulfilment of the degree of Master of Science (**Audiology**) of the student with Registration Number **P011124S023023**. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

Mysuru
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CERTIFICATE

This is to certify that this dissertation entitled " **A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss** " has been prepared under my supervision and guidance. It is also being certified that this dissertation has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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DECLARATION

This is to certify that this dissertation entitled " **A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss** " is the result of my own study under the guidance of Dr. N Devi, Associate Professor in Audiology, All India Institute of Speech and Hearing, Mysuru and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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ABSTRACT

Background: Hearing loss in children imposes a significant and continuous financial burden on families, extending from diagnosis through long term rehabilitation. In India, where out-of-pocket expenditure constitutes a major proportion of total healthcare spending, families of children with hearing loss substantial costs related to diagnostic evaluations, hearing aid purchase, therapy, follow-up care, and non-medical expenses. Despite the growing prevalence of paediatric hearing loss, comprehensive cost analysis studies in the Indian context remain limited.

Aim: The present study aimed to conduct comprehensive cost analysis of expenditure incurred by parents of children with hearing loss associated with diagnosis, hearing aid fitting, rehabilitation, and ongoing hearing aid management

Method: The study was carried out in three phases: development of a structured questionnaire, content validation of the questionnaire by five experts, and administration of the questionnaire to parents/caregivers of children with hearing loss using hearing aids. A total of 100 parents/caregivers participated in the study. The questionnaire assessed direct audiological costs, indirect audiological costs, indirect non-audiological costs, and overall financial burden experienced by families. Data were collected through direct and telephonic interviews, and all expenditures were recorded in Indian Rupees and standardized to annual costs. Descriptive analysis and Spearman's correlation analysis were performed.

Results: Descriptive analysis revealed that the majority of participants belonged to rural, lower-middle socioeconomic backgrounds, and most children had bilateral profound hearing loss. Among the three expenditure domains, indirect non-audiological costs — comprising travel, accommodation, and loss of wages — recorded the highest maximum annual expenditure of Rs. 1,23,500, followed by direct audiological costs Rs. 59,600, with indirect audiological costs (repairs and servicing) being the lowest at Rs. 16,500. Hearing aid purchase was the single largest contributor to direct audiological expenditure. The majority of participants (31%) reported total annual hearing-related expenditure in the range of Rs. 1,00,001–2,00,000, with the average annual expenditure being approximately Rs. 1,99,600. Eighty-four percent of families perceived the overall financial burden as moderate to high, 59% received no government or NGO financial support, and 36% had to borrow money or take loans. Spearman's correlation analysis revealed a statistically significant moderate negative correlation between socioeconomic status and overall financial burden ($r = -0.425$, $p < 0.01$), indicating that families with lower socioeconomic status experienced greater financial strain.

Conclusion: The study highlights the substantial economic burden experienced by parents of children with hearing loss during diagnosis and long-term hearing aid management. The findings emphasize the need for improved financial assistance programmes, subsidy schemes, insurance support, and accessible rehabilitation services to reduce the financial strain on families and improve continuity of hearing care services for children with hearing loss.

Keywords: *financial burden, comprehensive cost analysis, questionnaire, direct audiological costs, indirect non-audiological costs.*

Chapter 1

Introduction

According to the World Health Organization (WHO), India has historically reported one of the highest levels of Out-of-Pocket (OOP) expenditure on healthcare in the South-East Asian region. Sriram and Albadrani (2022) reported that India ranks third among countries in the WHO South-East Asia Region with respect to OOP health expenditure. This indicates that a substantial proportion of healthcare expenses are directly borne by individuals and households rather than being financed through insurance mechanisms or government-funded healthcare systems. In earlier WHO estimates, nearly 60% of total health expenditure in India was paid directly by households. Out-of-Pocket health expenditure refers to the direct payments made by households at the time of receiving healthcare services, including expenses related to consultation, hospitalization, medicines, diagnostics, and transportation. High OOP expenditure is considered a major barrier to equitable healthcare access because it can lead to catastrophic health spending and push families into poverty. Russell, (2004) highlighted that healthcare-related financial burdens significantly reduce the overall welfare and economic stability of households, especially in developing countries. Similarly, Sriram and Albadrani, (2022) emphasized that OOP health expenditures constitute a substantial proportion of household expenditure in India and adversely affect the economic well-being of families. Studies by Bonu et al. (2007) and van Doorslaer et al. (2006) reported that nearly 37-39 million Indians falls below the poverty line every year due to healthcare-related expenses.

India also continues to face major poverty-related challenges. Planning Commission, Government of India. (2013) report estimated that 21.9% of India's population was living below the poverty line in 2011–12. Studies conducted in India have consistently demonstrated that high Out-of-Pocket (OOP) healthcare expenditure contributes significantly to household impoverishment and

increases the risk of poverty among economically vulnerable populations (Hooda, 2017; Garg & Karan, 2009; Balarajan et al., 2011). Similarly Van Doorslaer et al., (2006) found that nearly 37 million people in India were pushed into poverty due to OOP healthcare payments alone. The burden of OOP expenditure is particularly significant in low- and middle-income populations, where limited health insurance coverage and inadequate public healthcare infrastructure compel individuals to depend heavily on private healthcare services. Consequently, many households delay or avoid seeking medical care due to financial constraints, adversely affecting health outcomes and quality of life.

Another important concern is the increasing use of private healthcare services in India. Due to inadequate public healthcare infrastructure, overcrowding, and perceived poor quality of care in government hospitals, many individuals depend on private healthcare facilities, which are associated with significantly higher treatment costs. Sriram and Albadrani (2022) observed that households utilizing private healthcare facilities had substantially higher odds of becoming impoverished due to OOP healthcare expenditure. Chronic illnesses and prolonged hospitalization were also identified as major determinants increasing the risk of poverty among households. Although the Government of India has introduced several initiatives such as Ayushman Bharat, National Health Mission, and publicly funded health insurance schemes to improve financial risk protection and reduce OOP expenditure, the burden on households remains considerable.

According to Hooda (2017) out-of-pocket health expenditures can increase the incidence and depth of poverty; additionally, poverty has a negative impact on health. Out-of-pocket healthcare payments aggravate both the occurrence and depth of poverty, and selling assets and borrowing money are the most important mechanisms households follow to pay for the expenses incurred. The majority of the health insurance programmes in India cover only the hospital expenses. Mishra and Mohanty, (2019) reported that disability is an emerging public health, economic, and social challenge worldwide. Globally, over 150 million people have some form of disability, and 6 million of them have severe

disability. Disability varies largely within and between countries and regions, as well as by socio-economic and demographic characteristics, owing to disease burden, stages of demographic transition, and definitional differences.

In the Indian socio-economic landscape, disability is both a consequence and a catalyst of poverty: people with disabilities are disproportionately represented among the poorest, and their economic status often persists across generations (Mishra et al., 2021). Disabilities and healthcare needs frequently result in catastrophic out-of-pocket (OOP) expenditures, pushing households deeper into poverty—particularly when insurance coverage is limited or absent. National data reported by Panda et al., (2024) suggest that OOP health spending, especially for inpatient care, can account for nearly 11% of monthly household consumption, with nearly 28% of households facing severe financial hardship in India. The findings of the analysis showed that the prevalence of disability of any kind was 22 persons per 1000. Around one-fifth (20.32%) of the household's monthly consumption expenditure was spent on out-of-pocket expenditure for disability. More than half (57.1%) of the households were pushed to catastrophic health expenditure due to one of the members being disabled. Almost one-fifth (19.1%) of the households that were above the poverty line before one of the members was treated for disability were pushed below the poverty line after the expenditure of the treatment, and the average percentage shortfall in income from the poverty line was 11.0% due to disability treatment care expenditure (Yadav et al., 2021)

Hearing loss is a major global public health concern, with over 430 million people worldwide experiencing disabling levels of hearing impairment (*World Report on Hearing*, 2021). Hearing impairment is one of the most prevalent disorders in children and adults worldwide, which not only interferes with the acquisition, development and maintenance of speech and language skills but also adversely deprives the auditory nervous system of future learning. It can have long-term harmful effects on educational, social, emotional and cognitive skills in young children; restrict the vocational

options and employment opportunities in adults; and can cause isolation, loneliness and depression in older adults, if it remains undetected and unattended at the earliest. However, early identification and intervention are known to greatly reverse the ill effects and improve the quality of life of children and adults with hearing impairment (Ansari, 2021). Early fitting of hearing aids in children plays a crucial role in optimizing speech and language development. Children fitted within the first year of life demonstrate significantly better spoken language outcomes compared to those fitted later (Yoshinaga-Itano et al., 1998; Tomblin et al., 2015). The concept of a "critical period" highlights that the auditory system and language networks are most plastic during infancy, and timely amplification allows children with hearing impairment to develop near age-appropriate communication skills (Sharma et al., 2002).

However, the cost implications extend well beyond the device itself: families are confronted with expenses at multiple stages, including diagnostics (Audiometry, Auditory Brainstem Response (ABR), Oto-Acoustic Emission (OAE)), initial fitting, components like earmolds and batteries, routine servicing, replacements every 5–7 years, and indirect costs such as travel, lost wages, and school disruptions (Ansari et al., 2021). Despite such wide-ranging costs, in India and many similar middle-income countries public subsidies and insurance schemes are often inadequate or non-existent for paediatric hearing aid users, forcing families to rely on Out-of-Pocket payments (Panda et al., 2022). The early assessment/diagnosis phase is especially burdensome, as it involves multiple tests and visits before amplification can occur a stage often under recognized in existing research. Given these layers of vulnerability, a comprehensive cost analysis tracing the full pathway from diagnosis to management of paediatric hearing loss is critically needed. Such a study will help quantify economic burden across direct medical, direct non-medical, and indirect domains. It will also provide empirical support for policymakers, health planners, and clinicians to counsel families effectively, advocate for inclusive subsidy mechanisms, and prioritize early hearing screening programs and diagnostics as essential components in the continuum of hearing care.

1.1 Need for the study

Hearing loss in children is an important health concern that affects the child's speech and language development, communication abilities, academic success, social interactions, and overall quality of life. Early identification of hearing loss and timely hearing aid fitting are very important to reduce developmental delays and also to improve the child's long-term outcomes. However, hearing aid management does not end with the initial fitting. It is a long-term rehabilitative process that requires regular follow-up, monitoring, maintenance, and active involvement from family members. Due to these ongoing requirements many families face financial challenges.

Children with hearing loss need several audiological and medical evaluations before they are fitted with hearing aids. These evaluations may include ENT consultations, audiological evaluations, hearing aid evaluations, and other diagnostic procedures. Subsequently after the diagnosis, parents must also have to meet the expenses associated to hearing aid purchase, ear moulds, batteries, harnesses, and other accessories that are necessary for effective and consistent hearing aid use. In addition to the hearing aid related expenses many children require regular speech and language therapy, auditory training and also auditory verbal intervention. These services may be needed for a long period which will result in additional expenses for the families. Therefore, the expenditure involved in hearing aid management outspreads beyond the initial cost of the device and also continues throughout the rehabilitation process.

In contrast to the temporary medical treatments, for many children with permanent hearing loss the hearing aid use is a lifetime requirement. Regular follow-up visits are necessary for hearing aid programming, verification, fine-tuning, troubleshooting, and also for monitoring hearing, speech and language development. Children also need frequent replacement of ear moulds as they grow and also need occasional servicing or repair of hearing aids. Thus, families are need to be prepared to manage not only the instantaneous expenditure but also the repeated maintenance costs related to hearing aid

use. These recurring expenses can be challenging for many families especially those from lower socioeconomic backgrounds.

In developing countries such as India, a considerable portion of healthcare expenditure is paid directly by families as out-of-pocket (OOP) expenditure. Although government schemes and financial assistance programs are available for children with hearing loss, to support for long-term hearing aid maintenance, accessories, batteries, repairs, and rehabilitation services is often limited. Still parents often spend their own income in order to continue the child's hearing aid management and rehabilitation. Financial constraints may therefore affect the regular hearing aid use, follow-up visits and continuity of the intervention services.

Deniz et al. (2022) reported that the families of individuals with hearing loss spent a significant part of their annual income on hearing-related expenses such as hearing aids, batteries, accessories, transportation and also other rehabilitation services. The author found that the families of children using hearing device experienced higher expenditure than those of adult user. These out-of-pocket (OOP) Expenses can place a financial burden on families and can affect their daily house hold living. In addition to direct audiological costs, families also often experience indirect non-audiological costs such as travel, food, accommodation, and may loss of wages while attending appointments and rehabilitation sessions. The financial burden will become even more troublesome for families who live far from specialized audiology and rehabilitation centres.

For many families especially those from lower socioeconomic backgrounds the financial burden can even delay intervention and also can compromise the regular follow up visits. Despite the increasing prevalence of hearing aid use among children with hearing loss, there is limited research in the Indian context focusing specifically on the comprehensive expenditure incurred by families during hearing aid management. Most studies had primarily focused on clinical outcomes rather than the financial impact experienced by parents and caregivers. Therefore, there is a need to systematically

analyse the direct audiological costs, indirect audiological costs, and indirect non-audiological costs associated with hearing aid use in children.

The findings of the present study may help audiologists and rehabilitation professionals to provide realistic counselling to parents regarding the short-term and long-term expenditure associated with hearing aid management. The study may also help families in financial planning and alertness for future rehabilitation needs. Additionally, the results can also provide baseline information for policymakers, healthcare administrators, and government agencies to strengthen financial assistance programmes, subsidy schemes, insurance coverage, and support services for paediatric hearing aid users. Therefore, Understanding the financial burden associated with hearing aid use in children is important for improving access to services, maintaining continuous care and achieving better rehabilitation outcomes.

1.2 Aim of the study

To conduct a study on the comprehensive cost analysis of expenditure for parents of children with hearing loss associated with the diagnosis, hearing aid fitting, and ongoing management of hearing loss.

1.3 Objectives of the study

➤ To collect information on the direct audiological costs:

- Incurred in the diagnosis of childhood hearing loss (including ENT consultations, audiological evaluations, and hearing aid testing charges).
- Incurred for hearing device purchase, ear moulds, and accessories, including batteries, harness.
- Incurred for intervention / therapeutic process.
- Incurred for post-follow-up hearing aid programming charges for hearing aids.

- **To collect information on the indirect audiological costs:**
 - Incurred for repairs, servicing, and replacement of hearing aids.
 - Incurred for repairs and replacement of ear moulds.
- **To collect information on the indirect non-audiological costs:**
 - Borne by families for travel, accommodation, and loss of wages
- **To analyse the overall financial burden** of managing a child with hearing loss from diagnosis to rehabilitation through hearing aids, from the parents'/caregivers' perspective.

Chapter 2

Review of literature

2.1 Overview of Hearing Impairment

Hearing loss is one of the most common sensory impairments affecting individuals across all age groups and has become a major global public health concern. According to the Global Burden of Disease (GBD) initiative, approximately 1.5 billion people worldwide were estimated to have some degree of hearing loss in 2019, representing nearly 20% of the global population. Among them, around 500 million individuals experienced disabling hearing loss. The prevalence of hearing loss continues to increase globally, and it is estimated that by 2050 nearly 2.5 billion people may be affected, with around 700 million requiring rehabilitation or intervention services (Suazo-Díaz et al., 2025).

Hearing impairment can significantly affect speech, language, communication, educational achievement, psychosocial development, and overall quality of life. In children, untreated hearing loss may interfere with speech and language acquisition, academic performance, cognitive development, and social interaction. In adults, hearing impairment may negatively influence employment opportunities, communication abilities, emotional well-being, and interpersonal relationships. Emotional consequences such as loneliness, anxiety, depression, and social isolation have also been reported among individuals with hearing loss (Haile et al., 2021; Suazo-Díaz et al., 2025). The World Health Organization (WHO, 2021) reported that unaddressed hearing loss negatively affects communication, education, employment, mental health, and social participation. The report further emphasized that early identification and timely intervention can significantly improve auditory, speech-language, educational, and socio-emotional outcomes among children with hearing impairment.

