International Centre for Evidence in Disability

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Do hearing aids improve lives? An impact study among a low-income population in Guatemala

Research Summary Report
December 2016

International Centre for Evidence in Disability

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In Memoriam Blema Steinberg & H. Arnold Steinberg

World Wide Hearing would like to thank its donors, Grand Challenges Canada, The Bussandri Family Foundation and The Blema & Arnold Steinberg Foundation for their generous support in making this outcomes-based impact study possible.

Table of Contents

Section Title	Page Number
Key Research Findings	4
Executive Summary	5
Introduction	9
Guatemala: Key Facts	16
Methods	17
Results	24
Discussion	48
Conclusion	56
References	57
Appendix	63

Key Research Findings

People with hearing loss:

- ☐ Were significantly poorer than people without disabling hearing loss[1]
- ☐ Twice as likely to have symptoms of depression
- ☐ Had a significantly poorer quality of life

After receiving hearing aids:

- ☐ 82% were satisfied with their hearing aids
- ☐ 71% of people used them daily
- ☐ 78% used them for at least four hours per day

The use of hearing aids created a significant improvement in mental health & wellbeing, including:

- ☐ Reduction in moderate-severe symptoms of depression[2]
- ☐ 86% of case participants reported that hearing aids increased their self-confidence
- ☐ 88% of case participants reported that hearing aids had positively changed their enjoyment of life
- ☐ 23% felt safer wearing their hearing aids
- ☐ 56% reported that the most significant benefit of wearing hearing aids had been the ability to communicate with family and friends

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[1] Total household and per capita expenditure was over 74% higher in control households as compared to case households

[2] A reduction of 83% based on six case participants reporting moderate to severe symptoms of depression at baseline and one case at follow-up.

Executive Summary

"We have often been asked, 'What are the outcomes of hearing aids on people in low and middle income countries?'. We never had a quantitative answer to that question because the data simply did not exist. That is why this impact study is so important, for the purpose of sharing the results with the world and advancing the field of hearing loss."

Audra Renyi
Executive Director
World Wide Hearing Foundation International

Background

Hearing loss affects over 1.3 billion people worldwide and ranks second on the list of non-fatal, disabling impairments.[1] Geographically, 90% of people with disabling hearing loss [2] live in low & middle income countries.[3]

Hearing loss has both immediate and long-term consequences. It has been adversely linked to a poorer socio-economic status, impaired activities of daily living and employment, reduced mental health and quality of life.[4,5] Most of this evidence comes from research conducted in high income countries and data is lacking from the poorer parts of the world.

Hearing aids are considered to be the most effective and cost-effective way of improving the quality of life of hearing impaired people and may contribute to the economic independence of affected individuals.[6] However, few studies have looked at the positive impact of hearing aid interventions, in particular in a low or middle income country such as Guatemala.

Research Aim

The aim of this study is to assess the impact of hearing impairment and the provision of hearing aids on socio-economic status (poverty), mental health, quality of life and activity participation in Guatemala.

Methods

A controlled, before-and-after impact evaluation was conducted to assess the impact of: 1) Hearing loss and 2) Provision of hearing aids (the intervention).

Participants: Adults with a moderate-profound hearing impairment, living within urban and rural areas in and around Guatemala City, were identified by the Sonrisas que Escuchan Foundation. For each case, a matched age and gender control was selected and screened to confirm that they did not have disabling hearing loss.[3]

Baseline Data Collection: All cases and controls were interviewed using a structured questionnaire which asked questions about mental health, quality of life, activity participation and their socio-economic status.

Intervention: Cases with hearing loss were provided with hearing aids.

Follow-up: After a period of 6-9 months, cases and controls were re-interviewed to assess the impact of this intervention. In-depth qualitative interviews were conducted with a sample of subjects to complement the data gathered from the survey questionnaire.

Results

The study compared 206 cases with moderate to profound hearing loss and 146 control participants without disabling hearing loss. The results of the study at baseline indicate that compared to controls, case participants were:

- Significantly poorer, as measured by a 44% lower level of expenditure
- Spending 58% less on household items, 69% less on education but 33% more on health care products and services
- Significantly more likely to have a lower income (34%)
- Twice as likely to report depressive symptoms
- Significantly more likely to experience poor quality of life on a range of domains.

In addition, 78% of case participants described the emotional and social impact of hearing loss as disabling. Common reported barriers to uptake of hearing aids were affordability and lack of knowledge on where to access support.

[3] Inclusive of mild, non-disabling hearing loss.

At follow-up, after the cases had received their hearing aid(s), they:

- Reported significantly fewer symptoms of depression
- Had significantly improved quality of life across a range of domains
- Reported positive hearing aid experiences including improved communication with family and friends, feeling safer and more confident and increased effectiveness at work.
- Were satisfied with their hearing aids (82%).

Furthermore, the use of hearing aids was high, whether measured objectively, from the device usage data or through self-reporting. Most people (71%) used their hearing aids on a daily-basis and over three quarters (78%) used them for at least four hours per day.

There was no change in poverty level among the cases, as measured by expenditure. However, the expenditure level among controls declined between baseline and follow-up. External forces such as political fragmentation, reduction in public investment, increased poverty levels and insufficient GDP growth[7] may provide an explanation for these results, inferring that under more favourable economic conditions, case income and expenditure at follow up may have increased and that the hearing aids were protecting the cases from the economic losses experienced among the controls.

Discussion

Hearing loss has a substantial and broad ranging negative impact on the lives of people living in Guatemala, including their: economic status, mental health and quality of life. In less than a year of usage, hearing aids significantly improve mental health and quality of life. It is proposed that in the longer term, hearing aid provision may also reveal a positive impact on poverty alleviation.

Research Recommendations

Advocacy

To disseminate the findings of this research study amongst a wide range of community based, national and international stakeholders. Such open communication will generate awareness of hearing loss prevalence, promote an understanding of its impact and aim to encourage a positive change in practice, such as national ear-health policy development and greater hearing aid funding and provision.

Service Provision

The research findings indicate that people were satisfied with the ear health services provided by the Sonrisas que Escuchan Foundation and that commonly reported barriers to uptake of hearing aids was affordability and lack of knowledge.

Based on these outcomes, it is recommended that screening activities and hearing aid provision are scaled up and delivered to a wider population. Such activities should be based on the robust and comprehensive aural rehabilitation programme model currently employed by the Sonrisas que Escuchan Foundation. To improve access, such activities should be delivered using a community based, out-reach infrastructure, ensuring financially subsidised hearing aids are provided as part of an ongoing programme of support, guidance and device maintenance.

Further Research

The outcomes from this research project should act as a foundation and catalyst for further research. Therefore, it is recommended that a research strategy is developed that provides clear and systematic guidance as to the prioritized objectives, planning and implementation processes, resources and funding of such research.

Such future research may include:

- Further follow-up of cases after two and five years, to determine long-term impact on mental health, socio-economic status and quality of life.
- An assessment of how different methods of means testing and levels of subsidization of hearing aids affect accessibility, outcomes and usage.
- Examination of the impact of hearing impairment and hearing aid provision on social inclusion and the educational attainment of children living in Guatemala.
- Repetition of this primary impact study in other low and middle income countries, enabling comparative analysis and shared learning

Introduction

'At any age, disabling hearing impairment has a profound impact on interpersonal communication, psychosocial well-being, quality-of-life and economic independence'

Olusanya et al. (2014)[8]

World Wide Hearing is a non-profit organisation based in Canada. Its vision is to enable better hearing around the world through the provision of affordable hearing aids and services. World Wide Hearing works in collaboration with it's partners to support research which is critical to effectively addressing the impact of hearing loss within low and middle income countries. This research project was conducted by the International Centre for Evidence in Disability, part of the London School of Hygiene & Tropical Medicine, based in London, UK. In Guatemala City, a collaborative partnership was established with the Centre of Hearing and Phonetic Training and their charitable foundation, Sonrisas que Escuchan - 'Smiles that Listen'.

Prevalence of Hearing Loss

Hearing loss is very common and affects over 1.3 billion people worldwide.[1]

Disabling hearing loss (Defined in figure 1.0) affects 360 million people worldwide, representing 5% of the global population, including 32 million children and one third of all people aged 65 years and older.[9] This sensory deficit is one of the most prevalent and chronic health conditions in the world and ranks second on the list of non-fatal disabling impairments[1 10 11] Geographically, it is estimated that 90% of those affected by disabling hearing loss live in Low and Middle Income Countries (LMICs).[3] The number of people with hearing impairment is expected to increase further over the coming decades as the worldwide population continues to age and grow.[8,12 13]

Despite these global estimates, national data on the prevalence of hearing impairment within LMICs is lacking, because many countries struggle to conduct relevant population-based surveys using standardized protocols and classification methods.[8] As a consequence, there is limited public and governmental awareness of hearing loss, lack of funding and strategic planning at community and national level.[3] Fewer than 40% of low and middle income countries have a national management plan for ear and hearing health.[14]

Classification of Hearing Loss

Hearing is measured in decibels (dB) and hearing loss is defined by audiometric thresholds. Hearing loss is determined by measuring the softest level of sound that an individual can detect across a range of frequencies.[5] People with thresholds between 0 and 25 dB, across all frequencies are considered to have 'normal' hearing.[2]

The World Health Organisation has identified grades of hearing loss (Table 1.0) and defines disabling hearing loss as greater than 40 dB in the better hearing ear in adults (15 years or older) and greater than 30 dB in the better hearing ear in children (0 to 14 years).[15]

Figure 1: WHO Grades of Hearing Impairment [2,16] (Average: 0.5, 1, 2, 4 KHz in Better Ear)

Grade 0: None	25 dB or less	No/Slight Problems Hears whispers	
Grade 1: Slight/Mild	26-40 dB	Hears/repeats words in normal voice at 1 metre.	
Grade 2: Moderate	Child 31-60 dB Adult 41-60 dB	Hears/repeats words in raised voice at 1 metre.	Disabling Hearing Impairment
Grade 3: Severe	61-80 dB	Hears words shouted into better ear	
Grade 4: Profound	81 dB or more	Cannot hear/understand shouted voice	

Disabling hearing loss diminishes the ability to detect and localise sounds and recognize speech, adversely affecting the ability to communicate.[4]

Hearing loss may be caused by a range of congenital or acquired health conditions. This includes genetic causes, complications at birth, certain infectious diseases such as Measles, Meningitis, chronic ear infections, the use of ototoxic drugs and exposure to excessive noise.[9] The most common cause of sensorineural hearing loss affecting the function of the inner ear structures and auditory nerve, is age-related and known as Presbycusis.[17] This form of hearing loss is associated with the aging process and is characterized by progressive deterioration of auditory sensitivity, loss of the auditory sensory cells and central processing functions.[18] Age related hearing loss may be attributed to genetic predisposition and physiological deterioration caused by environmental factors and modifiable lifestyle behaviors that are sustained throughout the course of life.[5] To a large extent, therefore, hearing loss cannot always be avoided and so instead needs to be treated.

'When someone in the family has a hearing loss, the entire family has a hearing problem'

Dr. Mark Ross (1999)[19]

Impact of Hearing Loss

Hearing loss may have immediate and long-term consequences. The communication challenges associated with hearing loss, such as the inability to recognise or understand the spoken messages of others or frequently having to ask for information to be repeated, may lead the individual to withdraw from social activities and events. The person may find it difficult to fully participate in society, for example, engaging in work, attending school or accessing health services. Such participatory exclusion may have a socio-economic impact, leading to poverty, while also resulting in reduced intellectual and cultural stimulation and an increasingly passive and isolated existence with consequently poorer mental health and quality of life.[4] These impacts will not be the same for all people with hearing loss, but will depend on their environment, personal and social characteristics.[5] There is a general lack of information available on the impact of hearing loss, particularly in LMICs. The available evidence on the impact of hearing loss and how it affects people's lives is summarised below.