2.2 Importance of Early Identification and Intervention

Early identification and intervention play a crucial role in reducing the adverse effects associated with hearing loss. Hearing screening programs facilitate early detection of hearing impairment and improve the possibility of timely rehabilitation. Children diagnosed and treated early demonstrate significantly better speech, language, communication, cognitive, and academic outcomes compared to children receiving delayed intervention (Suazo-Díaz et al., 2025). Yoshinaga-Itano et al. (1998) and Tomblin et al. (2015) reported that children fitted with hearing aids within the first year of life exhibited significantly better spoken language outcomes compared to children fitted later. Similarly, Sharma et al. (2002) highlighted the presence of a sensitive period for auditory development, suggesting that the central auditory nervous system demonstrates maximum plasticity during the first few years of life. The authors observed that auditory plasticity remains optimal until approximately 3.5 years of age and gradually reduces after seven years, emphasizing the importance of early amplification and rehabilitation. The WHO (2021) also emphasized that hearing technologies such as hearing aids and cochlear implants are effective and cost-effective interventions when accompanied by appropriate rehabilitative support services. However, successful outcomes depend not only on device fitting but also on continuous follow-up, therapy, counselling, and auditory rehabilitation services.

2.3 Need for Hearing Aids and Optimal Rehabilitation

Hearing aids are among the most commonly recommended rehabilitation devices for individuals with hearing impairment. Advances in hearing aid technology, especially the development of digital hearing aids, have significantly improved speech perception, programmability, noise reduction, and listening comfort among users (Levitt, 1987; Levitt, 2007). Digital hearing aids provide several advantages over conventional analog devices through advanced signal processing and individualized programming (Bentler & Duve, 2000; Levitt, 2007). The WHO (2021) estimated that more than 400 million individuals worldwide could benefit from hearing aids; however, less than 20% of those requiring hearing aids actually use them. In low- and middle-income

countries, the coverage gap remains particularly high due to limited accessibility, financial barriers, inadequate healthcare infrastructure, and lack of awareness.

Dillard et al. (2025) reported that individuals meeting hearing aid candidacy criteria generally undergo hearing aid fitting and counselling during the initial appointment itself. However, long-term success with hearing aids depends on consistent usage, maintenance, counselling, periodic programming, and rehabilitative support services. Humes (2003) further observed that hearing aid outcomes are influenced by multiple factors such as satisfaction, benefit perception, device performance, and regular use among hearing aid users. The study highlighted that the hearing aid users who reported better aided sound quality, greater daily hearing aid usage, and higher perceived benefit demonstrated more successful hearing aid outcomes. In addition, factors such as age, degree of hearing loss, cognitive performance, communication difficulties, and previous hearing aid experience were found to contribute significantly to individual differences in hearing aid satisfaction and overall hearing aid success. The author also emphasized that the hearing aid outcome assessment should not rely solely on speech recognition measures, but should additionally include self-reported measures of benefit, satisfaction, and hearing aid use in everyday listening situations.

2.4 Economic Burden Associated with Hearing Loss

The economic burden associated with hearing loss is substantial and affects both families and healthcare systems worldwide. World Health Organization (2021) estimates indicate that unaddressed hearing loss results in an annual economic loss of approximately US\$ 980 billion world wide due to healthcare expenditure, educational support, reduced productivity, and social costs. The report also emphasized that a relatively small annual investment in hearing healthcare services could significantly reduce the global burden associated with hearing impairment.

In India, out-of-pocket (OOP) healthcare expenditure constitutes a major proportion of total healthcare spending. Using data obtained from the national sample survey organisation (NSSO)

health surveys conducted during 2014 and 2018, Sriram and Albadrani (2022) investigated the effect of OOP healthcare payments on catastrophic health expenditure and household welfare in India. The authors reported that that OOP expenditure accounted for nearly 62.6% of total healthcare expenditure in India, placing India among the countries with the highest OOP expenditure in Southeast Asia Region. The study further revealed that high healthcare expenses significantly affected household consumption expenditure and increased the risk of financial hardship among economically vulnerable populations.

Hooda (2017) examined the impact of OOP healthcare payments on household impoverishment in India using unit-level data from the 68th round (2011–2012) of the National Sample Survey Organisation (NSSO). The study estimated the prevalence, intensity, and incidence of catastrophic healthcare expenditure across different economic groups, rural–urban populations, and states. The findings demonstrated that poorer households experienced a disproportionately higher burden of healthcare expenditure, particularly during hospitalization and chronic illness management. The study also highlighted that the healthcare expenditure frequently pushed low-income households below the poverty line and widened existing socioeconomic inequalities in healthcare access and affordability.

Disability-related healthcare expenditure further increases the financial burden experienced by families. Yadav et al. (2023) conducted a study using nationally representative survey data to examine the financial impact of disabilities in India. The study assessed out-of-pocket expenditure, catastrophic healthcare expenditure, and poverty impact among households having members with disabilities. The results showed that approximately 57.1% of households experienced catastrophic healthcare expenditure due to disability-related treatment expenses. In addition, nearly 19.1% of households that were previously above the poverty line fell below the poverty threshold after meeting disability-related healthcare costs. The study further reported that rehabilitation expenses, assistive devices, repeated hospital visits, medication costs, and long-term treatment requirements

substantially contributed to the economic burden experienced by these families. These findings highlight the economic vulnerability associated with long-term healthcare needs among individuals with disabilities.

2.5 Direct Expenditure Associated with Hearing Aid Use

Families of children with hearing loss incur expenditure at multiple stages of hearing rehabilitation. Direct expenditure includes costs associated with ENT consultations, audiological evaluations, hearing aid purchase, earmoulds, batteries, hearing aid accessories, therapy sessions, follow-up visits, and hearing aid programming. Dillard et al. (2024) in its background study on hearing aid service delivery in resource-limited settings, conducted a systematic scoping review and stakeholder-based analysis to understand current practices and barriers associated with hearing aid services in low- and middle-income countries. The review included 15 peer reviewed studies conducted across 9 countries and additionally incorporated semi-structured interviews with 13 experts involved in hearing aid service delivery programmes across 11 countries. The study reported that high costs associated not only with hearing aid purchase, but also with sustained hearing aid use, including batteries, repairs, maintenance, and follow-up rehabilitation services, remained major barriers to hearing aid accessibility and long-term utilization, particularly in resource-limited settings. The report further highlighted that the shortage of trained hearing healthcare professionals, limited service accessibility, and affordability issues significantly affected hearing aid uptake and rehabilitation outcomes. The study also emphasized that community-based service delivery models, task-sharing strategies, telehealth approaches, and the use of low-cost hearing technologies could improve accessibility and reduce the long-term economic burden associated with hearing rehabilitation.

Deniz et al. (2022) conducted a cross-sectional study among hearing aid and cochlear implant users and reported that parents of paediatric hearing aid users incurred significantly higher annual

expenditure compared to adult users. Paediatric hearing aid users demonstrated increased expenditure related to batteries, earmoulds, accessories, transportation, food during hospital visits, and total direct healthcare costs. The study also observed that families of paediatric hearing aid users spent a larger proportion of their annual income on hearing-related expenditure compared to adults. Ostrowski and Mouzakes (2022) reported that hearing aid devices themselves represent a major financial burden, with additional recurring expenditure for batteries, repairs, earmould replacement, tubing changes, shell replacement, and reprogramming. The authors observed that even families with comparatively higher income experienced financial stress due to repeated hearing aid-related expenditure.

2.6 Indirect and Non-Audiological Expenditure related to hearing loss

In addition to direct audiological expenditure, families also incur indirect and non-medical costs associated with hearing rehabilitation. These include transportation expenses, accommodation charges, food expenditure during hospital visits, and loss of wages among caregivers. Baltussen et al. (2009) evaluated the costs associated with a school-based hearing screening programme and hearing aid delivery services among approximately 216,000 school children across primary, secondary, and tertiary care centres in China. The study used a prospective design in which screening and hearing aid delivery costs were estimated using programme records and assessment of healthcare personnel time. In addition, household-related expenses such as transportation, travel, accommodation, and costs associated with seeking and undergoing hearing healthcare were collected through questionnaires administered to parents of the children. The study reported that transportation expenses, repeated follow-up visits and household related indirect costs substantially increased the overall expenditure associated with paediatric hearing rehabilitation. The author further observed that that hearing rehabilitation services delivered at the primary care level were comparatively less costly than those provided at secondary and tertiary care centres.

Similarly, Deniz et al. (2022) conducted a cross-sectional expenditure analysis to investigate the direct health-related expenditure associated with hearing loss among hearing aid and cochlear implant users. The study compared expenditures between paediatric and adult users and evaluated costs related to hearing devices, batteries, accessories, transportation, accommodation, and repeated clinical follow-up visits. Data were collected using structured expenditure questionnaires administered to participants and caregivers. The study reported that paediatric hearing aid users required more frequent clinical follow-up visits and ongoing rehabilitation services, which significantly contributed to travel-related and indirect expenditure. The authors further emphasized that long-term maintenance expenses and repeated rehabilitation appointments considerably increased the economic burden experienced by families of children with hearing loss. Families of children with often require repeated visits for hearing assessment, hearing aid fitting, auditory-verbal therapy, speech therapy, and follow-up programming sessions. These repeated visits may particularly affect rural families who travel long distances to tertiary hearing healthcare centres. In many cases, caregivers may also experience reduced employment opportunities and loss of wages due to caregiving responsibilities and repeated hospital visits (Baltussen et al., 2009; Deniz et al., 2022).

Barriers to hearing aid use and rehabilitation have been widely reported in the literature. Knudsen et al. (2010) reported that hearing aid uptake and long-term hearing aid use were influenced by multiple demographic, audiological, psychological, and social factors. The review found that individuals with greater self-perceived hearing difficulties and communication problems were more likely to seek hearing rehabilitation and adopt hearing aids. However, stigma, denial of hearing loss, low perceived benefit, cosmetic concerns, financial burden, and lack of motivation negatively affected hearing aid uptake and consistent usage. The study further highlighted that psychosocial attitudes and individual perceptions played a significant role in determining hearing rehabilitation outcomes.

Jenstad and Moon (2011) reported that cost, stigmatization, false expectations, reduced trust in hearing aid benefit, and psychosocial factors were among the major barriers preventing individuals from purchasing and consistently using hearing aids. The review also demonstrated that counselling, positive family support, patient education, and appropriate expectation management improved hearing aid acceptance and rehabilitation compliance. Meyer and Hickson (2012) found that self-perceived hearing handicap, communication difficulties, social participation restrictions, and encouragement from family members positively influenced help-seeking behaviour and hearing aid adoption among older adults. In contrast, denial of hearing loss, stigma associated with hearing aids, financial constraints, and negative attitudes towards amplification were identified as important barriers affecting hearing rehabilitation and consistent hearing aid use.

McCormack and Fortnum (2013) conducted a scoping review to identify the reasons The study involved a comprehensive literature search using databases such as PubMed and Web of Science, through which 10 relevant articles were identified and reviewed. The results revealed several barriers affecting hearing aid usage, including poor hearing aid benefit, discomfort, maintenance difficulties, psychosocial concerns, stigma, appearance-related issues, financial burden, and negative attitudes toward hearing aids. Problems related to manual dexterity, device handling, and recurring expenditure were also identified as significant factors contributing to reduced hearing aid compliance and long-term usage. Tapia-Mora et al. (2026) investigated the influence of social and socioeconomic determinants on hearing aid acceptance and continued usage among adults with hearing loss. The study evaluated factors such as educational level, income status, social support, and attitudes toward hearing loss and hearing aids socioeconomic conditions significantly affected hearing aid adoption and retention. Individuals with higher income levels and stronger social support systems showed lower rates of hearing aid abandonment and better long-term compliance. The study further emphasized that financial stability, accessibility to follow-up care, and positive social attitudes play an important role in successful hearing rehabilitation outcomes.

2.7 Need for Financial Support and Policy Development

The available literature clearly demonstrates that hearing rehabilitation imposes substantial economic burden on families, especially among paediatric hearing aid users. Although government subsidy programs and healthcare schemes may reduce initial device costs, many families continue to experience financial stress due to recurring expenditure associated with maintenance, therapy, repairs, travel, and follow-up care. McDaid et al. (2021) emphasized that despite the availability of subsidy programs, considerable gaps remain in maintenance and long-term rehabilitation support, particularly in low- and middle-income countries.

Suazo-Díaz et al. (2025) highlighted the need for financially sustainable healthcare frameworks that ensure equitable access to hearing rehabilitation services without economic discrimination. Similarly, WHO (2021) stressed the importance of strengthening hearing healthcare services, improving accessibility, and implementing inclusive policies to reduce the burden associated with hearing impairment. Despite the growing evidence regarding hearing loss and rehabilitation needs, limited studies have comprehensively evaluated the direct and indirect expenditure incurred by parents of children with hearing loss in the Indian context. Most available studies focus primarily on device costs or adult hearing aid users, with limited emphasis on long-term maintenance expenditure, indirect costs, and caregiver burden among paediatric hearing aid users.

Chapter 3

Methods

The aim of the present study was to investigate the expenditure incurred by parents of children with hearing loss associated with the diagnosis, hearing aid fitting, and ongoing management of hearing loss. The study was carried out in three phases.

Phase I involved the development of a structured questionnaire to assess the expenditure incurred by parents from the stage of diagnosis through hearing aid fitting and subsequent follow-up care.

Phase II involved the content validation of the developed questionnaire.

Phase III involved the administration of the questionnaire to parents/caregivers of children using hearing aids, followed by analysis of the responses to identify patterns of expenditure and financial burden.

Procedures

The study was conducted as per the following procedure:

Phase I: Development of the Questionnaire

The questionnaire was developed to assess the expenditure incurred by parents and caregivers in the diagnosis, amplification, follow-up, maintenance, and rehabilitation of children with hearing loss using hearing aids. The questionnaire was designed based on a review of existing literature focusing on the financial burden associated with paediatric hearing aid management and the common expenditure areas experienced by hearing aid users and their caregivers, irrespective of the type or model of hearing aid used. Based on the literature review and the objectives of the present study, a questionnaire was developed in English language to assess the financial burden experienced by parents and caregivers of children with hearing loss using hearing aids. The questionnaire titled “*A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss*” (Annexure-

I) consisted of five sections covering various domains of expenditure associated with paediatric hearing aid management. The questionnaire mainly included five sections:

Section 1: Demographic and Hearing Loss Profile of the child and their Parents / Caregivers

Section 2: Direct Audiological Cost

Section 3: Indirect Audiological Cost

Section 4: Indirect Non-Audiological Costs

Section 5: Overall Financial Burden (Parents'/Caregivers' Perspective)

The first section included demographic and Hearing loss profile such as age, gender, parental education and occupation, socioeconomic status, and type and degree of hearing loss. The second section captured the direct audiological costs, such as diagnostic expenditures, including ENT consultations, audiological evaluations, and other assessments required prior to hearing aid fitting. It also covered hearing aid purchase and related audiological costs, including the cost of the device, earmoulds, batteries, intervention, and post-fitting follow-up. The third section focused on indirect audiological costs such as repairs, servicing, and replacement of hearing aids, as well as repairs and replacement of earmoulds. The fourth section covered indirect non-audiological costs, including travel, accommodation, and loss of wages by the parents or the caregivers. The fifth section assessed the overall financial burden experienced by the family using closed-ended questions related to affordability, effect of expenditure on family income and budget, adequacy of financial support, and overall perception regarding the economic burden associated with hearing aid management in children with hearing loss. In addition, the percentage of family income spend on hearing loss management was assessed. This was calculated dividing the total annual hearing loss-related expenditure by the annual family income and multiplying the result by 100

The developed questionnaire “*A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss*” consisted of total 96 questions.

3.1 Section 1: Demographic and Hearing Loss Profile of the Child and their Parents /

Caregivers

- **Question number from 1–28:** included demographic details of the child and caregiver, socioeconomic profile, and hearing loss profile. These questions contain details such as child’s age, gender, education, caregiver information, parental education and occupation, monthly income, type and degree of hearing loss, laterality, age at diagnosis, age at hearing aid fitting, duration of hearing aid usage, and family history of hearing loss.

3.2 Section 2: Direct Audiological Costs

3.2.1 Expenditure on Diagnostic Services

- **Question number from 29–33:** included expenditure related to pre-amplification diagnostic and medical evaluations such as new-born hearing screening, ENT consultations, medications prescribed before audiological evaluation, initial audiological assessments, and repeat/follow-up hearing tests performed to confirm diagnosis.

3.2.2 Hearing Aid Purchase & Related Accessories Costs

- **Question number from 34–44:** included hearing aid–related expenditures such as manufacturer and model details, ear fitted, place of purchase, cost of hearing aids, financial assistance received, source and amount of financial help, year of purchase, earmould expenditure, battery expenses, and cost of hearing aid accessories including dry kit boxes, chargers, domes, ear hooks, wax guards, and related components.

3.2.3 Intervention / Therapeutic Process Costs

- **Question number from 45–51:** included rehabilitation and intervention-related expenditures such as place of therapy, multiple therapy centres attended, frequency of therapy sessions, and monthly expenditure on auditory verbal therapy (AVT), speech therapy, and special education support services.