Participation & Poverty

Hearing loss is associated with poorer employment and educational opportunities and higher levels of poverty. An Australian survey showed that hearing loss was associated with a decreased rate of participation in employment of between 11-17%. People with hearing loss were also less likely to be found in highly skilled jobs and were over-represented among low income earners.[20] Similarly, a national survey conducted in the USA showed that people with hearing loss were three times more likely to have lower educational attainment as compared with those with normal hearing. Hearing loss was also independently associated with a lower income and unemployment or underemployment, which contributed to economic hardship.[21] [22] Similarly, in Brazil a cross-sectional household survey showed that people with hearing loss had on average fewer years of formal schooling and a lower income.[23] Further data from LMICs is lacking. From a national perspective, the economic burden of hearing impairment can be extremely large. [24] A study from the USA showed that

people were predicted to lose between $220,000 and $440,000 in earnings over their working life due to hearing loss, mostly due to reduced work productivity. It was estimated that people who experience severe to profound hearing loss before retirement, are expected to earn only 50% to 70% of their non–hearing-impaired peers. Another study from 40,000 households in the USA, [25] demonstrated that hearing loss negatively impacted on household income by an average of $12,000 per year, depending on the degree of hearing loss.

As these studies have demonstrated, unaddressed hearing loss may pose a considerable economic burden on the person and their family, the wider community and the country. This economic burden is attributed to loss of earnings and productivity and increasing demands for health care services and education.[26]

Mental Health & Wellbeing

Hearing loss may also contribute to poorer mental health and well-being, as demonstrated by studies from high income settings. A USA study showed that hearing loss was significantly associated with depression, particularly in women.[27] Similarly, in a large-scale health screening survey in Norway, hearing loss was associated with substantially poorer ratings for depression and self-esteem amongst young and middle-aged individuals. Possible explanations given for this association were that hearing loss may produce social isolation, distorted communication and in some cases stigmatisation which may affect mental health and quality of life.[28] In recent years, hearing loss has also been associated with poor cognitive performance and the development of cognitive decline and dementia. [29 30]

Quality of Life

Hearing loss may also be related to poorer quality of life. A survey among older adults in the USA showed that the severity of hearing loss is significantly associated with reduced quality of life. Participants with moderate to severe hearing loss were almost eight times as likely as those without hearing loss to have self-reported difficulties with communication. Hearing loss was also associated with reduced functionality and impacted on activities of daily living such as shopping, preparing meals and talking on the telephone.[31] Limited data is available from low and middle income settings. One study conducted in Yemen showed that self-reported quality of life was significantly

lower among people with hearing loss. This difference was attributed to feelings of isolation, lower productivity, self-esteem and decreased social activity participation. [32] Hearing loss may also impact on the people that the hearing impaired person lives with, such as their wife, husband or partner otherwise known as their significant other.[33] The significant other is usually the main communication partner and can play an important role as the primary influencer and motivator for accessing and actively participating in audiological rehabilitation. [34]

In summary, this review of the literature has identified the multifaceted impact of hearing loss and demonstrated the causative link to impaired activities of daily living, a reduced quality of life, diminished mental well-being and economic disadvantage.
Yet it has also demonstrated that little information is available from low resource settings.

'About half of the incidence of hearing impairment in all age groups could probably be avoided via known and proven methods'

(WHO, 2013)[16]

Hearing Loss Intervention

Aural rehabilitation aims to reduce hearing loss–induced deficits of function, activity participation and quality of life through sensory management, instruction, perceptual training and counseling.[35] Sensory management may be addressed through the provision of technological devices, such as hearing aids, whilst instruction involves teaching people how to effectively use technology and create optimal listening environments. Perceptual training can improve the types of listening skills needed to enhance speech perception and counseling can be used to manage any residual limitations and encourage social participation.[5]

Of these interventions, the provision of hearing aids is most common. The hearing aid is designed to receive, amplify and modulate sound for the wearer. As part of an aural rehabilitation programme, hearing aids are considered the most effective and cost-effective way of making a major difference to the quality of life of hearing impaired people and may contribute to the economic independence of affected individuals.[36] Of the few, small scale studies that have been conducted in LMICs, [37,38] the use of hearing aids have been shown to improve quality of life and mental health.

Despite the potential positive impacts of hearing aids, there are currently large gaps in coverage and accessability. The international production and supply of hearing aids meets less than 10% of global need and within LMICs, less than 3% of those who need hearing devices have access.[3] Such low coverage may have a large societal impact. A study from USA estimates that for the 24 million hearing-impaired individuals who do not use hearing aids, the impact of untreated hearing loss is quantified as loss of earnings, in excess of $100 billion annually. [25] The cost to society may exceed $18 billion due to unrealised taxes.

The reason for such polarized usage is that in LMICs the cost of acquiring and maintaining such devices remains prohibitive for most potential users.[8] Equally, within LMICs 80% of people with hearing loss cannot access hearing healthcare services because audiologists or other healthcare workers are unavailable.[3] Even when hearing aids are available, however, this does not translate into their use. In the USA, the majority (80%) of adults aged 55 – 74 years who would benefit from a hearing aid, do not use them.[39] Identifying factors that affect hearing aid usage are therefore necessary for devising appropriate rehabilitation strategies to ensure greater use of hearing aids.

'The psychological, physical and social consequences of a hearing impairment, together with its high prevalence make it a major public health concern.'

Zhan et al., 2009 [40]

Current Position

This review of the literature has provided an overview of the existing knowledge base. The key drivers and priorities for this research project have been formulated from this synthesis.

- The prevalence of hearing loss is high, particularly in LMICs.
- This prevalence is likely to increase further in ageing populations.[8]
- Hearing impairment is adversely linked to socio-economic status, impaired activities of daily living, employment, reduced quality of life and mental well-being.
- Hearing aids can alleviate the negative consequences of hearing loss and are highly cost-effective.

- The studies that have investigated the impact of hearing loss and hearing aids are predominantly from high income settings. Only a limited number of small studies have been undertaken in LMICs.
- Many people who are offered hearing aids, or have received them, may not use them regularly.[39] The main reasons for this are not fully understood and few empirical studies have been undertaken to assess the barriers to use.

This research project aims to fill these evidence gaps around the impact of hearing loss and the potential benefits of hearing aids. The outcomes from this research will provide an evidence-based foundation from which audiological rehabilitation programme planning is facilitated, intervention and user expectation management is supported and advocacy, programme funding, resource allocation and wider health-system development is actively promoted.

Research Aim

The aim of this study is to assess the impact of hearing impairment and the provision of hearing aids on socio-economic status (poverty), mental health, quality of life and activity participation in Guatemala.

Objectives

Based on an adult population in Guatemala, Central America:

1. Compare socio-economic status, quality of life, mental health and functional activity participation between individuals with hearing loss and age, sex-matched adults with normal hearing.
2. Evaluate the impact of hearing aid provision on socio-economic status, mental health, quality of life and functional activity participation.
3. Assess clinical auditory measures, before and after hearing aid provision and intervention
4. Explore the barriers and facilitators to uptake and usage of hearing aids.
5. Assess patient satisfaction with hearing aids.

Guatemala: Key Facts

The Republic of Guatemala has a growing population of over 15.5 million people [57] and is the most populous country in Central America, with a GDP per capita, approximately half the average for Latin America and the Caribbean. The agricultural sector accounts for 13.6% of GDP and 31% of the labour force; key agricultural exports include sugar, coffee, bananas, and vegetables.[58]

Guatemala has one of the highest inequality rates in the Latin American & Caribbean region. The distribution of income remains highly unequal with the richest 20% of the population accounting for more than 51% of Guatemala's overall consumption. More than half of the population is below the national poverty line and 23% of the population lives in extreme poverty. [58]

Guatemala is heavily burdened by communicable, maternal, neonatal and nutritional diseases. Nearly one-half of Guatemala's children under age five are chronically malnourished, representing one of the highest malnutrition rates in the world.[58]

Life expectancy is amongst the lowest in Central America and the Caribbean at 72 years. Cardiovascular and respiratory conditions (13.3%) are ranked as the top causes of death in Guatemala. 12.8% of total deaths are attributed to violence, the second highest rating in the world. There is also an increasing magnitude of mental health disorders and a high rate of suicide.[21]

Health expenditure represented as a total percentage of GDP (2013) is 6.4 as compared with the UK and Canada at 9.1. Guatemala has the lowest health worker density in Central America with 12.5 health workers per 10,000 population. This represents only half of the 22.8 per 10,000 population ratio that the WHO recommends as the bare minimum for a functioning health system. The number of physicians per 1000 people in 2009 was 0.9.[59] Accessibility to health workers is more than eight times greater for patients in urban areas than in rural areas, demonstrating inequalities in health service accessibility.[21]

No current or reliably sourced data regarding the epidemiology of hearing loss in Guatemala was identified. The availability of information about the prevalence and incidence of hearing impairment in Latin American countries remains very limited.[60]

Methods

Overview of Research Methods

A controlled, before-and-after impact evaluation was conducted to assess the impact of hearing loss and of provision of hearing aids (the intervention). Adults with a hearing impairment were identified and for each case, a matched age and gender control was selected and screened for normal hearing or non-disabling hearing loss. All cases and controls were interviewed using a structured questionnaire which explored quality of life, mental health, activity participation and their socio-economic status. Cases with hearing loss were provided with hearing aids. 7.5 months later, cases and controls were re-interviewed to assess the impact of this intervention. In-depth qualitative interviews were conducted with a sample of subjects to complement the data gathered from the survey questionnaire.

Research Project Organisation

This research project was funded by World Wide Hearing and conducted by the International Centre for Evidence in Disability, part of the London School of Hygiene & Tropical Medicine. Collaborative partnerships were formed with two charitable organisations in Guatemala, with the aim of facilitating effective project management. The Sonrisas que Escuchan Foundation is a social outreach programme managed by the Centre of Hearing and Phonetic Training based in Guatemala City. The team of audiologists and technicians fulfilled a critical role in auditory screening and identifying eligible cases for the study. The foundation also fitted the hearing aids and provided ongoing aural rehabilitation and device maintenance. A collaborative partnership was also established with a Guatemalan Deaf-Blind School, known as FUNDAL, to support administrative and financial management functions.

Fieldwork Team and Training

The field-based research team was comprised of six, full-time Interviewers, one Lead Interviewer & Translator and a Project Manager. In September 2015, prior to the commencement of the primary, pre-intervention phase of the fieldwork, the research team participated in a modular training and development programme that prepared them for conducting effective interviews, auditory screening tests and competently

managing research data. The Interviewers were paired and divided into three functional sub-teams in order to address safety and security transportation concerns. Work assignment, performance management and ongoing support and guidance was provided by the Research Lead and Project Manager.

Case Selection

206 people with disabling hearing loss ('cases') were identified through the activities of the Sonrisas que Escuchan Foundation, Guatemala City. This process involved assessing each candidate within the clinic, performing an aural examination and a sequence of audiometric hearing tests. As identified in Figure 2.0, cases to be included in the research project were selected based on pre-determined research criteria. This study was investigating the impact of hearing loss on such factors as socio-economic status, employment, mental health and quality of life and therefore adult participants were selected. (i.e. aged 15 years and over) Eligibility for financially subsidized hearing aids was based on the subjectively informed socio-economic suitability criteria, determined by the Sonrisas que Escuchan Foundation Executive Director during the preliminary interview and clinical assessment process.

Figure 2.0

Parameter	Case Specific Research Inclusion Criteria
Gender	Male or female
Age	Adult (Aged 15 & Above)
Hearing Test Outcome	Unilateral or bilateral hearing loss Loss classified within the following range: ▪ Moderate (41dB-60dB) ▪ Severe (61-80dB) ▪ Profound (Over 81dB)
Socio-Economic Status	Unable to independently finance and access aural rehabilitation services
Geographical Location	Live within urban or rural areas within a 150 KM radius of Guatemala City

Control Selection

In order to identify a matched control group, each case participant was requested to identify three neighbors or people living in their community of a similar age (+/- 5 years) and of the same sex. All potential controls underwent an electronic tablet-enabled auditory screening test in their home to assess whether the candidate had any pre-existing, undiagnosed hearing loss. All participants with 'normal' or 'mild' hearing loss (0-40dB) were included as 'controls' in the study. Participants who presented with disabling hearing loss (measured as 41dB and above) were excluded from the control group and offered a referral and follow-up assessment at the Sonrisas que Escuchan Foundation.

Interview Process

All case and control participants were interviewed in their home by a paired fieldworker sub-team based on a pre-scheduled appointment. A structured and standardised questionnaire format was utilised which was verbally administered in Spanish. The participant responses were recorded on an electronic tablet. The questionnaire may be reviewed in Appendix I. To address the key research objectives, the questionnaire was comprised of the following specific question sets:

- ***Activity and Participation:*** Based on the International Classification of Functioning, Disability and Health, (WHO 2001) the UN Washington Group developed a functional measure of disability. This short version of the questionnaire assesses activities of daily living and the core universal elements of sensory function, cognition and mobility. Furthermore, people were asked about the activities undertaken in the previous 24 hours (e.g. sleeping, working, looking after children), and their approximate duration.