3.2.4 Follow-up Expenditures for Individuals with Hearing Loss

- **Question number from 52–60:** included follow-up and review expenditures such as ENT follow-up consultations, audiological evaluations, hearing aid programming sessions, frequency of programming visits, annual programming expenses, purpose of clinic visits, and number of hospital/clinic visits per year.

3.3 Section 3: Indirect Audiological Costs

- **Question number from 61–80:** included indirect hearing aid–related expenditures such as warranty status, repair and servicing frequency, repair/service costs, yearly maintenance expenditure, hearing aid replacement history, reasons for replacement, replacement expenditure, earmould replacement and repair costs, earmould tube replacement expenses, and expenditure on hearing aid accessories.

3.4 Section 4: Indirect Non-Audiological Costs

- **Question number from 81–86:** included non-audiological indirect expenditures such as transportation costs, accommodation expenses during hospital visits, caregiver accompaniment, loss of wages due to appointments and therapy visits, and number of work/school days missed annually due to hearing-related appointments.

3.5 Section 5: Overall Financial Burden (Parents'/Caregivers' Perspective)

- **Question number from 87–93:** included parents’ or caregivers’ perception regarding affordability and financial burden of hearing loss management. These questions contain details regarding major financial challenges, reduction in household expenses, borrowing or loans taken for treatment, annual expenditure incurred, adequacy of government or NGO financial support, and overall perception of financial burden.
- **Question number from 94–96:** included annual household income, total annual expenditure related to hearing loss management, and percentage of family income spent on hearing loss–related expenses.

Phase II: Content validation of the questionnaire:

The developed questionnaire titled “*A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss*” was subjected to content validation prior to its administration to participants/caregivers. The content validity of the questionnaire was evaluated by five qualified audiologists with a minimum of five years of experience in the field of hearing aids. The experts evaluated the questionnaire using the “*Content Validity Questionnaire for Item Analysis by Professionals*” (Annexure I). The questionnaire items were rated using a 5-point Likert scale, where 1 – Strongly Disagree, 2 – Disagree, 3 – Neither Agree nor Disagree, 4 – Agree, and 5 – Strongly Agree. Items rated as “Strongly Agree or “Agree” were retained in the questionnaire, whereas items received lower ratings were revised based on the suggestions provided by the experts. Subsequently, the revised questionnaire was administered to four caregivers, and their feedback were incorporated into the final version of the questionnaire.

The “*Content Validity Questionnaire for Overall Validation of the Developed Questionnaire*” (Annexure II) contained expert ratings for the questionnaire under three major domains, namely Content Quality, Practicality and Application, and Overall User Experience. The Content Quality section evaluated whether the questionnaire adequately obtained direct and indirect costs, intervention

expenses, follow-up expenditures, and also overall financial burden. The Practicality and Application section evaluated the clarity, viability, suitability of response options, and appropriateness of the questionnaire across different socioeconomic backgrounds. The Overall User Experience section examined the presentation, structure, flow, clearness of instructions, and overall ease of use of the questionnaire. Further, the Content Validity Index (CVI) was subsequently calculated based on the expert ratings to determine the validity of the developed questionnaire (Polit et al., 2007).

Formulas used to compute the content validity index are as follows:

3.6 Item Level Content Validity Index (I-CVI):

The I-CVI refers to the proportion of expert panellists who rate a particular item as relevant or appropriate, typically a rating of 4 or 5 on a 5-point Likert scale. It helps determine how well each individual item aligns with the intended content or construct.

$$\text{I-CVI} = \frac{\text{Raters rating} > 3}{\text{Total number of raters}}$$

3.7 Scale Level Content Validity Index (S-CVI):

3.7.1 S-CVI Average (S-CVI_{avg}):

This is the average of the I-CVI values for all items in the material. It provides an overall estimate of the scale's content validity.

$$\text{S-CVI}_{avg} = \text{Average of I-CVI across all the items}$$

3.7.2 S-CVI Universal Agreement (S-CVI_{ua}):

This refers to the proportion of items for which all panellists rated the item as relevant (e.g., all gave a 4 or 5). It is a stricter measure since it requires 100% agreement across all experts for each item considered.

$$S-CVI_{ua} = \frac{\text{Total No. of raters with a rating} > 3}{\text{Total No. of raters}}$$

3.8 Content Validity Ratio (CVR):

Content validity ratio (CVR) is a quantitative method to evaluate how individual items are essential to the overall material.

$$CVR = \frac{(n_e - (N/2))}{(N/2)}$$

where, n_e = number of raters who rated the item to be essential and
 N = Total number of raters

The minimum CVR for 5 panellists is 0.99 (Lawshe, 1975). The content which had the minimum CVR were retained, and the content that had less than the required CVR were modified based on the suggestions and feedback given by the experts. The suggestions provided by the professionals during content validation were incorporated wherever applicable. The modified questionnaire was then reviewed by the experts and then questionnaire finalised.

Phase III: Administration of the Questionnaire

The Questionnaire titled *A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss* was administered to a total of 100 parents of children with hearing loss. The following inclusion and exclusion criteria were used for participant selection.

3.9 Participant Selection Criteria

3.9.1 Inclusion Criteria

Participants were included in the study if they met the following criteria:

1. Parents/caregivers of children up to 15 years of age.
2. Children with a confirmed diagnosis of permanent hearing loss (sensorineural, conductive, or mixed).
3. Children who were current users of hearing aids (unilateral or bilateral).
4. Parents/caregivers who were willing to provide informed consent and participate in the interview process.
5. Participants from both rural and urban areas were included, with socioeconomic status assessed on the basis of family income rather than place of residence.

3.9.2 Exclusion Criteria

Participants were excluded from the study if they met any of the following criteria:

1. Children with multiple disabilities (e.g., intellectual disability, cerebral palsy, autism, visual impairment), as these conditions could confuse cost estimates.
2. Children with temporary or fluctuating hearing loss (e.g., due to otitis media with effusion) who did not require permanent amplification.
3. Families whose children were using cochlear implants or bone-anchored devices, as their expenditure profiles differed considerably from those of hearing aid users.
4. Families who were unable to recall or provide reliable expenditure details during the interview.

5. Children who were newly diagnosed and had not yet been fitted with hearing aids, as ongoing expenditure data were not available for this group.

General instructions were provided to participants and informed consent was obtained prior to administering the questionnaire. The basic framework of the questionnaire was developed in Google Docs format. Both face to face (direct) and telephonic interview method were employed to elicit responses to the questionnaire items. In the direct interview method, was used to gather information from participants who were unavailable for direct interviews. All expenditure were recorded in Indian rupees and standardized to annual costs. The outcome measures of the study included the average annual direct audiological, indirect audiological and indirect non- audiological expenditures, along with caregivers subjective perceptions of financial strain.

Along with the developed questionnaire, the Modified Kuppuswamy Socioeconomic Status Scale questionnaire was also administered to the parents/caregivers in order to assess their socioeconomic status. The scale evaluates socioeconomic status based on three parameters, namely educational qualification, occupation, and monthly family income of the head of the family. The total scores obtained were used to classify participants into different socioeconomic categories according to the Modified Kuppuswamy classification (Shankar et al., 2025).

Chapter 4

RESULTS

Phase I: Description of the developed structured questionnaire titled “*A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss*”

The final developed questionnaire consists of a total of 96 questions under various subsections that collect the demographic and hearing loss profile such as age, gender, parental education and occupation, socioeconomic status, and type and degree of hearing loss of the children as well as the parents or the care givers. It also includes questions related to diagnostic expenditures, including ENT consultations, audiological evaluations, and other assessments required prior to hearing aid fitting, cost of hearing aid, earmoulds, batteries, intervention, and post-fitting follow-up under direct audiological costs. The cost of repairs, servicing, and replacement of hearing aids, and earmoulds, are included under indirect audiological costs. Further the indirect non-audiological costs, including travel, accommodation, and loss of wages by the parents or the caregivers and finally the overall financial burden experienced by the family is included.

Phase II: Results of the content validation of the developed questionnaire:

The developed questionnaire titled “*A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss*” was subjected to content validation by a panel of five professionals using the “*Content Validity Questionnaire for Item Analysis by Professionals*” (Annexure I). The experts evaluated the relevance and appropriateness of each item using a 5-point Likert scale. To determine the level of agreement among the experts, the number of professionals who assigned a rating greater than or equal to 4 (Agree/Strongly Agree) for each item was calculated. The evaluation was carried out for all items included under the different sections of the questionnaire, namely Demographic and Hearing Loss Profile of the Child and their Parents /

Caregivers, Direct Audiological Costs, Indirect Audiological Costs, Indirect Non-Audiological Costs, and Overall Financial Burden.

Based on the expert ratings, the Item-Level Content Validity Index (I-CVI) and Content Validity Ratio (CVR) were computed for each item in the questionnaire. Further, the I-CVI values were converted into the modified Kappa statistic (k^*) to adjust for chance agreement among the experts. The modified Kappa statistic accounts for the probability of chance agreement and provides a more robust estimate of content validity (Polit et al., 2007)

Formula to calculate the modified kappa statistic:

- i. The probability of chance agreement (p_c) was calculated using the formula:

$$p_c = \frac{N!}{A! (N - A)!} \times 0.5^N$$

where

N = Total number of experts

A = Number of experts who rated the item as relevant (rating ≥ 4)

The modified Kappa statistic (k^*) was calculated using:

- ii. Kappa statistics

$$k^* = \frac{(I-CVI - p_c)}{1 - p_c}$$

Where I-CVI represents the item-level content validity index and p_c represents the probability of chance agreement.

According to Polit et al. (2007), an I-CVI value of 0.78 or higher is considered evidence of good content validity, while the modified Kappa statistic (k^*) values were interpreted based on the guidelines proposed by Cicchetti and Sparrow (1981) where values between 0.40–0.59 indicate fair agreement, 0.60–0.74 indicate good agreement, and values greater than 0.74 indicate excellent

agreement. Further, the Content Validity Ratio (CVR) was interpreted according to Lawshe (1975), where a CVR value approaching 0.99 indicates excellent agreement among five experts.

Table 4.1

Depicts overall I-CVI, CVR, and k of all the items included in the questionnaire, based on the experts rating ≥ 4 .*

Objectives (Items / Questions)	I- CVI (N)	Impression	k*	Impression	CVR	Impression	Status
Demographic and Hearing loss profile (28)	1 (25) 0.8 (3)	Excellent Excellent	1 (25) 0.76 (3)	Excellent Excellent	1 (25) 0.6 (3)	Excellent Fair	Selected Modified
Direct Audiological cost (32)	1 (30) 0.8 (2)	Excellent Excellent	1 (30) 0.76 (2)	Excellent Excellent	1 (30) 0.6 (2)	Excellent Fair	Selected Modified
Indirect Audiological cost (20)	1(20)	Excellent	1(20)	Excellent	1(20)	Excellent	Selected
Indirect Non- audiological cost (6)	1(6)	Excellent	1(6)	Excellent	1(6)	Excellent	Selected
Overall Financial Burden (10)	1(10)	Excellent	1(10)	Excellent	1(10)	Excellent	Selected

Note: N – No. of questions, n – no. of raters is 5, I-CVI – Item-level Content Validity Index, k* – Modified Kappa Statistic, CVR – Content Validity Ratio

From Table 4.1, it was observed that the majority of the domains included in the questionnaire demonstrated excellent content validity based on the obtained I-CVI, modified Kappa statistic (k*), and CVR values. Most of the questionnaire domains achieved complete agreement among the five experts, with I-CVI, k*, and CVR values of 1.00, indicating excellent relevance, clarity, and appropriateness of the items included in the questionnaire.

The domains related to Direct Audiological Cost, Indirect Audiological Cost, Indirect Non-Audiological Cost and Overall Financial Burden demonstrated excellent agreement among the experts and were therefore retained without modification. However, the Demographic and Hearing Loss Profile section obtained comparatively lower agreement values for a few items, with I-CVI

values of 0.80, modified Kappa statistic (k^*) values of 0.76, and CVR values of 0.60. Although the obtained I-CVI and k^* values indicated acceptable to excellent agreement among the experts, the comparatively lower CVR values suggested the need for revision of certain items. Therefore, these items were carefully reviewed and modified based on the suggestions and feedback provided by the experts to improve clarity, appropriateness of response options, and overall relevance to the objectives of the study. Overall, the obtained findings indicate that the developed questionnaire possesses satisfactory to excellent content validity and is appropriate for assessing the cost analysis of expenditure among parents of children with hearing loss.

Table 4.2

Depicts the overall scale-level content validity index of the developed questionnaire

Scale-Level Content Validity Index	Value	Impression
S-CVI/avg	0.99	Excellent
S-CVI/ <i>ua</i>	0.97	Excellent

Note: S-CVI/avg - Scale Level Content Validity Index Average, S-CVI/ *ua* - Scale Level Content Validity Index Universal Agreement

From Table 4.2, it can be inferred that the developed questionnaire demonstrated excellent overall scale-level content validity based on both the averaging method and the universal agreement method. The obtained S-CVI/Ave value of 0.99 and S-CVI/UA value of 0.97 exceeded the recommended criterion value of 0.90 suggested by Polit et al. (2007), indicating a high level of agreement among the experts regarding the relevance, clarity, and appropriateness of the questionnaire items. The high S-CVI/Ave value indicates that the majority of the items in the questionnaire achieved excellent item-level agreement among the experts, whereas the high S-CVI/UA value reflects near-universal agreement across the questionnaire items. These findings suggest that the developed questionnaire possesses excellent overall content validity and is appropriate for assessing the cost analysis of expenditure among parents of children with hearing loss. The ‘*Content Validity Questionnaire for Overall Validation of the Developed Questionnaire*’

(Annexure II) was also analysed to evaluate the overall quality of the questionnaire in terms of Content Quality, Practicality & Application, and Overall User Experience. For each statement, the number of experts who rated the item as ≥ 4 (Agree/Strongly Agree) on the 5-point Likert scale was calculated. Based on the expert ratings, the Item-Level Content Validity Index (I-CVI) and Content Validity Ratio (CVR) were computed for each item in the questionnaire. Further, the I-CVI values were translated into the modified Kappa statistic (k^*).

Table 4.3

Depicts I-CVI, CVR and k^ of the statements about the items in the questionnaire under each parameter*

Parameter	statistics	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Content quality	I-CVI	1	1	1	1	1	1	1	1
	CVR	1	1	1	1	1	1	1	1
	K^*	1	1	1	1	1	1	1	1
Practicality and application	I-CVI	1	1	1	1	1	1	1	1
	CVR	1	1	1	1	1	1	1	1
	K^*	1	1	1	1	1	1	1	1
Overall user experience	I-CVI	1	1	1	1	1	1	1	1
	CVR	1	1	1	1	1	1	1	1
	K^*	1	1	1	1	1	1	1	1

Note: Q1 to Q8 are questions related to the three parameters Content Quality, Practicality & Application, and Overall User Experience

Considering the established criteria for content validity (Polit et al., 2007), statements with I-CVI values ≥ 0.78 were considered to have good content validity. The majority of the statements across the three domains—Content Quality, Practicality & Application, and Overall User Experience—achieved acceptable to excellent agreement among the experts.

Although most statements received high ratings (≥ 4), minor modifications were incorporated wherever comparatively lower values were observed. These revisions were made based on expert suggestions to improve clarity, comprehensiveness, wording of items, and appropriateness of response options. Specifically, statements under the domains of practicality and overall user

experience that did not achieve complete agreement were reviewed and refined to enhance readability and ease of administration for caregivers from varied socioeconomic backgrounds.

Table 4.4

Depicts the overall scale-level content validity index of the developed questionnaire

Scale-Level Content Validity Index	Value	Impression
S-CVI/avg	1	Excellent
S-CVI/ua	1	Excellent

Note: S-CVI/avg - Scale Level Content Validity Index Average, S-CVI/ ua - Scale Level Content Validity Index Universal Agreement

Table 4.4 presents the Scale-Level Content Validity Index (S-CVI) findings demonstrated excellent content validity for the questionnaire. The S-CVI/Average (S-CVI/Ave) value of 1 indicated perfect agreement among the experts regarding the overall relevance and appropriateness of the questionnaire items. Similarly, the S-CVI/Universal Agreement (S-CVI/UA) value of 1 reflected complete universal agreement among all experts for all items included in the questionnaire, suggesting excellent overall content validity. Overall, the developed Questionnaire ‘*A Comprehensive Cost Analysis of Expenditure for Parents of Children With Hearing Loss*’ demonstrated good to excellent content validity and was considered suitable for administration in both clinical and research settings.