- ***Quality of Life:*** Quality of life is defined as an individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.[41] Quality of life was measured using the WHOQOL-BREF (WHO, 2002), which includes twenty-six questions divided into four domains. The domains include, physical and psychological health, social relationships and the environment.

- ***Mental Health:*** The Patient Health Questionnaire was used to measure depression, as it is a validated mental health screening tool.[42] As recommended, each person was asked the first two questions, and if they scored positively for depression, the remaining seven questions were administered.

- ***Socio-Economic Status & Poverty Measures:*** In order to capture the complexities of poverty, this question set utilises an adapted multi-dimensional approach to poverty measurement.[43] Questions were based on the multiple, concurrent elements of deprivation such as poor health, lack of education, inadequate living standards, amenities and poor quality of work. A detailed analysis of household expenditure was incorporated within this question set to produce a measure of per capita and household expenditure as a proxy measure for income.

- ***The Hearing Handicap Inventory for Adults (HHIA):*** The Hearing Handicap Inventory for Adults[44] is a 25-item self-assessment questionnaire, designed to measure the emotional, social and situational impact of hearing loss.

- ***Self-Assessment of Communication & Significant Other Assessment of Communication:*** These two complementary question sets[45] are designed to identify and characterise hearing loss and to be used as hearing aid outcome tools. The questionnaire structure is based on the WHO International Classification of Functioning and Disability[46] and focuses on activity limitation, participation restriction and the impact on social and emotional aspects of quality of life.

Questionnaire Development

The production of the baseline and follow up questionnaire involved several developmental key stages, including; stakeholder reviews, multiple content and structural revisions, pilot testing, language translation and electronic tablet formatting.

Hearing Aid Intervention

Upon completion of the baseline interview, all case participants were contacted by the Sonrisas que Escuchan Foundation and invited to visit the clinic to have their hearing aids fitted.

The type of hearing aid used for this research project was a 'Phonak Baseo Q15'. This is a basic four-channel, behind-the-ear device that supports a wide range of hearing loss from moderate to profound. Hearing aid selection was based on identifying a quality device from a dependable and recognised brand. This standardised model was consistently fitted on all cases.

A total of 376 hearing aids were purchased from the manufacturing company. The Sonrisas que Escuchan Foundation charged each case participant $50 USD, per aid which contributed to the cost of the device, batteries and follow up care.

During the fitting, participants were given the necessary supporting equipment and resources, such as a supply of batteries, protective case, de-humidifying dryer as well as ongoing access to maintenance and repair services. Guidance and support in the use and care of their hearing devices was provided verbally. To encourage and support hearing aid usage, participants were contacted frequently and encouraged to re-visit the clinic monthly to check the functionality of their devices. At this time, operational hearing aid usage data was captured, battery supplies replenished and a hearing aid inspection conducted.

Follow-up Post Intervention

Following a variable 6 – 9-month period of hearing aid ownership and potential usage, in July & August 2016 all case and control participants were revisited and a post-intervention interview and structured questionnaire was completed. The same questionnaire was administered as at baseline, with the addition of some new modules. In order to evaluate the impact of hearing aid fitting and the wider aural rehabilitation process, the International Outcome Inventory for Hearing Aids (IOI-HA) was integrated into the post-intervention questionnaire.[47] The inventory comprises of seven functional and contextual domains, including daily usage, benefit, residual activity limitations, satisfaction, residual participation restrictions, impact on others and quality of life. An adapted set of questions also explored and evaluated non-usage factors, device features, most significant benefits and safety and security concerns.

Analysis of Quantitative Data

Baseline: The proportions of baseline variables were summarized within cases and controls and the proportions compared using a logistic regression (adjusted for age and sex), with case/control status as the outcome.

Follow-up: A paired t-test was used to compare the mean quality of life scores and expenditure before and after the intervention. A McNemars test was used to compare the baseline proportions with the follow up proportions of employment and depression. Where the outcome of interest was an ordered categorical variable (depression category and asset quartile) a Wilcoxon signed-rank test was used to test any difference between baseline and follow up. All these tests were conducted separately for the cases and the controls.

Qualitative Research

The in-depth, qualitative interview process aimed to provide a detailed insight and contextual exploration of the effect of hearing loss. It sought to identify the enablers and barriers to uptake and the functional impact and self-perceived benefits of hearing aid use. A convenience based sample of twenty participants were identified and selected during the post intervention interview process. It was ensured that these participants included people with a range in demographic characteristics (age, geographical location, employment status) and hearing impairment severity.

The qualitative interviews followed a structured schedule and question format and lasted approximately 45 minutes. The interview questions and responses were verbally translated using an interpreter. The responses were audio-recorded and then electronically translated and transcribed. For the purposes of analysis, the transcripts were uploaded into a password protected NVIVO software project file and documented under a coded case name. Files were generated for each interview question and the participant responses selectively coded. Following an extensive review of the dataset, emergent themes were generated and cross-referenced with the questionnaire data responses and academic literature. The outcome of this qualitative analysis is presented in this report as a series of respondent quotations.

Ethics

All research activities were conducted in accordance and compliance with the procedures identified by the London School of Hygiene & Tropical Medicine Ethics Committee and the Local Ethics Board known as Zugueme Comite Etica Independiente, based in Guatemala City. With joint institutional approval the following key practices were implemented:

- ☐ All case and control participants were invited to participate on a voluntary basis and were free to withdraw their participation at anytime.
- ☐ All interviewed participants were provided with verbal and written information explaining the purpose and objectives of the project
- ☐ All participants were required to read an explanatory document and complete a signed consent form.
- ☐ All information provided by the respondent via the structured interview remained private and confidential.
- ☐ Data was stored on a password protected electronic tablet and automatically erased once the data was sent to the encrypted and password protected server.
- ☐ The Project Manager held all information on a password protected laptop and all document data was stored under an internal password.
- ☐ No personal information was shared with any third party and all reported data was anonymised.