Phase III: Results of the details on administration of the developed questionnaire

Phase III involved the response obtained from the participants were analysed using a descriptive research design with the survey method to examine the expenditure incurred at various stages of hearing loss management and also assessed the overall financial burden experienced by families. Descriptive analysis was performed to summarize the demographic characteristics of the participants and the expenditure patterns associated with direct audiological costs, indirect audiological costs, indirect non-audiological costs, and overall financial burden. Correlation analysis

was also performed to examine their relationships. The findings obtained from the analysis are presented in the following sections.

4.1 Section 1: Demographic and Hearing Loss Profile of the Child and their Parents /

Caregivers

The section represents the demographic and Hearing Loss Profile of the Child and their Parents / Caregivers. The factors analysed include the child's age, age at diagnosis, age at hearing aid fitting, duration of hearing aid use, gender, place of residence, parental education, occupation, family income, socioeconomic status, and hearing loss characteristics such as type, degree, and laterality of hearing loss. The descriptive analysis was done to depict the demographic data of the participants participated in the present study.

Table 4.5

Depicts the mean and standard deviation (SD) of demographic details of the participants.

Demographic details	Mean	Std. Deviation (SD)
Child's Age (years)	2.51	0.94
Age at Diagnosis (years)	4.07	1.68
Age at Hearing aid Fitting and Rehabilitation (years)	5.00	1.44
Duration of Hearing aid Use (years)	4.04	2.35

Table 4.5 presents the demographic and hearing loss profile of the 100 participants. The mean age of the children was 2.51 ± 0.94 years and among the participant's majority were male, accounting for 70%, while females constituted 30% of the study population. Most of the participants belonged to rural localities, accounting for 75%, whereas 25% were from urban areas. Majority of the participants belonged to Karnataka accounting for 60%, followed by Kerala with 30%. Participants from other states together constituted 10% of the study population. Regarding the hearing loss profile, sensorineural hearing loss was the most common type observed among the participants, accounting for 97%. Bilateral hearing loss was reported in the majority of the children,

accounting for 99%, while only 1% of the participants had unilateral hearing loss. Regarding the degree of hearing loss, profound hearing loss was the most commonly observed degree in both the left ear, accounting for 55%, and the right ear, accounting for 59%. Severe hearing loss was observed in 17% of the left ears and 15% of the right ears, while moderately severe hearing loss was present in 14% and 12%, respectively. Only a small proportion of participants exhibited mild hearing loss, accounting for 2% in both ears. The mean score for age at diagnosis was 4.07 ± 1.68 , while the mean score for age at hearing aid fitting and rehabilitation was 5.00 ± 1.44 . The mean duration of hearing aid usage among the participants was 4.04 ± 2.35 .

Overall findings showed that the majority of the participants were male children from rural areas, mainly belonging to Karnataka. Most of the children had bilateral sensorineural hearing loss with profound degree of hearing loss. Regarding family income, the majority of fathers had a monthly income between Rs. 10,001 and Rs. 25,000, accounting for 38%, followed by 29% earning between Rs. 1 and Rs. 10,000 and 20% earning between Rs. 25,001 and Rs. 50,000. Only a small proportion of fathers reported a monthly income above Rs. 50,000. In contrast, the majority of mothers (91%) reported no monthly income, indicating that most mothers were not engaged in paid employment. Among the employed mothers, monthly income was distributed across different income categories, with only a small percentage reported the earnings above Rs. 10,000 per month. The findings also indicated that most parents had school-level education and mothers were predominantly homemakers and fathers were the primary earners with the majority reporting a monthly income between Rs.10001 and Rs.25000.

4.2. Section 2: Direct Audiological Costs

Direct Audiological costs represents cost incurred by parents of children with hearing loss at various stages in hearing loss management. The expenditure includes cost incurred for diagnostic services, hearing aid purchase and related accessories, intervention and therapeutic services, and

follow-up audiological care. These expense represent the direct payments made by families for obtaining audiological evaluation, amplification, rehabilitation and ongoing hearing care services.

The expenditure under each category are represented below.

4.2.1 Expenditure on Diagnostic Services

This subsection involves the expenditure incurred by parents for diagnostic services required during the identification and confirmation of hearing loss. The cost include expenses related to new-born hearing screening, ENT consultations, medications prescribed prior to audiological evaluation, initial audiological assessments, and follow-up or confirmatory hearing tests. The percentage distribution of participants according to the expenditure incurred for each diagnostic services represented in 4.6.

Table 4.6

Depicts expenditure incurred by number of parents of children with hearing loss in percentage for various diagnostic services related to hearing assessment

Cost incurred	Rs.0	Rs. 1– 250	Rs. 251– 500	Rs. 501– 1000	Rs. 1001– 1500	Rs. 1501– 2000	Rs. 2001– 3000	Rs. 3001– 5000	Rs. 5001– 10000	Above Rs. 10000
New-born Hearing Screening	87%	5%	2%	3%	-	2%		1%		
First ENT Consultation	23%	33%	26%	11%	1%	5%		1%		
ENT Medications (Pre-Audiology)	84%		9%	4%	1%		-	-		2%
Initial Audiological Tests	8%		38%		27%		15%		11%	1%
Follow-up/Confirmatory Tests	46%		28%		8%		7%		9%	2%

Note: The percentage refers to the number of participants who had reported their expenditure

From Table 4.6 It can be inferred that the cost incurred for new-born hearing screening at the hospital, the majority of participants (87%) reported no expenditure, while 5% spent Rs. 1 to 250, 2% spent Rs. 251 to 500, 3% spent Rs. 501 to 1000, 2% spent above Rs. 1500, and 1% spent above Rs. 2000. With respect to the cost of ENT doctor consultations before undergoing audiological

assessment, 23% of participants reported no expenditure, whereas 33% spent Rs. 1 to 250, 26% spent Rs. 251 to 500, 11% spent Rs. 501 to 1000, 1% spent Rs. 1001 to 1500, 5% spent above Rs. 1500 to 2000 and 1% spent above Rs. 2000. For medications prescribed by the ENT doctor before audiological evaluation, most participants (84%) reported no expenditure. About 9% spent Rs. 1 to 500, 4% spent Rs. 501 to 1000, 1% spent Rs. 1001 to 2000 and 2% spent above Rs. 5000. Regarding the expenditure incurred for initial audiological tests, 8% of participants reported no expenditure, while 38% spent Rs. 1 to 500, 27% spent Rs. 501 to 2000, 15% spent above Rs. 2000 to 5000, 11% spent Rs. 5001 to 10000, and 1% spent above Rs. 10000. For follow-up confirmatory tests, 46% of participants reported no expenditure, whereas 28% spent Rs. 1 to 500, 8% spent Rs. 501 to 2000, 7% spent above Rs. 2000 to 5000, 9% spent Rs. 5001 to 10000, and 2% spent above Rs. 10000. Overall findings indicate that the majority of the participants reported minimal or no expenditure for newborn hearing screening, medications, and follow-up tests, whereas moderate expenditure was commonly incurred for ENT consultations and initial audiological assessments.

4.2.2. Hearing aid purchase and related accessories costs:

This subsection represents the expenditure incurred by parents of children with hearing loss at the time of hearing aid purchase and related accessories. The information includes details regarding the type and manufacturer of hearing aids used, the place and year of purchase, cost of hearing aids, financial assistance received, and expenditure associated with ear moulds, batteries, and other hearing aid accessories. These expenditures constitute significant part of the overall financial burden experienced by parents of children with hearing loss.

Most of participant's children were using a digital behind-the-ear hearing aid (BTE) for both ears (93%), left ear alone (3%), and right ear alone (4%) across different hearing aid companies like Resound, Danavox, Signia, Phonak, Oticon, Starkey. However, these hearings were fitted as per their hearing loss and the aided audiogram were found to be within the speech spectrum. Regarding the

place of hearing aid purchase, majority of the participants purchased hearing aids from government hospitals or centers (58%), followed by private clinics or hospitals (41%). Only 1% of the participants obtained hearing aids through NGO or charitable trusts. Furthermore, majority of participants (77%) had purchased hearing aids during the period 2023–2026, whereas 23% had purchased hearing aids between 2019–2022. These findings provide an overview of the hearing aid characteristics and sources of procurement among the participants, which will influence the overall expenditure incurred for hearing aid purchase and related accessories.

Table 4.7

Details of amount spent by the parents for the purchase of hearing aids

Details of Hearing aid Purchase Price	No. of participants (%)
Rs.0 (Fully subsidized)	9%
Rs.1-10000	4%
Rs.25001-50000	26%
Rs.50001-100000	24%
Rs.100001-150000	7%
Rs.150001 – 200000	3%
Rs.200001 – 250000	1%
Rs.250001 –300000	2%
Rs.300001 – 400000	1%

Table 4.7 presents the distribution of expenditure incurred for hearing aid purchase among the participants. The findings revealed that 9% of the participants received fully subsidized hearing aids and therefore reported no expenditure. Among those who purchased hearing aids, the highest proportion of participants (26%) spent Rs. 25001 to 50000, followed by 24% who spent Rs. 50001 to 100000 and 23% who spent Rs. 10001 to 25000. In addition, 7% of the participants spent Rs. 100001 to 150000, while 4% spent Rs. 1 to 10000. A smaller proportion of participants reported higher expenditures, with 3% spending Rs. 150001 to 200000, 2% spending Rs. 250001 to 300000, and 1% each spending Rs. 200001 to 250000 and Rs. 300001 to 400000.

Out of 100 participants, 66% reported that they did not receive any financial assistance for the purchase of hearing, while only 34% received some form of financial help. Among the reported sources of assistance, government schemes (29%) were the most common. A small proportion of participants received support through loans (1%), relatives/friends (3%), NGOs (1%) and also through EMI facilities, or disability pensions. These findings indicate that despite the availability of government support, a majority of individuals continue to rely on self-funding or receive no financial assistance for hearing aid-related expenses. Among those who received financial assistance, 21% received an amount ranging from Rs. 10001 to 25000, while 4% each received between Rs. 1 to 5000 and Rs. 5001 to 10000. In addition, 3% of the participants received financial help ranging from Rs. 25001 to 50000, whereas 1% each received between Rs. 50001 to 75000 and Rs. 75001 to 100000. Overall, the findings suggest that only a limited proportion of participants received moderate financial assistance toward hearing aid-related expenses. Overall findings indicate that the majority of the participants were using digital BTE hearing aids purchased mainly from government hospitals or private clinics, with most participants incurring moderate to high expenditure for hearing aid purchase. Despite the availability of government schemes, the majority of participants did not receive financial assistance and relied mainly on self-funding for hearing aid-related expenses.

Table 4.8

Depicts the expenditure incurred by number of parents of children with hearing loss in percentage for earmoulds, batteries, and hearing aid accessories at the time of purchase

Details of cost for accessories	Rs.0	Rs. 1–250	Rs. 251–500	Rs. 501–1000	Rs. 1001–1500	Rs. 1501–2000	Rs. 2001–3500	Rs. 3501–5000	Rs. 5001–7500	Rs. 7501–10000	Above Rs. 10000
Cost of Earmoulds	9%	13%		56%	15%	7%	-				
Cost of Batteries	10%	72%	13%	3%	1%	5%	-				
Cost of Accessories	65%	17%	6%	3%	2%	-	2%	-	1%	1%	3%

Table 4.8 presents the distribution of expenditure incurred for earmoulds, batteries, and accessories at the time of hearing aid purchase. Regarding the cost of earmoulds, the majority of participants (56%) spent Rs. 501 to 1000, followed by 15% who spent Rs. 1001 to 1500, 13% who spent Rs. 1 to 250, 9% who reported no expenditure, and 7% who spent Rs. 1501 to 2000. With respect to the cost of batteries at the time of hearing aid purchase, most participants (72%) spent Rs. 1 to 250, while 13% spent Rs. 251 to 500, 10% reported no expenditure, 3% spent Rs. 501 to 1000, 1% spent Rs. 1001 to 1500, and 5% spent Rs. 1501 to 2000.

Regarding the cost of accessories at the time of hearing aid purchase, the majority of participants (65%) reported no expenditure. About 17% spent Rs. 1 to 250, 6% spent Rs. 251 to 500, 3% spent Rs. 501 to 1000, and 2% each spent Rs. 1001 to 2000 and Rs. 2001 to 3500. In addition, 1% each spent Rs. 5001 to 7500 and Rs. 7501 to 10000, while 3% spent above Rs. 10000. Overall findings indicate that the majority of the participants incurred moderate expenditure for earmoulds and minimal expenditure for batteries at the time of hearing aid purchase, whereas most participants reported no expenditure for accessories.

4.2.3 Intervention / Therapeutic process Costs

This subsection involves the expenditure incurred by parents of children with hearing loss for intervention and therapeutic services. Among 100 participants majority of the children were currently receiving AVT/speech therapy services from government hospitals or centers (71%), while 5% attended private clinics or hospitals and about 24% of the participants were not currently attending therapy sessions. Therapy services from multiple places were utilized by 18% of the participants, whereas the majority (82%) received therapy from a single center only. Regarding the duration of therapy sessions, most children attended 11–20 sessions per month (37%), followed by 21–30 sessions (17%) and 6–10 sessions (16%). Only a small proportion attended more than 30 sessions per month.

Table 4.9

Depicts the annual expenditure incurred by number of parents of children with hearing loss in percentage for Auditory Verbal Therapy (AVT), speech therapy and special education

Cost details for the therapy	Rs.0	Rs. 1–1200	Rs. 1201–2400	Rs. 2401–6000	Rs. 6001–12000	Rs. 12001–24000	Rs. 24001–42000	Rs. 42001–60000	Rs. 60001–90000	Rs. 90001–120000	Above Rs. 120000
AVT	33%	49%	2%	5%	6%	1%	2%	1%	-	-	1%
Speech therapy	38%	43%	-	5%	4%	2%	3%	1%	2%	1%	1%
Special Education	94%	2%	1%	-	1%	1%	-	1%	-	-	-

Table 4.9 presents the distribution of annual expenditure incurred for auditory-verbal therapy (AVT), speech therapy, and special education support among the participants. Regarding the annual cost of auditory-verbal therapy support, the majority of participants ,49% spent Rs. 1 to 1200 annually, while 33% reported no expenditure. In addition, 6% spent Rs. 6001 to 12000, 5% spent Rs. 2401 to 6000, 2% each spent Rs. 1201 to 2400 and Rs. 24001 to 42000, 1% each spent Rs. 12001 to 24000 and Rs. 42001 to 60000, and 1% spent above Rs. 120000 annually. With respect to the annual cost of speech therapy, the majority of participants ,43%spent Rs. 1 to 1200 annually, whereas 38% reported no expenditure. Further, 5% spent Rs. 2401 to 6000, 4% spent Rs. 6001 to 12000, 3% spent Rs. 24001 to 42000, 2% spent Rs. 12001 to 24000, 2% spent Rs. 60001 to 90000, and 1% each spent Rs. 42001 to 60000, Rs. 90001 to 120000, and above Rs. 120000 annually. Regarding the annual cost of special education support, the majority of participants (94%) reported no expenditure. About 2% spent Rs. 1 to 1200 annually, while 1% each spent Rs. 1201 to 2400, Rs. 6001 to 12000, Rs. 12001 to 24000, and Rs. 42001 to 60000 annually. Overall findings indicate that the majority of the participants were receiving AVT/speech therapy services mainly from government hospitals or centers, with most children attending therapy sessions regularly from a single center. The findings also revealed that participants incurred minimal annual expenditure for AVT and speech therapy, while most reported no expenditure for special education support.

4.2.4. Follow-up expenditures for individuals with hearing loss

This subsection represents the annual expenditure incurred by parents for follow up services associated with the ongoing management of hearing loss. These expenditures include costs related to ENT follow-up consultations, audiological follow-up evaluations, and hearing aid programming services. The percentage distribution of participants according to the follow-up expenditure incurred for these services is presented in Table 4.10

Table 4.10

Depicts the annual follow-up expenditure incurred by number of parents of children with hearing loss in percentage for ENT consultation, audiological follow-up, and hearing aid programming services

Questions	Rs.0	Rs. 1– 250	Rs. 251– 500	Rs. 501– 1000	Rs. 1001– 2000	Rs. 2001– 3000	Rs. 3001– 3500	Rs. 3501– 5000	Rs. 5001– 7500	Rs. 7501– 10000	Above Rs. 10000
Cost for ENT Follow-up	40%	31%	13%	4%	4%	2%	4%			2%	
Cost for Audiology Follow-up	45%	24%	19%	6%	1%		2%		3%		-
Cost for Programming	74%	7%	4%	4%	9%		1%	1%		-	-

Table 4.10 presents the distribution of annual follow-up expenditure incurred by individuals with hearing loss for ENT consultations, audiology follow-up, and programming services. Regarding annual ENT follow-up expenditure, 40% of the participants reported no expenditure, while the majority of the remaining participants spent lower amounts, with 31% spending Rs. 1 to 250 and 13% spending Rs. 251 to 500. Smaller proportions of participants reported higher expenditures, including 4% each spending Rs. 501 to 1000, Rs. 1001 to 2000, and Rs. 3501 to 5000, while 2% each spent Rs. 2001 to 3500 and above Rs. 5000. Similarly, for annual audiology follow-up

expenditure, 45% of the participants reported no expenditure. Among those who incurred expenses, 24% spent Rs. 1 to 250 and 19% spent Rs. 251 to 500. In addition, 6% spent Rs. 501 to 1000, 1% spent Rs. 1001 to 2000, 2% spent Rs. 2001 to 5000, and 3% spent Rs. 5001 to 10000.

With respect to annual programming expenditure, the majority of participants (74%) reported no expenditure. Among those who incurred programming-related expenses, 9% spent Rs. 1001 to 2000, while 7% spent Rs. 1 to 250. Further, 4% each spent Rs. 251 to 500 and Rs. 501 to 1000, whereas 1% each spent Rs. 3001 to 5000 and Rs. 5001 to 7500. Regarding programming services, the majority of participants availed services from government hospitals or centers (63%), followed by private clinics or hospitals (28%), while 9% reported that programming services were not applicable. In terms of the frequency of programming sessions, 39% of the participants attended programming sessions once a year, followed by 33% who attended twice a year and 6% who attended three times a year. Only 1% each attended programming sessions four times, five times, or more than six times per year, whereas 19% reported that programming sessions were not applicable.

Regarding clinic visits, the majority of participants reported visiting clinics between 1 to 5 times annually (25%), followed by 6 to 15 visits (23%), 16 to 25 visits (20%), and 26 to 35 visits (17%). In addition, 11% of the participants reported more than 50 clinic visits per year, while 2% reported 36 to 45 visits, 1% reported 46 to 50 visits, and 1% reported no clinic visits annually. The major reasons for clinic visits included speech therapy or auditory-verbal therapy (AVT) sessions, hearing assessment or evaluation, hearing aid fitting or programming, medical consultations, parent counselling sessions, hearing aid repair or servicing, follow-up or review appointments, and device troubleshooting or replacement. Among these, speech therapy or AVT sessions and hearing assessment or evaluation were reported as the most frequent reasons for clinic visits. Overall findings indicate that the majority of the participants incurred minimal or no annual expenditure for ENT follow-up, audiology follow-up, and programming services, with most services being availed from government hospitals or centers. The findings also revealed that clinic visits were mainly related to

speech therapy/AVT sessions and hearing assessments, with most participants attending clinics multiple times annually.

Table 4.11

Summary of maximum expenditure incurred towards the Direct audiological cost across each questions

Direct audiological cost	Maximum Expenditure (Annually)	Percentage of participants responded
Cost – Newborn Hearing Screening	Rs. 1 to 250	5%
Cost – First ENT Consultation	Rs. 1 to 250	33%
Cost – ENT Medications (Pre-Audiology)	Rs. 1 to 500	9%
Cost – Initial Audiological Tests	Rs. 1 to 500	38%
Cost – Follow-up/Confirmatory Tests	Rs. 1 to 500	28%
Hearing Aid Purchase Price	Rs. 25001 to 50000	26%
Cost of Earmoulds (Purchase Time)	Rs. 501 to 1000	56%
Cost of Batteries	Rs. 1 to 250	72%
Cost of Accessories (Purchase Time)	Rs. 1 to 250	17%
Annual AVT Cost	Rs. 1 to 1200	49%
Annual Speech Therapy Cost	Rs. 1 to 1200	43%
Annual Special Education Cost	Rs. 1 to 1200	2%
Annual ENT Follow-up Cost	Rs. 1 to 250	31%
Annual Audiology Follow-up Cost	Rs. 1 to 250	24%
Annual Programming Cost	Rs. 1001 to 2000	9%

From above Table 4.11, it can be inferred that taking into consideration of the maximum percentage of the participants reporting data for each questions, the upper expenditure of expenses towards the Direct audiological cost will be Rs 59,600.

4.3. Section 3: Indirect Audiological Costs:

This section represents the indirect audiological costs incurred by parents of children with hearing loss during the ongoing management of hearing loss. These expenditures include costs for

repair, servicing, and replacement of hearing aids, as well as expenses related to earmould replacement and repairs and also other hearing aid maintenance requirements.

Majority of the participants reported that their hearing aids were currently under warranty (68%), while 32% had devices that were out of warranty. Hearing aid repairs or servicing were required among 30% of the participants, whereas 70% reported no repair history. Among that 19% of the participants required repairs once a year, while 11% required repairs 2–3 times annually. Only a small proportion of participants required repairs 4–5 times per year (3%). The remaining participants reported that repairs or servicing were not applicable, as they had not required such services. Repair and servicing were predominantly obtained from government hospitals or centers (27%), followed by private clinics or dealers (15%). The remaining participants reported that repair or servicing was not applicable. Majority of the participants reported no expenditure for single repair (81%) and servicing sessions (93%), as the services were either covered under warranty, provided free of cost, or not required.

Among the participants who incurred repair expenditure, 9% reported spending above Rs. 5000, while 4% reported expenditure between Rs. 4001–5000. A smaller proportion reported expenditure within the ranges of Rs. 1–500 (3%), Rs. 3001–4000 (2%), and Rs. 501–1000 (1%) for a single repair session. Regarding servicing expenditure, only a small proportion of participants reported costs ranging from Rs. 1–500 (2%), Rs. 501–1000 (2%), Rs. 2001–3000 (1%), Rs. 3001–4000 (1%), and above Rs. 5000 (1%) for a single service.

Table 4.12

Depicts the annual repair and servicing expenditure for hearing aids incurred by number of parents of children with hearing loss in percentage

Detail of cost for repair and servicing	Rs.0	Rs. 1–500	Rs. 501–1500	Rs. 1501–3000	Rs. 3001–5000	Rs. 5001–7500	Rs. 7501–10000	Above Rs. 10000
Annual Repair/service cost for hearing aids	81%	2%	2%	1%	2%	3%	1%	8%

Table 4.12 depicts the annual expenditure incurred for hearing aid repair and servicing among the participants. Majority of the participants (81%) reported no annual expenditure on repair or servicing, as the services were either covered under warranty, provided free of cost, or not required. Among those who incurred expenditure, 8% reported annual costs above Rs. 10,000, while smaller proportions reported expenditure within the ranges of Rs. 5001–7500 (3%), Rs. 3001–5000 (2%), Rs. 501–1500 (2%), Rs. 1–500 (2%), Rs. 1501–3000 (1%), and Rs. 7501–10000 (1%). Overall findings indicate that the majority of the participants had hearing aids under warranty and reported no annual expenditure for repair or servicing, while only a small proportion incurred moderate to high repair-related expenses.

Among the 100 participants, the majority were currently using their original hearing aids, while hearing aid replacement was reported by 35% of the participants. Among those who had replaced their hearing aids, most participants had replaced them once (23%), followed by twice (10%), while the remaining participants reported three or four replacements. The most commonly reported reasons for hearing aid replacement were poor sound quality or performance issues and device malfunction, followed by upgrading to newer technology and physical damage to the device. Only a smaller proportion of participants reported replacement due to recommendations by audiologists or because of loss/misplacement of the device. Most participants replaced their hearing aids through private clinics (25%), followed by government hospitals/centres, while only a small proportion obtained replacements through hearing aid company service centres (1%)

Table 4.13

Depicts the total expenditure incurred on previously used hearing aids by the children with hearing loss

Cost	Rs.0 / Not applicab le	Rs.1– 10000	Rs.1000 1–25000	Rs.2500 1–50000	Rs.50001– 100000	Rs.100001 –150000	Rs.150001 –200000	Above Rs.2000 00
Total expenditure on previous hearing aids	62%	9%	13%	10%	2%	2%	2%	-

Note: The percentage depicts the number of parents of children with hearing impairment

Table 4.13 depicts the total expenditure incurred on previous hearing aid replacements among the participants. Majority of the participants (62%) reported no previous expenditure or indicated that replacement was not applicable. Among those who incurred expenditure, 13% reported spending between Rs. 10,001–25,000, while 10% reported expenditure between Rs. 25,001–50,000. Smaller proportions reported expenditure within the ranges of Rs. 1–10,000 (9%), Rs. 50,001–1,00,000 (2%), Rs. 1,00,001–1,50,000 (2%), and Rs. 1,50,001–2,00,000 (2%). Overall findings indicate that the majority of the participants continued using their original hearing aids, while a smaller proportion required hearing aid replacement mainly due to device malfunction or poor performance, with most replacement-related expenditure falling within moderate cost ranges. Regarding earmould replacement and accessory-related expenditure among the 100 participants, majority of them were reported replacing earmoulds every 3–6 months (48%), while 11% replaced them once a year and 5% replaced them every 2–3 years. About 4% of participants reported replacing earmoulds rarely, and 32% reported that earmould replacement was not required.

Among that majority of the participants reported replacing both earmoulds simultaneously (62%), whereas 5% replaced only one earmould. Earmould replacement and repair services were predominantly obtained from government hospitals or centers (46%), followed by private clinics or dealers (21%). Only 1% of the participants reported obtaining

services from hearing aid company service centers, while 32% reported that the service was not applicable. The average cost per earmould replacement was predominantly within the range of Rs. 1001–2000 (30%), followed by Rs. 501–1000 (24%) and Rs. 251–500 (10%). About 34% of the participants reported no expenditure, as the cost was either covered within the package, provided free of cost, or not applicable.

Table 4.14

Depicts the annual expenditure incurred for earmould and earmould tube replacement among children with hearing loss

Questions	Rs.0	Rs. 1– 100	Rs. 101– 250	Rs. 251– 300	Rs. 301– 500	Rs. 501– 1000	Rs. 1001– 2000	Rs. 2001– 3000	Rs. 3001– 4000	Rs. 4001– 5000	Above Rs. 5000
Annual Earmould Replacement Cost	34%	-		2%	7%	28%	15%	9%	4%	1%	
Annual Earmould Tube Replacement Cost	28%	4%	17%	36%	12%	2%	-	1%	-	-	

Note: The percentage depicts the number of parents of children with hearing impairment

Table 4.14 depicts the annual expenditure incurred for earmould replacement and earmould tube replacement among the participants. Regarding annual earmould replacement expenditure, majority of the participants reported either no expenditure or that the service was not applicable (34%). Among those who incurred expenditure, 28% reported annual costs between Rs. 1001–2000, followed by Rs. 2001–3000 (15%) and Rs. 3001–4000 (9%). Smaller proportions reported expenditure within the ranges of Rs. 501–1000 (7%), Rs. 4001–5000 (4%), Rs. 251–500 (2%), and above Rs. 5000 (1%).

With respect to annual earmould tube replacement expenditure, the majority of the participants reported expenditure within the range of Rs. 301–500 (36%), followed by Rs. 101–300 (17%) and Rs. 501–1000 (12%). About 28% reported no expenditure or indicated that the

service was not applicable. Only a smaller proportion reported expenditure within the ranges of Rs. 1–100 (4%), Rs. 1001–2000 (2%), and Rs. 3001–4000 (1%).

Overall findings indicate that the majority of the participants replaced earmoulds regularly every 3–6 months and obtained services mainly from government hospitals or centers, with most participants incurring low to moderate annual expenditure for earmould and tube replacement.

Table 4.15

Depicts the total expenditure incurred on hearing aid accessories among children with hearing loss

Questions	Rs. 0	Rs. 1– 500	Rs. 501– 1500	Rs. 1501– 2500	Rs. 2501– 3500	Rs. 3501– 5000	Above Rs. 5000
Total Cost of Accessories	26%	13%	31%	24%	3%	1%	8%

Note: The percentage depicts the number of parents of children with hearing impairment

Purchase of hearing aid accessories was reported by 74% of the participants, whereas 26% did not purchase any accessories. Among those who purchased accessories, the majority reported expenditure within the range of Rs. 501–1500 (31%), followed by Rs. 1501–2500 (24%) and Rs. 1–500 (13%). Smaller proportions reported expenditure within the ranges of Rs. 2501–3500 (3%), above Rs. 5000 (2%), and Rs. 3501–5000 (1%). Overall findings indicate that the majority of the participants purchased hearing aid accessories and incurred low to moderate expenditure, with most spending between ₹501–₹2500

Table 4.16

Summary of maximum expenditure incurred towards the Indirect audiological cost across each questions.

Indirect audiological cost	Maximum Expenditure (Annually)	Percentage of participants responded
Annual Repair/service cost	Above Rs.10000	8%
Annual Earmould Replacement Cost	Rs.1001–2000	28%
Annual Ear mould Tube Replacement Cost	Rs.301–500	36%
Total Cost of Accessories	Rs.501–1500	31%
Total expenditure on previous hearing aid	Rs.10001-25000	13%

From above Table 4.16, it can be inferred that taking into consideration of the maximum percentage of the participants reporting data for each questions, the upper expenditure of expenses towards the Indirect audiological cost will be Rs 16500.

4.4. Section 4: Indirect non -Audiological Costs

Indirect non-audiological costs incurred by parents of children with hearing loss are not directly related to audiological services but are incurred while accessing healthcare services. the costs mainly include travel, accommodation, and loss of wages experienced by parents or caregivers during hospital visits and therapy appointments.

Table 4.17

Depicts the annual travel expenditure incurred by number of parents of children with hearing loss in percentage

Questions	Rs.0	Rs. 1– 500	Rs. 501– 1000	Rs. 1001– 2000	Rs. 2001– 3500	Rs. 3501– 5000	Rs. 5001– 7500	Rs. 7501– 10000	Above Rs.10000
Cost incurred for travel by parents	6%	9%	8%	10%	27%	16%	11%	6%	7%

Table 4.17 depicts the annual travel and transportation expenditure incurred for hearing-related visits to professionals among the 100 participants. The majority of the participants reported annual travel expenditure within the range of Rs. 2001–3500 (27%), followed by Rs. 3501–5000 (16%) and Rs. 5001–7500 (11%). Smaller proportions reported expenditure within the ranges of Rs. 1001–2000 (10%), Rs. 1–500 (9%), Rs. 501–1000 (8%), above Rs. 10,000 (7%), and Rs. 7501–10000 (6%). Only 6% of the participants reported no travel expenditure. Overall findings indicate that the travel and transportation expenditure constituted a recurring cost for most participants, with expenditure most commonly falling within the range of Rs. 2001–3500 per year.

Table 4.18

Depicts the average annual accommodation expenditure incurred by parents of children with hearing loss during hearing-related visits

Questions	Rs.0	Rs. 1– 6000	Rs. 6001– 18000	Rs. 18001– 36000	Rs. 36001– 60000	Rs. 60001– 120000	Rs. 120001– 240000	Rs. 240001– 420000
Annual Accommodation Cost	48%	1%	2%	-	6%	30%	11%	2%

Table 4.18 presents the distribution of annual accommodation-related expenditure incurred during hospital or clinic visits among the participants. The findings indicate that nearly half of the participants (48%) reported no accommodation expenditure. In contrast, 30% of the participants spent between Rs. 60001 and 120000 annually on accommodation during hearing-related visits. Further, 11% reported expenditure between Rs. 120001 and 240000 annually, while 6% spent between Rs. 36001 and 60000 annually. A smaller proportion of participants reported expenditure between Rs. 6001 and 18000 (2%) and Rs. 240001 and 420000 annually (2%). Only 1% of the participants spent between Rs. 1 and 6000 annually. None of the participants reported

accommodation expenditure between Rs. 18001 and 36000, Rs. 420001 and 600000, or above Rs. 600000 annually. The findings suggest that although a large proportion of participants did not incur accommodation expenses, a considerable number of families experienced high accommodation-related expenditure during hearing healthcare visits. Overall findings indicate that while nearly half of the participants reported no accommodation-related expenditure, a considerable proportion of families incurred high annual accommodation costs during hearing healthcare visits.