Results

The pre-intervention, baseline phase of this research project identified 349 participants, 206 cases with hearing loss and 143 controls with normal hearing or non-disabling hearing loss. 80% of the case participants had a bilateral hearing impairment. 47% of cases had a moderate impairment, 41% were classified with moderate-severe and 11% had profound hearing loss. 45% of case participants had not previously sought other forms of help or auditory rehabilitation. The key reasons for this was lack of financial affordability and not knowing where to access support services.

Table 1: Characteristics of Cases and Controls (Baseline)

Baseline Characteristics		Cases	Controls	Age-Sex Adjusted OR (95% CI)	p-value
Age	<40	32 (16%)	28 (19%)	Baseline	<0.001
	40-49	20 (10%)	25 (17%)	0.7 (0.3,1.5)	
	50-59	33 (16%)	43 (29%)	0.7 (0.3, 1.3)	
	60-69	60 (29%)	37 (25%)	1.4 (0.7, 2.7)	
	70+	62 (30%)	13 (9%)	4.1 (1.9, 9.0)	
Gender	Male	114 (55%)	71 (49%)	Baseline	0.48
	Female	93 (45%)	75 (51%)	0.8 (0.5, 1.3)	
Marital Status	Single	47 (23%)	32 (22%)	Baseline	0.45
	Married / Living Together	123 (59%)	89 (61%)	0.8 (0.4, 1.4)	
	Divorced / Separated	8 (4%)	12 (8%)	0.4 (0.1, 1.3)	
	Widowed	29 (14%)	13 (9%)	0.7 (0.3, 1.6)	
Literacy	Not at all	13 (6%)	5 (3%)	Baseline	0.72
	Little	22 (11%)	13 (9%)	0.8 (0.2, 3.1)	
	Well	172 (83%)	128 (88%)	0.7 (0.2, 2.1)	
Education Level	No Education	16 (8%)	7 (5%)	Baseline	0.94
	Primary	68 (33%)	51 (35%)	0.9 (0.3, 2.5)	
	Secondary/ University	123 (59%)	88 (60%)	1 (0.3, 2.8)	

Disability	No	85 (41%)	112 (77%)	Baseline	<0.001
	Yes	122 (59%)	34 (23%)	4 (2.6, 7.3)	
Disability (Except Hearing)	No	113 (55%)	112 (77%)	Baseline	0.001
	Yes	94 (45%)	34 (23%)	2.3 (1.4, 3.9)	
Living Conditions Score					
Quartile 1 (Low)		47 (23%)	42 (29%)	Baseline	0.65
Quartile 2		55 (27%)	35 (24%)	1.2 (0.7, 2.3)	
Quartile 3		70 (34%)	39 (27%)	1.4 (0.7, 2.5)	
Quartile 4 (High)		35 (17%)	30 (21%)	0.9 (0.5, 1.9)	
Asset Score					
Quartile 1 (Low)		57 (27%)	32 (22%)	Baseline	0.29
Quartile 2		54 (26%)	34 (23%)	0.8 (0.4, 1.5)	
Quartile 3		54 (26%)	36 (25%)	0.7 (0.4, 1.4)	
Quartile 4 (High)		42 (20%)	44 (30%)	0.5 (0.3, 1.0)	

Table 1.0 identifies the key characteristics of the case and control participants. The data shows that over 80% of all research participants were older than 40 and more than half of the cases (59%) were aged 60 years or above. Both genders were equally represented. Cases and controls were generally well matched on gender, but cases were significantly older than control subjects. The majority of case and control subjects were married. Case and control participants generally reported a high level of literacy and the majority had received some form of secondary education. Almost 60% of all case participants perceived that they had a disability[4] of which, 45% identified other forms of disability in addition to difficulties with hearing (e.g. difficulty with walking, vision, functional self-care, understanding or communicating). In comparison, less than a quarter of the control group reported a disability. The socio-economic status of the participants was described by characteristics such as household living conditions and asset ownership and these were very similar for both cases and controls. The

[4] Disability was measured, according to the Washington Group Short Set, as reports of at least 'a lot of difficulty' in the domains of hearing, seeing, walking, self-care, communicating and/or understanding.

quartiles indicate the position of each case and control relative to the other subjects, ranging from a *high* number of assets or better living conditions to low or poorer. There was a trend for less ownership of household assets among cases than controls, but this did not reach statistical significance.

Table 2: Employment

Employment	Response	Cases	Controls	Age-sex adjusted OR (95% CI)	p-value
Any Type of Work In Last 4 Weeks	No	102 (49%)	56 (38%)	(Baseline)	0.67
	Yes	105 (51%)	90 (62%)	0.9 (0.56, 1.46)	
Looking / Ready for Work in Last 4 Weeks (Amongst Only Those Without Work)	No	88 (86%)	50 (89%)	(Baseline)	0.38
	Yes	14 (14%)	6 (11%)	1.7 (0.53, 5.27)	
				Age-Sex Adjusted Mean Difference	
Annual Income of Individuals US$ (000's)	Median (IQR)	2.1 (0.0, 4.8)	3.2 (0.9, 6.4)	2.0 (0.45, 3.66)*	0.01
Total Annual Household Income US$ (000's)	Median (IQR)	5.3 (3.0, 10.4)	6.9 (3.8, 13.8)	2.56 (0.12, 5.0)*	0.04
Income of Individuals US$ Per Day	Median (IQR)	5.7 (0.0, 13.2)	8.8 (2.5, 17.5)	5.6 (1.2, 10.0)*	0.01
Household Income US$ Per Day	Median (IQR)	14.5 (8.3, 24.5)	19.0 (10.5, 38.0)	7.1 (0.34, 13.8)*	0.04

*Mean difference (95% CI)

Table 2 shows employment status among cases and controls. 62% of the control group were in paid work and contributed to the household income. By comparison, just over half of all case participants were in employment although this difference did not

reach statistical significance. Individual earnings were significantly lower among the cases than the control group (overall 34% less). The lower earnings were reflected in the annual household income which was identified as (30%) significantly lower for case participant households than control households.