Table 4.19

Summary of maximum expenditure incurred towards the Indirect non-audiological cost across each questions

Indirect non-audiological cost	Maximum Expenditure (Annually)	Percentage of participants responded
Annual Travel Cost (Hearing Visits to professional)	Rs. 2001–3500	27%
Annual Accommodation Cost	Rs. 60001–120000	30%

From above Table 4.19, it can be inferred that taking into consideration of the maximum percentage of the participants reporting data for each questions, the upper expenditure of expenses towards the Indirect non -audiological cost will be Rs123500

4.5. Section 5: Overall Financial Burden (Parents’/Caregivers’ Perspective)

This section included information related to the affordability of hearing loss management, the impact of hearing related expenditure on household expenses, the adequacy of the financial assistance received and also include details regarding annual expenditure, borrowing of money or taking loan in order to meet the expenditure and finally assess the percentage of income spent on hearing loss management.

The parents of children with hearing loss perceived hearing loss management as difficult but manageable (41%), while 25% reported it to be very difficult with a high financial burden.

About 23% considered the expenses somewhat affordable, whereas only 5% perceived them as very affordable. A small proportion of participants (6%) reported that hearing loss management was not affordable at all and caused major financial hardship.

Regarding the biggest financial challenge, majority of the participants identified hearing aid purchase and fitting costs as the primary financial burden (65%), followed by indirect costs such as travel, accommodation, and wage loss (23%). Therapy and intervention related expenses were reported as the major challenge by 8% of the participants, whereas only a small proportion identified repair/maintenance costs (2%) or reported no financial challenges (2%).

Majority of the participants (50%) reported that they had reduced household expenses to some extent due to hearing loss management costs, while 34% reported significantly cutting down on household expenses. Only 16% of the participants reported no reduction in the household expenditure. Regarding financial support mechanisms, 36% of the participants reported borrowing money or taking loans from banks, relatives, or money lenders to manage hearing loss-related expenses, whereas the remaining 64% reported that they had not borrowed money or taken loans. Overall findings indicate that the majority of the parents perceived hearing loss management as financially difficult, with hearing aid purchase and fitting costs being the major financial challenge. Many families reported reducing household expenses and some relied on loans or borrowed money to manage hearing loss-related expenses.

Table 4.20

Depicts the annual total expenditure incurred by number of parents of children with hearing loss in percentage for hearing-related management

Questions	Less than Rs.10000	Rs. 10001– 25000	Rs. 25001– 50000	Rs. 50001– 100000	Rs. 100001– 200000	Rs. 200001– 350000	Rs. 350001– 400000
Annual Total Hearing Loss Expenditure	10%	12%	15%	16%	31%	14%	2%

Table 4.20 depicts the annual total expenditure incurred for hearing loss management among the participants. The majority of the participants reported annual expenditure within the range of Rs. 1,00,001–2,00,000 (31%), followed by Rs. 50,001–1,00,000 (16%) and Rs. 25,001–50,000 (15%). Smaller proportions reported expenditure within the ranges of Rs. 2,00,001–3,50,000 (14%), Rs. 10,001–25,000 (12%), and less than Rs. 10,000 (10%). Only 2% of the participants reported annual expenditure between Rs. 3,50,001–4,00,000 while none one of the participants reported above Rs.400000.

The table also depict the perceived adequacy of financial support and the overall financial burden experienced by the participants in managing hearing loss. Majority of the participants (59%) reported that they had not received any government, NGO, or insurance support. Among those who received support, 26% reported that the support was not sufficient at all, while 10% perceived the support as partly sufficient. Only 5% of the participants reported that the available support was sufficient. Regarding the overall financial burden rating, majority of the participants perceived the financial burden associated with hearing loss management as moderate (48%), followed by high burden (32%). Smaller proportions reported the burden as low (9%) or very high (9%), while only 2% perceived the burden as very low. Overall findings indicate that the majority of the participants incurred annual expenditure between Rs. 1,00,001–2,00,000 for hearing loss management. Most participants reported not receiving adequate financial support and perceived the overall financial burden as moderate to high.

Table 4.21

Depicts percentage of income spend on hearing related expenditure

Percentage of total income spend on hearing related expenditure	Percent
0/ Not applicable	30%
1-10	17%
11-20	13%
21-30	10%
31-40	10%
41-50	13%
51-60	5%
61-70	8%
71-80	5%
81-90	5%
91-100	3%
Above 100	8%

Table 4.21 depicts the percentage of family income spent on hearing loss management among the participants. Majority of the participants reported spending 1–10% of their income on hearing loss management (17%), followed by 11–20% (13%) and 41–50% (13%). About 10% of the participants reported spending 21–30% and another 10% reported spending 31–40% of their income on hearing-related expenses. Smaller proportions reported expenditure within the higher income ranges. A small proportion of participants (8%) reported spending very high amounts on hearing loss management in comparison to their family income, possibly due to borrowing money or receiving financial support from others, while 3% reported no income to meet the expenditure. Overall findings indicate that the majority of the participants spent a considerable proportion of their family income on hearing loss management, with some families reporting very high expenditure relative to their income and a few having no income to meet the expenses.

4.6. Results of Spearman correlation analysis to examine the relationship between socioeconomic status (SES) and overall financial burden among the participants.

The Modified Kuppuswamy Socioeconomic Status Scale was administered to all the participants and the results of their socio-economic status are as in Table 4.22.

Table 4.22

Distribution of Parents/caregivers (%) according to Modified Kuppuswamy Socioeconomic Status Scale

Modified Kuppuswamy socio-economic status	No. of participants (%)
Lower SES	1%
Upper Lower SES	27%
Lower Middle SES	38%
Upper Middle SES	28%
Upper SES	6%
Total	100%

Table 4.22 presents the socioeconomic status (SES) characteristics of the participants based on the modified Kuppuswamy socioeconomic scale. Majority of the families belonged to the lower middle socioeconomic class (38%), followed by upper middle class (28%) and upper lower class (27%). Only a smaller proportion of the participants belonged to the upper class (6%) and lower socioeconomic class (1%).

Overall findings indicate that the majority of the participants belonged to the lower middle socioeconomic class, suggesting that most families were from middle socioeconomic backgrounds. Further a Spearman correlation analysis was carried out to examine the relationship between socioeconomic status (SES) and overall financial burden among the participants.

Table 4.23

Results of spearman correlation analysis between socioeconomic status and overall financial burden

	Spearman's rho (r)	p value	Interpretation
Socioeconomic Status (SES) vs Overall Financial Burden	-0.425	<0.01	Moderate negative correlation; lower SES was associated with higher financial burden

The analysis revealed a moderate negative correlation between SES and overall financial burden ($r = -0.425$, $p < 0.01$), which was statistically significant. This indicates that participants belonging to lower socioeconomic groups experienced greater financial burden related to hearing loss management, whereas participants from higher socioeconomic groups reported relatively lower financial burden.

Chapter 5

Discussion

Hearing loss in children not only affects speech and language development, but also cause a considerable financial burden on families due to the long term nature of hearing rehabilitation. The expenditure associated with hearing loss management extends beyond the initial diagnosis and hearing aid fitting, and includes costs related to diagnostic evaluations, hearing aid purchase, therapy sessions, follow-up visits, programming, repairs, earmould replacement, travel, accommodation, and loss of wages. These repeated expenses may particularly affect families from lower socioeconomic backgrounds and can influence the continuity of rehabilitation services. Therefore, the present study aimed to evaluate the direct and indirect audiological expenditure incurred by parents of children with hearing loss undergoing hearing aid management and rehabilitation.

5.1 Demographic and Hearing Loss Profile

The demographic findings of the present study revealed that the majority of the participants belonged to rural areas and most parents had school-level education. In addition, the majority of mothers were homemakers or unemployed. These findings may indicate that families attending hearing rehabilitation services often belong to middle or lower socioeconomic backgrounds, where caregiving responsibilities and repeated hospital visits may limit employment opportunities, particularly for mothers. Similar observations have been reported in studies evaluating hearing-related expenditure, where parents of children with hearing loss experienced financial and occupational burden due to continuous rehabilitation requirements. Baltussen et al. (2009) and Deniz et al. (2022) also reported that repeated rehabilitation visits and long-term caregiving responsibilities significantly affected the socioeconomic stability of families.

With respect to the hearing loss profile, the majority of the children in the present study had bilateral profound sensorineural hearing loss. Severe-to-profound hearing loss generally requires early amplification, regular follow-up, auditory-verbal therapy, and prolonged rehabilitation services. This may explain the increased healthcare expenditure observed among many families in the present study. Similar findings were reported by Deniz et al. (2022), where paediatric hearing device users demonstrated higher healthcare expenditure compared to adults due to the increased need for rehabilitation and monitoring services. The World Health Organization (2021) has also highlighted that children with disabling hearing loss need continuous rehabilitative support, including hearing aids, therapy and follow-up care, which considerably increases long-term expenditure.

The present study also identified delayed age at diagnosis and hearing aid fitting among several participants. Although newborn hearing screening programs are becoming more widely available, delays in identification and intervention may still occur due to lack of awareness, financial difficulties, delayed referrals, and limited accessibility to specialized hearing healthcare services in rural areas. Delayed intervention may further increase rehabilitation burden, as children diagnosed later often require prolonged therapy and additional educational support services. Similar findings were reported by Sharma et al. (2002) and Yoshinaga-Itano et al. (1998), who emphasized that delayed amplification negatively affects speech and language outcomes and may prolong rehabilitation requirements.

5.2 Direct Audiological Costs

5.2.1 Expenditure on Diagnostic Services

The findings of the present study showed that although most participants reported minimal or no expenditure for newborn hearing screening and medications, moderate expenditure was commonly incurred for ENT consultation and initial audiological evaluations. Initial audiological tests and confirmatory assessments contributed significantly to diagnostic expenditure among several

participants. These findings suggest that even before hearing aid fitting, families experience financial burden associated with repeated consultations and diagnostic procedures. The relatively lower expenditure reported for newborn hearing screening may be due to the availability of screening services in certain hospitals and government healthcare centres. However, repeated confirmatory testing and specialized audiological assessments such as ABR and OAE may increase expenditure, particularly when tertiary care services are required. Similar findings were also reported by Baltussen et al. (2009), where repeated follow-up diagnostic visits significantly contributed to healthcare expenditure among families of children with hearing loss.

5.2.2 Hearing Aid Purchase and Related Accessories Costs

Among the direct audiological costs, hearing aid purchase represented one of the highest expenditures incurred by families. Most participants spent between Rs. 25,001–1,00,000 for hearing aid purchase, while only a smaller proportion received fully subsidized devices. Even though government schemes and hospital support were available for certain participants, many families still relied on self-funding for hearing aid-related expenditure. Similar findings were observed in the study conducted by Deniz et al. (2022), where families of hearing aid and cochlear implant users reported considerable out-of-pocket expenditure associated with hearing devices and rehabilitation. Ostrowski and Mouzakes (2022) also reported that hearing aid devices and related maintenance costs impose major financial burden even among higher-income families.

Apart from hearing aid purchase, additional recurring expenditure was observed for earmoulds, batteries, accessories, and hearing aid programming. In the present study, most participants reported expenditure toward earmould replacement and batteries, which reflects the ongoing maintenance cost associated with hearing aid usage. These findings suggest that the economic burden of hearing loss management is ongoing and extend well beyond the one time purchase of hearing devices. Deniz et al. (2022) also reported that hearing-related expenditure

includes recurring costs such as batteries, accessories, repairs, and follow-up services, which significantly contribute to overall out-of-pocket healthcare expenditure. Dillard et al. (2024) further emphasized that maintenance costs and follow-up rehabilitation expenses remain major barriers to long-term hearing aid utilization in low- and middle-income countries.

5.2.3 Intervention / Therapeutic Process Costs

The findings related to therapy and rehabilitation showed that the majority of children were receiving auditory-verbal therapy or speech therapy services from government hospitals or centres. Consequently, many participants reported lower monthly expenditure for therapy services. However, despite reduced direct therapy costs through government services, repeated hospital visits may still contribute to indirect financial burden through travel expenditure, accommodation costs, and loss of wages. In the present study, speech therapy and AVT sessions were among the most common reasons for repeated clinic visits. These findings are consistent with previous literature reporting that rehabilitation-related expenditure continues throughout the management period of hearing loss. WHO (2021) highlighted that successful hearing rehabilitation depends not only on hearing aid fitting, but also on continuous rehabilitative support, therapy, counselling, and follow-up care. Similarly, Deniz et al. (2022) reported that paediatric hearing aid users required prolonged rehabilitative services, which substantially increased long-term healthcare expenditure.

5.2.4 Follow-up Expenditures for Individuals with Hearing Loss

Follow-up expenditure constituted another important component of audiological management. Although many participants reported low annual expenditure for ENT follow-up, audiological follow-up, and programming services, repeated visits throughout the year may cumulatively contribute to financial burden. Regular follow-up appointments are essential for monitoring hearing aid performance, auditory progress, speech perception, and device functioning, particularly in paediatric populations. Similar observations were reported by Deniz et al. (2022),

where paediatric hearing device users required more frequent clinical appointments compared to adults, thereby increasing healthcare expenditure. Dillard et al. (2024) also highlighted that follow-up care and periodic hearing aid programming are essential for optimal hearing aid outcomes, but these repeated services increase long-term out-of-pocket expenditure among families. Therefore, the present findings further support the importance of considering follow-up expenditure as major component of paediatric hearing rehabilitation costs.

5.3 Indirect Audiological Costs

The present study further evaluated indirect audiological costs such as hearing aid repair, servicing, replacement, and earmould replacement. Although the majority of participants reported no expenditure toward repairs due to warranty coverage or free servicing, a smaller proportion incurred high repair expenditure exceeding Rs. 10,000 annually. Hearing aid replacement was reported among 35% of participants, mainly due to poor sound quality, malfunction, technological upgrades, or physical damage. These findings suggest that long-term hearing aid management involves repeated maintenance expenditure, which may increase the economic burden on families over time. Similar findings were reported by Ostrowski and Mouzakes (2022), who emphasized that recurring repair, replacement, and maintenance costs significantly contribute to hearing aid-related financial burden.

Frequent earmould replacement was commonly noted among younger children, with many participants replacing earmoulds every 3–6 months. This may be largely attributed to rapid ear growth in children, necessitating periodic replacement to maintain proper fitting and acoustic performance. Additional expenditure was also incurred toward earmould tubing and hearing aid accessories. Similarly Deniz et al. (2022) have emphasized that hearing rehabilitation requires continuous expenditure toward maintenance and accessories beyond the initial hearing aid fitting. These findings indicate that indirect audiological expenditure is continuous and cumulative in nature,

particularly among paediatric hearing aid users who require prolonged hearing rehabilitation and repeated hearing aid maintenance services.

5.4 Indirect Non-Audiological Costs

Indirect non-audiological expenditure also contributed substantially to the overall burden experienced by families. Travel expenditure was reported by nearly all participants, with many families spending between Rs. 2001–5000 annually for hearing-related visits. Since a majority of participants belonged to rural areas, repeated travel to tertiary hearing healthcare centres may have increased transportation expenditure. Accommodation-related expenditure was also observed among several participants, suggesting that some families travelled long distances and required overnight stays during appointments and therapy visits. Similar findings were reported by Baltussen et al. (2009) and Deniz et al. (2022), who observed that transportation and accommodation expenditure contributed significantly to overall hearing-related healthcare costs.

The present study also highlighted caregiver burden associated with hearing loss management. Most children were accompanied by their mothers during hospital visits and therapy sessions. Frequent appointments, travel, and caregiving responsibilities may contribute to reduced employment opportunities and loss of wages among caregivers. Such indirect financial consequences may further affect the family's economic stability, particularly among lower socioeconomic groups. Similar findings were reported by Hooda (2017) and Panda et al. (2024), who emphasized that chronic healthcare expenditure and disability-related costs often intensify household financial hardship and poverty risk.

5.5 Overall Financial Burden

The findings of the present study revealed that hearing loss management imposes substantial direct and indirect financial burden on families. A majority of the participants reported annual expenditure within the range of Rs. 1,00,001–2,00,000 with the average annual expenditure incurred

by the majority of parents for hearing loss management was approximately Rs. 1,99,600 per year. These findings indicate that a considerable share of household income is spent on hearing -related rehabilitation and management services. Correlation analysis revealed a significant negative correlation between socioeconomic status and financial burden, indicating that families with lower socioeconomic status experienced greater financial strain related to hearing loss management. Similarly, affordability of hearing loss management was also significantly associated with increased financial burden. These findings suggest that although government support schemes reduce certain expenses, many families continue to experience difficulty managing the cumulative costs associated with hearing rehabilitation.

Similar findings have been reported by Sriram and Albadrani (2022), Hooda (2017), and Yadav et al. (2021), who noted that out-of-pocket healthcare expenditure significantly affects economically vulnerable families and may drive households towards financial hardship and poverty. WHO (2021) also emphasized that strengthening financial assistance programmes and improving accessibility to hearing healthcare services are essential for reducing the long-term economic burden associated with hearing loss management. Overall, the findings of the present study demonstrate that hearing loss management imposes substantial direct audiological, indirect audiological, and indirect non-audiological expenditure on families. The burden is not limited to hearing aid purchase alone, but extends to long-term rehabilitation, maintenance, travel, therapy, and follow-up care.

Chapter 6

Summary and conclusions

Hearing loss in children can have significant impact on speech and language development, communication skill, academic performance, and overall quality of life. Early identification and timely intervention through hearing aids are essential for improving auditory and speech-language outcomes in children with hearing loss. However, managing hearing loss involves much more than initial fitting of hearing aids. Families often face a range of expenses from the time of diagnosis and throughout the rehabilitation process, including costs related to diagnostic assessments, hearing aids, earmoulds, batteries, therapy services, follow-up visits, repairs, replacements, travel, accommodation, and loss of income due to repeated hospital visits. In a country like India, where healthcare expenses are largely borne by families themselves, these ongoing costs can place a considerable financial strain on households, particularly those from lower socioeconomic backgrounds.

The present study aimed to investigate the comprehensive expenditure incurred by parents/caregivers of children with hearing loss associated with diagnosis, hearing aid fitting, and on going rehabilitation. A structured questionnaire was developed for the purpose of the study to obtain the information regarding demographic details, hearing loss profile, direct audiological costs, indirect audiological costs, indirect non audiological costs, and the overall financial burden experienced by families. The questionnaire was content validated before administration to participants. A total of 100 parents/caregivers of children with hearing loss using hearing aids participated in the study. Direct interview and telephonic interview methods were used for data collection. The findings of the study revealed that the majority of participants belonged to rural backgrounds and middle or lower socioeconomic groups. Most children had bilateral profound sensorineural hearing loss and required long-term hearing rehabilitation services.

The findings of the study also demonstrated that families incurred expenditure at multiple stages of hearing rehabilitation. Expenditure related to diagnostic services included newborn hearing screening, ENT consultations, medications, initial audiological evaluations, and follow-up confirmatory tests. Although many participants reported lower expenditure for newborn hearing screening and medications, considerable expenditure was incurred for audiological testing and diagnostic evaluations. Hearing aid purchase constituted one of the major direct audiological expenditures in the present study. Although a small proportion of participants received fully subsidized hearing aids or financial assistance through government schemes, the majority of participants continued to depend on self-funding for hearing aid-related expenses. Additional expenditure was also incurred for earmoulds, batteries, and hearing aid accessories. The findings further revealed that repeated costs related to therapy sessions, hearing aid programming, and follow-up services contributed significantly to the long-term rehabilitation burden experienced by families.

The study also identified considerable indirect audiological expenditure linked to hearing aid repair, servicing, earmould replacement, and hearing aid replacement. While some participants benefited from warranty coverage or free servicing, several families incurred additional expenditure for maintenance and replacement of hearing aids. The most common reasons for hearing aid replacement included poor device performance, malfunction, and technological upgrades. These findings indicate that hearing rehabilitation involves continuous recurring expenditure that extent well beyond the initial hearing aid fitting. Apart from direct audiological expenditure, indirect non-audiological cost such as travel, accommodation, and loss of wages also contributed substantially to the financial burden experienced by families. Frequent visits for speech therapy, auditory-verbal therapy, hearing assessments, programming sessions, and follow-up consultations increased travel-related expenditure, particularly among families residing in rural areas who relied on tertiary care centres for rehabilitation services. The findings of the present study indicated that the majority of

parents incurred an average annual expenditure of approximately Rs. 1,99,600 for hearing loss management, reflecting a considerable financial burden on families.

The findings of the correlation analysis further demonstrated that families belonging to lower socioeconomic groups experienced greater financial burden and reduced affordability for hearing loss management. Although government schemes and financial support programs are available, the assistance provided was often inadequate to completely meet the long-term rehabilitation needs of children with hearing loss. As a result, many families continued to experience considerable out-of-pocket expenditure throughout the rehabilitation process. Similar findings have been reported in previous studies, which observed that hearing-related healthcare expenditure significantly affects the economic well-being of families and may increase financial hardship among economically vulnerable populations.

Overall, the present study concludes that hearing loss management in children imposes substantial direct and indirect financial burden on families. The expenditure associated with hearing rehabilitation extends from the stage of diagnosis to long-term management and includes costs related to hearing aid purchase, therapy services, follow-up care, repairs, replacement, travel, accommodation, and caregiver burden. These repeated and long-term expenses may significantly affect the financial stability and quality of life of families, particularly those from lower and middle socioeconomic backgrounds.

Although government schemes and financial assistance programs help offset certain expenses related to hearing rehabilitation, the support currently available is often insufficient to fulfil the complete rehabilitation needs of children with hearing loss. Many families still continue to rely largely on out-of-pocket expenditure for accessing essential hearing healthcare and rehabilitation services. Therefore, the findings of the present study highlight the urgent need for strengthening healthcare policies and financial support systems for paediatric hearing rehabilitation in India.

Expansion of government subsidy schemes, inclusion of hearing healthcare facilities in rural areas, and increased financial support for therapy and maintenance services may help reduce the burden experienced by families. The findings of the study may assist audiologists, rehabilitation professionals, policymakers, and healthcare planners better understand the economic challenges encountered by families of children with hearing loss. The study may also contribute toward developing more inclusive, affordable, and accessible hearing healthcare and rehabilitation services for paediatric hearing aid users in India.

6.1 Implications of the study

1. The findings of this study can be used to counsel parents and caregivers regarding the expenditure involved in the diagnosis, fitting and long-term management of hearing aids for children, thereby helping them prepare for associated financial responsibilities.
2. The results would help parents create a structured budget that accounts for both initial and repeated costs, such as batteries, earmolds, servicing, and replacements, encouraging them to plan these expenses in advance and discover available financial aid or subsidy options.
3. The study would provide valuable evidence for policymakers and healthcare planners, enabling them to design or strengthen government schemes and insurance coverage that support families in meeting both the initial purchase cost and also ongoing maintenance costs associated with hearing aid management in children.

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Appendix

ANNEXURE – I

A COMPREHENSIVE COST ANALYSIS OF EXPENDITURE FOR PARENTS OF CHILDREN WITH HEARING LOSS

Dear Parent/Caregiver,

You are invited to participate in a research study conducted to understand the expenses faced by parents/caregivers of children with hearing loss using hearing aids. The study aims to evaluate the costs involved in diagnosis, hearing aid fitting, therapy, follow-up visits, repairs, travel, and other related expenses.

The information collected through this questionnaire will help in understanding the financial burden experienced by families and may help in improving rehabilitation planning and support services in the future.

This questionnaire consists of the following sections:

1. Demographic and Hearing Loss Profile
2. Direct Audiological Costs
3. Indirect Audiological Costs
4. Indirect Non-Audiological Costs
5. Overall Financial Burden

Please read the following instructions carefully:

- Kindly answer all questions based on your experience.
- If you do not know the exact amount, choose the closest option provided.

- All information shared by you will be kept completely confidential and used only for research purposes.
- Your participation in this study is completely voluntary.
- There are no right or wrong answers. Please answer honestly.

Approximate time required to complete the questionnaire: 15–25 minutes.

Thank you for your valuable time and cooperation.

Section 1: Demographic & Hearing Loss Profile

1. Name of the child:
2. Case Number:
3. Present age of the child?
4. Gender: ☐ Male ☐ Female
5. Education level of the child: _____
6. Phone number of the parent
7. State
8. City/Town/village: _____
9. Type of locality: ☐ Rural ☐ Urban
10. What is the father's educational qualification?
11. What is the father's occupation?
12. What is the father's monthly income?

13. What is the mother's educational qualification?
14. What is the mother's occupation?
15. What is the mother's monthly income?
16. Is the primary caregiver someone other than the parents?
17. What is the name / relationship of the primary caregiver to the child?
18. What is the primary caregiver's educational qualification?
19. What is the primary caregiver's occupation?
20. What is the primary caregiver's monthly income?
21. Type of hearing loss: ☐ Sensorineural ☐ Conductive ☐ Mixed
22. Degree of hearing loss in left ear: ☐ Mild ☐ Moderate ☐ Moderately severe ☐ Severe ☐
Profound
23. Degree of hearing loss in Right ear: ☐ Mild ☐ Moderate ☐ Moderately severe ☐ Severe ☐
Profound
24. Laterality of hearing loss: ☐ Unilateral ☐ Bilateral
25. Age of the child at the time of diagnosis: _____

☐ <6 months
☐ 6 months -1year
☐ 1-year - 1.6 years
☐ 1.6 years -2 years
☐ 2-3 year2.5 year
☐ 2.5-3 years
☐ 3-4 years
☐ >4 year then specify in other option
26. Age of the child at the time of fitting hearing aids and rehabilitation: _____

- ☐ <6 months
- ☐ 6 months -1year
- ☐ 1-year - 1.6 years
- ☐ 1.6 years -2 years
- ☐ 2-3 year2.5 year
- ☐ 2.5-3 years
- ☐ 3-4 years
- ☐ >4 year then specify in other option

27. How long is the child using the hearing aid?

- ☐ <6 months
- ☐ 6 months -1year
- ☐ 1-year - 1.6 years
- ☐ 1.6 years -2 years
- ☐ 2-3 years
- ☐ 3-4 years
- ☐ >4 year then specify in other option

28. Is there any sibling with hearing loss? ☐ Yes ☐ No

if yes please fill the form again

Section 2: Direct Audiological Costs

Dear parents/ caregivers kindly recall the expenditure occurred.

A.Expenditure on Diagnostic Services:

29. Cost incurred for newborn hearing screening at the hospital:

- ☐ ₹0
- ☐ ₹1 – ₹250
- ☐ ₹251 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹1,500
- ☐ ₹1,501 – ₹2,000
- ☐ Above ₹2,000 (Please specify the amount in other option)
- ☐ Not aware

30. Cost of ENT doctor consultations before any audiological assessments: ₹_____

- ☐ ₹0
- ☐ ₹1 – ₹250
- ☐ ₹251 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹1,500
- ☐ ₹1,501 – ₹2,000
- ☐ Above ₹2,000 (Please specify the amount in other option)

31. Amount spent on medications prescribed by the ENT doctor before the audiological evaluation :

₹_____

- ☐ ₹0
- ☐ ₹1 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹2,000
- ☐ ₹2,001 – ₹3,000

- ☐ ₹3,001 – ₹5,000
- ☐ Above ₹5,000 (Please specify the amount in other option)

32. Cost of your initial hearing check-up / audiological tests (e.g., hearing test, tympanometry, speech tests, hearing aid testing charges,): ₹ _____

- ☐ ₹0
- ☐ ₹1 – ₹500
- ☐ ₹501 – ₹2,000
- ☐ ₹2,001 – ₹5,000
- ☐ ₹5,001 – ₹10,000
- ☐ Above ₹10,000 (Please specify the amount in other option)

33. Cost of follow-up, repeat, or confirmatory hearing tests (including tests done in multiple setups/centres to confirm the diagnosis or hearing loss):

- ☐ ₹0
- ☐ ₹1 – ₹500
- ☐ ₹501 – ₹2,000
- ☐ ₹2,001 – ₹5,000
- ☐ ₹5,001 – ₹10,000
- ☐ Above ₹10,000 (Please specify the amount in other option)

B.Hearing Aid Purchase & Related Accessories Costs

34. Manufacturer, model, type, and battery type (rechargeable / non-rechargeable) , Battery Size of your current hearing aid/s:

35. Hearing aid fitted in:

- ☐ Right ear
- ☐ Left ear

☐ Both ears

36. Place of purchase of the current hearing aid. (private or government sector):

☐ Private clinic / hospital

☐ Government hospital /center

☐ NGO / charitable trust

☐ Other: _____

37. Purchase price of hearing aid/s currently being used used: ₹ _____

☐ ₹0 (Fully subsidized)

☐ ₹1 – ₹10,000

☐ ₹10,001 – ₹25,000

☐ ₹25,001 – ₹50,000

☐ ₹50,001 – ₹1,00,000

☐ ₹1,00,001 – ₹1,50,000

☐ ₹1,50,001 – ₹2,00,000

☐ ₹2,00,001 – ₹2,50,000

☐ ₹2,50,001 – ₹3,00,000

☐ ₹3,00,001 – ₹4,00,000

☐ Above ₹4,00,000, Please specify the amount in other option

38. Did you receive any financial help for the purchase of hearing aids or related expenses?

☐ Yes

☐ No

39. If yes, what was the source of financial help? (Select all that apply)

☐ Loan

☐ Govt scheme

- ☐ MLA / MP fund
- ☐ NGO
- ☐ Friends
- ☐ Relatives
- ☐ Private firm
- ☐ EMI
- ☐ Other: _____

40. What was the approximate amount of financial help received?

- ☐ ₹1 – ₹5,000
- ☐ ₹5,001 – ₹10,000
- ☐ ₹10,001 – ₹25,000
- ☐ ₹25,001 – ₹50,000
- ☐ ₹50,001 – ₹75,000
- ☐ ₹75,001 – ₹1,00,000
- ☐ Above ₹1,00,000 , please specify in other option)
- ☐ Not received any financial help

41. Year of hearing aid purchase: _____

- ☐ Before 2015
- ☐ 2015 – 2017
- ☐ 2018 – 2020
- ☐ 2021 – 2023
- ☐ 2024 – 2026

42. Cost of earmoulds at the time of hearing aid purchase

- ☐ ₹0 (not applicable / included in package)
- ☐ ₹1 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹1,500
- ☐ ₹1,501 – ₹2,000
- ☐ If above ₹2,000, Please specify the amount in the "other" option

43. cost of batteries at the time of hearing aid purchase: ₹ _____

- ☐ ₹0 (rechargeable aid)
- ☐ ₹1 – ₹250
- ☐ ₹251 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹1,500
- ☐ ₹1,501 – ₹2,000
- ☐ If above ₹2,000, Please specify the amount in the "other" option

44. cost of accessories at the time of hearing aid purchase (eg: Dry kit box, BTE huggies, Ear tip, Ear hook, Ear mould tube, covers, chargers, batteries, Domes -Instant Custom Hearing aid, Wax Guard): ₹ _____

- ☐ ₹0 (No accessories purchased / included in the package)
- ☐ ₹1 – ₹250
- ☐ ₹251 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹2,000
- ☐ ₹2,001 – ₹3,500
- ☐ ₹3,501 – ₹5,000

- ☐ ₹5,001 – ₹7,500
- ☐ ₹7,501 – ₹10,000
- ☐ Above ₹10,000 (Please specify the amount: ₹_____)

C. Intervention / Therapeutic process Costs

45. Where is the child currently receiving AVT (listening) / speech therapy?

- ☐ Government hospital / center
- ☐ Private clinic / hospital
- ☐ NGO / charitable center
- ☐ Online / tele-therapy
- ☐ School-based therapy
- ☐ Home-based therapy (with professional visits)
- ☐ Other: _____

46. Are you taking therapy from multiple places?

- ☐ Yes
- ☐ No

47. If yes, please specify all the places where therapy is taken:

- ☐ Government hospital / center
- ☐ Private clinic / hospital
- ☐ NGO / charitable center
- ☐ Online / tele-therapy
- ☐ School-based therapy
- ☐ Home-based therapy (with professional visits)
- ☐ Other: _____

48. Duration of speech therapy sessions (per month):

- ☐ 1–5 sessions
- ☐ 6–10 sessions
- ☐ 11–20 sessions
- ☐ 21–30 sessions
- ☐ 31–40 sessions
- ☐ 41–50 sessions
- ☐ More than 50 sessions (Please specify: _____)

49. Cost of auditory-verbal therapy support per month:

- ☐ ₹0 (Not availed / free / government support)
- ☐ ₹1 – ₹100
- ☐ ₹101 – ₹200
- ☐ ₹201 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹2,000
- ☐ ₹2,001 – ₹3,500
- ☐ ₹3,501 – ₹5,000
- ☐ ₹5,001 – ₹7,500
- ☐ ₹7,501 – ₹10,000
- ☐ Above ₹10,000 (Please specify the amount: ₹_____)

50. Cost of speech therapy per month:

- ☐ ₹0 (Not availed / free / government support)
- ☐ ₹1 – ₹100
- ☐ ₹101 – ₹200

- ☐ ₹201 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹2,000
- ☐ ₹2,001 – ₹3,500
- ☐ ₹3,501 – ₹5,000
- ☐ ₹5,001 – ₹7,500
- ☐ ₹7,501 – ₹10,000
- ☐ Above ₹10,000 (Please specify the amount: ₹_____)

51. Cost of special education support per month:

- ☐ ₹0 (Not availed / free / government support)
- ☐ ₹1 – ₹100
- ☐ ₹101 – ₹200
- ☐ ₹201 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹2,000
- ☐ ₹2,001 – ₹3,500
- ☐ ₹3,501 – ₹5,000
- ☐ ₹5,001 – ₹7,500
- ☐ ₹7,501 – ₹10,000
- ☐ Above ₹10,000 (Please specify the amount: ₹_____)

D.Follow-up expenditures for individuals with hearing loss

52. Follow-up cost for ENT consultations per visit? (after initial diagnosis):

- ☐ ₹0
- ☐ ₹1 – ₹250
- ☐ ₹251 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹2,000
- ☐ ₹2,001 – ₹3,500
- ☐ ₹3,501 – ₹5,000
- ☐ Above ₹5,000 (Please specify the amount: ₹_____)

53. Follow-up cost for audiological evaluations per visit? (after fitting or review):

- ☐ ₹0
- ☐ ₹1 – ₹250
- ☐ ₹251 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹2,000
- ☐ ₹2,001 – ₹5,000
- ☐ ₹5,001 – ₹10,000
- ☐ Above ₹10,000 (Please specify the amount: ₹_____)

54. Did you pay for follow-up hearing aid programming sessions after purchase?

- ☐ Yes
- ☐ No

55. Place of programming services received:

- ☐ Private clinic / hospital
- ☐ Government hospital / center

☐ Hearing aid company / dealer

☐ Not applicable

☐ Other: _____

56. How often do you require programming / fine-tuning sessions?

☐ Once a year

☐ Twice a year

☐ Three times a year

☐ Four times a year

☐ Five times a year

☐ Six times a year

☐ More than six times a year, then specify in other option

☐ Not applicable

57. how much do you usually pay per programming session?