Table 3: Expenditure

Expenditure Products & Services		**Cases**	**Controls**	**Age-Sex Adjusted Mean Difference (95% CI)**	**p-value**
Average Monthly Spend Mean US$ (SD)	Other	73 (103)	178 (418)	90 (28, 152)	0.004
	Food	131 (131)	154 (134)	18 (-11, 47)	0.23
	Household	59 (67)	142 (278)	78 (37, 119)	<0.001
	Entertainment	10 (18)	18 (38)	7 (0.4, 13)	0.04
	Healthcare	35 (82)	25 (53)	-7 (-23, 9)	0.41
	Education	13 (58)	42 (133)	24 (2, 45)	0.03
	Tax, Legal Fees & Insurance	6 (16)	12 (37)	6 (0.4, 12)	0.04
	Total Household Expenditure	328 (306)	571 (767)	216 (96, 337)	<0.001
	Total Per Capita Expenditure	99 (102)	176 (323)	75 (26, 124)	0.003
Categories of Per Capita Expenditure				**Age-Sex Adjusted OR (95% CI)**	**p-value**
	Quartile 1 (Low)	52 (25%)	37 (25%)	Baseline	0.03
	Quartile 2	58 (28%)	30 (21%)	1.34 (0.71,2.55)	
	Quartile 3	56 (27%)	32 (22%)	1.12 (0.59,2.12)	
	Quartile 4 (High)	41 (20%)	47 (32%)	0.55 (0.29,1.03)	

Table 3 explores expenditure by household. Expenditure is used as a measure of household wealth. Overall, total household expenditure and per capita expenditure was over 74% higher in control households than case households, reflecting the greater wealth of control households. There were also key differences between case and controls on specific categories of expenditure. Control participants spent more than double the amount on household items (such as furniture and home repairs) and 80% more on entertainment. (Cable TV, hobbies & interests) Controls also spent three times more on education. By contrast, cases spent 33% more on healthcare. Expenditure on food was similar across the two groups.

Table 4: Activity-Time Usage

Overall Mean % Time Spent:	Cases	Controls	Age & Sex Adjusted Mean Difference (95% CI)	p-value
Household Tasks	38%	31%	9.3% (2.8%, 15.8%)	0.005
Paid/Self Employment	8%	10%	-2.3% (-7.5%, 3.0%)	0.40
Household Work	5%	5%	-1.0% (-4.1%, 2.2%)	0.55
Social Visits	13%	12%	2.0% (-3.3%, 7.4%)	0.46
Leisure Activities	28%	34%	-8.4% (-15.3%,-1.4%)	0.02
Daytime Sleeping	5%	4%	0.9% (-2.0%, 3.8%)	0.55
Other	3%	4%	-0.6% (-3.5%, 2.3%)	0.68
Males				
Household Tasks	24%	18%	7.9% (-0.1%, 16.0%)	0.05
Paid/Self Employment	12%	12%	-1.2% (-9.7%, 7.3%)	0.79
Household Work	6%	7%	-1.5% (-6.8%, 3.8%)	0.58
Social Visits	14%	13%	2.8% (-5.6%, 11.1%)	0.51
Leisure Activities	35%	40%	-6.2% (-17.2%, 4.8%)	0.27
Daytime Sleeping	5%	5%	-0.1% (-5.1%, 4.8%)	0.95
Other	5%	6%	-1.7% (-6.7%, 3.3%)	0.51
Females				
Household Tasks	55%	44%	10.8% (0.5%, 21.1%)	0.04
Paid/Self Employment	5%	9%	-3.7% (-10.0%, 2.7%)	0.26
Household Work	2%	3 %	-0.3% (-3.7%, 3.1%)	0.87
Social Visits	12%	11%	1.8% (-5.1%, 8.7%)	0.61

Leisure Activities	20%	28%	-10.8% (-19.7%,-1.9%)	0.02
Daytime Sleeping	4%	2%	1.9% (-1.3%, 5.1%)	0.24
Other	2%	3%	0.2% (-2.9%, 3.3%)	0.89

Table 4 explores the range and time spent engaged in activities of daily living. Cases spent more of their time on household tasks (E.g. cooking, cleaning & caring for family members) and engaged in fewer leisure activities than controls. There were no other clear differences in patterns of activity engagement between cases and controls and these trends were broadly similar among males and females.

Table 5: Depression

Mental Health		**Cases**	**Controls**	**Age & Sex Adjusted OR (95% CI)**	**p-value**
Depression	No	202 (98%)	142 (97%)	1 Baseline	0.55
	Yes	5 (2%)	4 (3%)	0.65 (0.16, 2.69)	
Depression (Symptoms)	Not	143 (69%)	128 (88%)	1 Baseline	0.02
	Minimal	40 (19%)	11 (7%)	2.85 (1.35, 6.04)	
	Minor	17 (2%)	5 (3%)	2.59 (0.86, 7.79)	
	Moderate->Severe	7 (3%)	2 (1%)	1.68 (0.32, 8.88)	

Table 5 displays the self-reported mental health scores for the screening of depression using the Patient Health Questionnaire. The results show that few participants, whether cases or controls, reached the threshold for a diagnosis of depression. In contrast, mental health symptoms of depression, expressed as a severity classification ranging from 'minimal – severe' were more common, and significantly more prevalent among cases (24%) than control participants (11%). Overall, cases were approximately twice as likely to experience depressive symptoms as controls. When asked, '*In the last two weeks how often have you felt down, depressed or hopeless'?* As represented in the graph below, over a third (38%) of cases reported 'several days' or more compared to 18% of controls.