☐ ₹0 (included in package / free)

☐ ₹1 – ₹500

☐ ₹501 – ₹1,000

☐ ₹1,001 – ₹2,000

☐ ₹2,001 – ₹3,000

☐ ₹3,001 – ₹4,000

☐ Above ₹4,000 (Please specify the amount: ₹_____)

☐ Not applicable

58. Approximate total cost of programming sessions in one year:

☐ ₹0

☐ ₹1 – ₹250

- ☐ ₹251 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹3,000
- ☐ ₹3,001 – ₹5,000
- ☐ ₹5,001 – ₹7,500
- ☐ ₹7,501 – ₹10,000
- ☐ Above ₹10,000 (Please specify the amount: ₹_____)
- ☐ Not applicable

59. Purpose of the clinic visits

(Select all that apply.)

- ☐ Hearing assessment / evaluation
- ☐ Hearing aid fitting / programming / mapping
- ☐ Speech therapy / AVT sessions
- ☐ Hearing aid repair / servicing
- ☐ Follow-up or review appointments
- ☐ Medical consultation (ENT/other)
- ☐ Device troubleshooting or replacement
- ☐ Parent counselling sessions
- ☐ Other: _____

60. Number of clinic visits per year:

- ☐ 1–5 times
- ☐ 6–15 times
- ☐ 16–25 times
- ☐ 26–35 times

- ☐ 36–45 times
 - ☐ 46–50 times
 - ☐ More than 50 times, then specify in other option
-

Section 3: Indirect Audiological Costs:

61. Is your hearing aid currently under warranty or out of warranty?

- ☐ Under warranty
- ☐ Out of warranty

62. Have you ever had to repair or service your hearing aid?

- ☐ Yes
- ☐ No

63. If yes, how often do you typically need repairs/servicing?

- ☐ Once a year
- ☐ 2–3 times a year
- ☐ 4–5 times a year
- ☐ 6–7 times a year
- ☐ 8–10 times a year
- ☐ More than 10 times a year
- ☐ Not applicable (I have not required repairs/servicing)

64. Where do you usually get the hearing aid repaired/serviced?

- ☐ Private clinic / dealer
- ☐ Government hospital / center

☐ Hearing aid company service center

☐ Not applicable

☐ Other: _____

65. Average cost of a single repair:

☐ ₹0 (Covered under warranty / free)

☐ ₹1 – ₹500

☐ ₹501 – ₹1,000

☐ ₹1,001 – ₹1,500

☐ ₹1,501 – ₹2,000

☐ ₹2,001 – ₹3,000

☐ ₹3,001 – ₹4,000

☐ ₹4,001 – ₹5,000

☐ Above ₹5,000 (Please specify the amount: ₹_____)

☐ Not applicable

66. Average cost of a single service:

☐ ₹0 (Covered under warranty / free)

☐ ₹1 – ₹500

☐ ₹501 – ₹1,000

☐ ₹1,001 – ₹1,500

☐ ₹1,501 – ₹2,000

☐ ₹2,001 – ₹3,000

☐ ₹3,001 – ₹4,000

☐ ₹4,001 – ₹5,000

☐ Above ₹5,000 (Please specify the amount: ₹_____)

☐ Not applicable

67. Total yearly expenditure on repairs/servicing:

☐ ₹0

☐ ₹1 – ₹500

☐ ₹501 – ₹1,500

☐ ₹1,501 – ₹3,000

☐ ₹3,001 – ₹5,000

☐ ₹5,001 – ₹7,500

☐ ₹7,501 – ₹10,000

☐ Above ₹10,000 (Please specify the amount: ₹_____)

☐ Not applicable

68. Have you ever had to replace your hearing aid?

☐ Yes

☐ No

69. If yes, what was the main reason for replacing your hearing aid?

☐ Device stopped working

☐ Physical damage (broken, cracked, etc.)

☐ Poor sound quality / performance issues

☐ Lost or misplaced device

☐ Upgrading to a newer model / technology

☐ Recommended by audiologist

☐ Other (please specify): _____

☐ Not applicable

70. How many times have you replaced your own hearing aids?

71. How much total amount was spent on previous hearing aids?

- ☐ ₹0 (Fully subsidized)
- ☐ ₹1 – ₹10,000
- ☐ ₹10,001 – ₹25,000
- ☐ ₹25,001 – ₹50,000
- ☐ ₹50,001 – ₹1,00,000
- ☐ ₹1,00,001 – ₹1,50,000
- ☐ ₹1,50,001 – ₹2,00,000
- ☐ ₹2,00,001 – ₹2,50,000
- ☐ ₹2,50,001 – ₹3,00,000
- ☐ ₹3,00,001 – ₹4,00,000
- ☐ Above ₹4,00,000, Please specify the amount in other option
- ☐ Not applicable

72. Source of hearing aid replacement (if applicable):

- ☐ Private clinic / dealer
- ☐ Government hospital / center
- ☐ Hearing aid company service center
- ☐ Other: _____
- ☐ Not applicable

73. How often do you need to replace your child's earmould(s)?

- ☐ Every 3–6 months
- ☐ Once a year
- ☐ Every 2–3 years
- ☐ Rarely

☐ Never

74. When replacing earmoulds, how many are usually replaced at a time?

☐ Only one earmould

☐ Both earmoulds

☐ It varies (sometimes one, sometimes both)

☐ Not applicable

75. Place where earmoulds are repaired/replaced:

☐ Government hospital / center

☐ Private clinic / dealer

☐ Hearing aid company service center

☐ Not applicable

☐ Other: _____

76. Average cost per earmould replacement:

☐ ₹0

☐ ₹1 – ₹250

☐ ₹251 – ₹500

☐ ₹501 – ₹1,000

☐ ₹1,001 – ₹2,000

☐ ₹2,001 – ₹3,000

☐ ₹3,001 – ₹4,000

☐ ₹4,001 – ₹5,000

☐ Above ₹5,000 (Please specify the amount: ₹ _____)

☐ Not applicable

77. Total yearly expenditure on earmould replacement/repairs:

- ☐ ₹0
- ☐ ₹1 – ₹250
- ☐ ₹251 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹2,000
- ☐ ₹2,001 – ₹3,000
- ☐ ₹3,001 – ₹4,000
- ☐ ₹4,001 – ₹5,000
- ☐ Above ₹5,000 (Please specify the amount: ₹_____)
- ☐ Not applicable

78. Average cost spent per year on earmould tube replacement: ₹_____

- ☐ ₹0
- ☐ ₹1 – ₹100
- ☐ ₹101 – ₹300
- ☐ ₹301 – ₹500
- ☐ ₹501 – ₹1,000
- ☐ ₹1,001 – ₹2,000
- ☐ ₹2,001 – ₹3,000
- ☐ ₹3,001 – ₹4,000
- ☐ ₹4,001 – ₹5,000
- ☐ Above ₹5,000 (Please specify the amount: ₹_____)
- ☐ Not applicable

79. Did you have to purchase any hearing aid accessories (e.g., dry kit box, BTE huggies, Ear tip, ear hook, ear mould tube, covers, chargers, batteries, RIC domes, wax guards)?

☐ Yes

☐ No

80. If yes, please mention the total cost: ₹ _____

☐ ₹0 (No accessories purchased)

☐ ₹1 – ₹500

☐ ₹501 – ₹1,500

☐ ₹1,501 – ₹2,500

☐ ₹2,501 – ₹3,500

☐ ₹3,501 – ₹5,000

☐ Above ₹5,000 (Please specify the amount: ₹ _____)

Section 4: Indirect non -Audiological Costs

81. Travel/transportation costs for hearing-related visits (per month):

☐ ₹0

☐ ₹1 – ₹500

☐ ₹501 – ₹1,000

☐ ₹1,001 – ₹2,000

☐ ₹2,001 – ₹3,500

☐ ₹3,501 – ₹5,000

☐ ₹5,001 – ₹7,500

☐ ₹7,501 – ₹10,000

☐ Above ₹10,000 (Please specify the amount: ₹ _____)

82. Have you ever had to spend on accommodation (staying overnight) during hospital/clinic visits?

☐ Yes

☐ No

83. If yes, average accommodation cost per month:

☐ ₹0 (Stayed with relatives/friends)

☐ ₹1 – ₹500

☐ ₹501 – ₹1,500

☐ ₹1,501 – ₹3,000

☐ ₹3,001 – ₹5,000

☐ ₹5,001 – ₹10,000

☐ ₹10,001 – ₹20,000

☐ ₹20,001 – ₹35,000

☐ ₹35,001 – ₹50,000

☐ Above ₹50,000 (Please specify the amount: ₹_____)

☐ Not applicable

84. Who usually accompanies the child for visits?

☐ Father

☐ Mother

☐ Both parents

☐ Other family member/Caregiver

85. Loss of wages/income due to taking leave for appointments and also for accompanying for therapy (per month):

☐ ₹0 (No wage loss / caregiver not employed)

☐ ₹1 – ₹500

- ☐ ₹501 – ₹1,500
- ☐ ₹1,501 – ₹3,000
- ☐ ₹3,001 – ₹5,000
- ☐ ₹5,001 – ₹7,500
- ☐ ₹7,501 – ₹10,000
- ☐ ₹10,001 – ₹15,000
- ☐ ₹15,001 – ₹20,000
- ☐ Above ₹20,000 (Please specify the amount: ₹ _____)

86. Days of work/school missed in a year due to appointments: _____

- ☐ None
 - ☐ 1–5 days
 - ☐ 6–10 days
 - ☐ 11–20 days
 - ☐ 21–30 days
 - ☐ 31–45 days
 - ☐ More than 45 days, then specify in other option
-

Section 5: Overall Financial Burden (Parents'/Caregivers' Perspective)

87. In your opinion, how affordable has it been to manage your child's hearing loss (from diagnosis to rehabilitation)?

- ☐ Very affordable (minimal burden)
- ☐ Somewhat affordable

- ☐ Difficult but manageable
- ☐ Very difficult (high burden)
- ☐ Not affordable at all (major hardship)

88. What has been the biggest financial challenge for your family?

- ☐ Diagnostic tests (ENT, audiology, hearing aid evaluation)
- ☐ Hearing aid purchase and fitting
- ☐ Therapy/intervention costs (speech therapy, auditory training, etc.)
- ☐ Indirect costs (travel, accommodation, loss of wages)
- ☐ Repairs/maintenance/replacement of devices
- ☐ Other: _____

89. Has managing your child's hearing loss caused you to cut down on other household expenses?

- ☐ Yes, significantly
- ☐ Yes, to some extent
- ☐ No

90. Did you have to borrow money, take a loan, or sell assets to cover the costs?

- ☐ Yes → From bank / relatives / money lender (specify)
- ☐ No

91. On average, how much do you spend per year for managing your child's hearing loss (all combined: diagnosis, devices, therapy, travel, etc.)?

- ☐ Less than ₹10,000
- ☐ ₹10,001 – ₹25,000
- ☐ ₹25,001 – ₹50,000
- ☐ ₹50,001 – ₹1,00,000

- ☐ ₹1,00,001 – ₹2,00,000
- ☐ ₹2,00,001 – ₹3,50,000
- ☐ ₹3,50,001 – ₹4,00,000
- ☐ ₹4,00,001 – ₹5,00,000
- ☐ Above ₹5,00,000, then specify in other option

92. Do you feel the financial support (if any) provided by the government/NGO/insurance is sufficient?

- ☐ Not applicable (no support received)
- ☐ Yes, sufficient
- ☐ Partly sufficient
- ☐ Not sufficient at all

93. Overall, how would you rate the financial burden of managing your child's hearing loss?

- ☐ Very low
- ☐ Low
- ☐ Moderate
- ☐ High
- ☐ Very high

94. Annual household income: ₹ _____

95. Total annual hearing loss-related expenditure: ₹ _____

96. Percentage of income spent on hearing loss-related costs: (auto-calculated) _____ %

Annexure II

Instructions: Please rate each statement based on your level of agreement, using the following scale:

- 1 - **Strongly Disagree**
- 2 - **Disagree**
- 3 - **Neutral**
- 4 - **Agree**
- 5 - **Strongly Agree**

Content Quality

Sl.No	Questions	1 - Strongly Disagree	2 - Disagree	3 - Neutral	4 - Agree	5 - Strongly Agree
1.	The items in the questionnaire adequately collect information on direct audiological costs related to ENT consultations, audiological evaluations, and hearing aid testing.					
2.	The questionnaire sufficiently captures costs of hearing device purchase , including ear moulds, batteries, accessories,					
3.	The items clearly reflect costs associated with intervention and therapeutic processes (speech therapy, auditory-verbal therapy, etc.).					
4.	The questionnaire appropriately covers post-follow-up costs , including hearing aid programming and fine-tuning charges.					
5.	The questions adequately assess indirect audiological costs , such as repair, servicing, or replacement of hearing aids, hearing aid accessories ,ear mould .					
6.	The questionnaire includes relevant items on indirect non-audiological costs such as travel, accommodation, and loss of wages.					
7.	The questions accurately address the overall financial burden faced by parents/caregivers in					

- managing a child with hearing loss.
8. Overall, the questionnaire demonstrates **good content validity** based on the objectives.

Practicality & Application

Sl.No	Questions	1 - Strongly Disagree	2 - Disagree	3 - Neutral	4 - Agree	5 - Strongly Agree
1.	The questionnaire items are practical and easy for parents/caregivers to understand.					
2.	The questionnaire is manageable in length and does not take excessive time to complete.					
3.	The questions are feasible to administer in clinical and research settings.					
4.	The response options provided are appropriate and easy for respondents to choose from.					
5.	The questionnaire is suitable for use across families with varied educational and socioeconomic backgrounds.					
6.	Overall, the questionnaire demonstrates strong practicality and applicability for real-world use.					

Overall User Experience

Sl.No	Questions	1 - Strongly Disagree	2 - Disagree	3 - Neutral	4 - Agree	5 - Strongly Agree
1.	The questionnaire is clear, well-presented, and easy to follow.					
2.	The layout, structure, and flow of the questionnaire enhance the overall user experience.					
3.	The instructions provided throughout the questionnaire are easy to understand.					
4.	The questionnaire feels user-friendly and convenient for parents/caregivers to complete.					

5. The overall experience of using this questionnaire meets expectations for clinical and research use.
-

Any other suggestions:

Expert signature

Expert Name

Expert Phone number