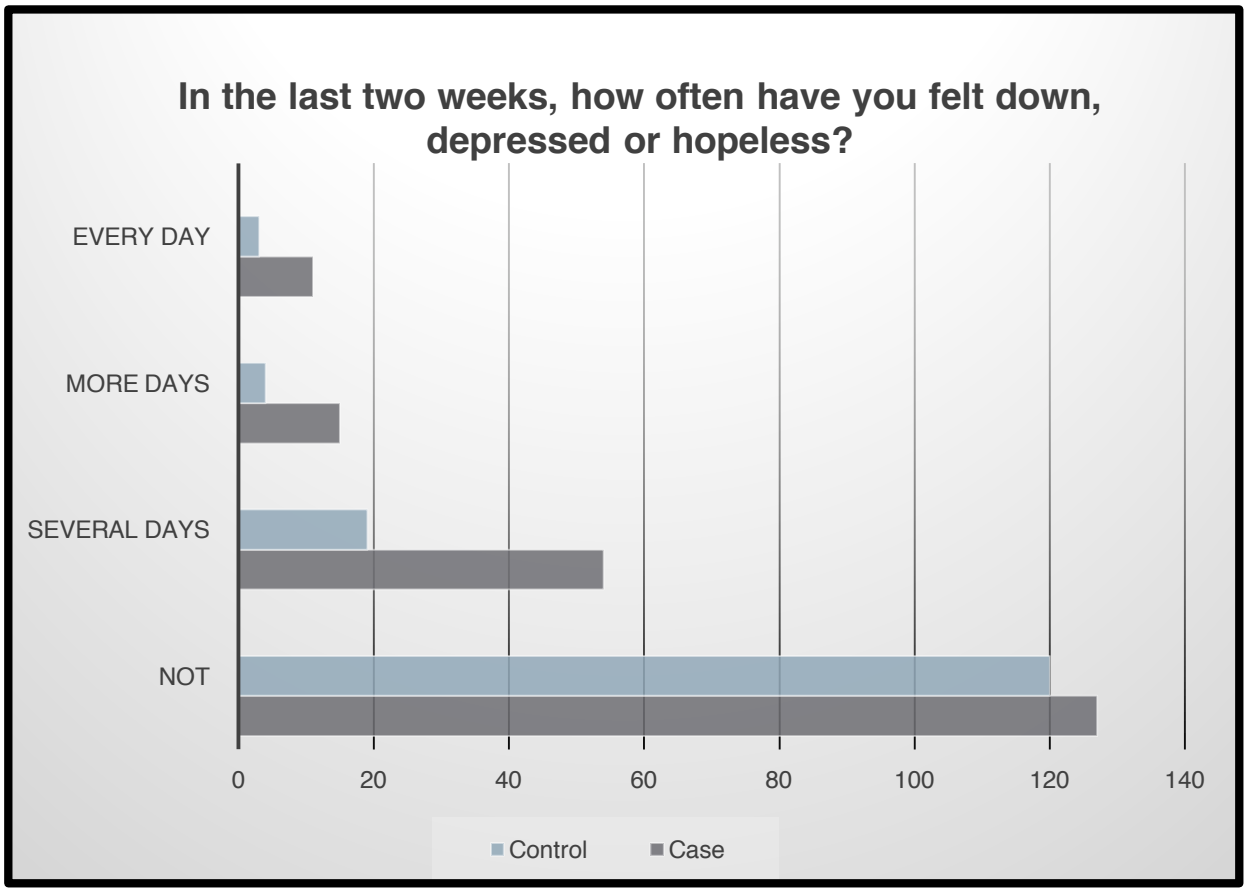


Table 6: Quality of Life

Quality of Life	Cases Mean (SD)	Controls Mean (SD)	Mean Difference (95% CI) Adjusted for Age and Gender	p-value
Overall Quality of Life	3.6 (0.9)	3.8 (0.7)	-0.20 (-0.39, -0.02)	0.03
Overall Health	3.3 (1.0)	3.7 (0.9)	-0.34 (-0.55, -0.14)	0.001
Physical	14.6 (2.4)	15.8 (2.2)	-0.90 (-1.37, -0.42)	<0.001
Psychological	14.6 (2.1)	15.0 (2.2)	-0.33 (-0.79, 0.14)	0.17
Social Relationships	15.3 (2.3)	15.9 (1.9)	-0.66 (-1.13, -0.19)	0.006
Environmental	12.8 (1.9)	13.5 (1.7)	-0.78 (-1.19, -0.38)	<0.001

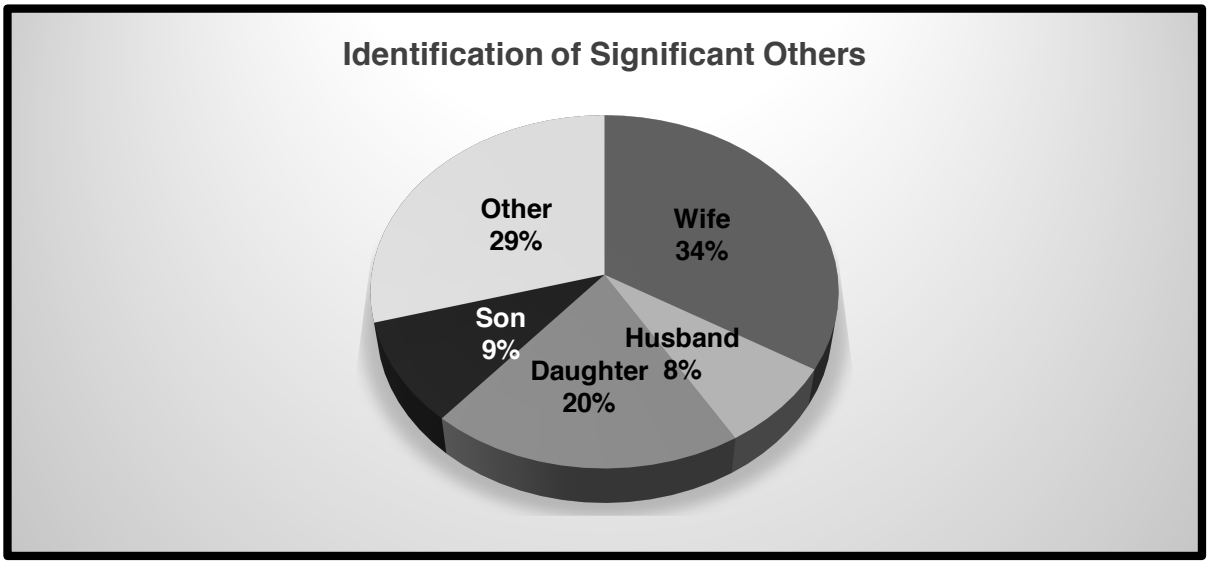
Table 6 identifies the overall and domain scores for subjective quality of life. The data demonstrates that cases had significantly poorer quality of life in most domains compared to controls, with the exception of psychological quality of life.

Table 7: Self Assessment of Hearing

Assessment of Hearing	Cases Mean (SD)
Overall Score (Out of 100)	47.4 (30.0)
Social Score (Out of 48)	20.8 (14.8)
Emotional Score (Out of 52)	26.4 (16.2)
Assessment Outcome	**Cases N (%)**
No Handicap	45 (22%)
Mild-Moderate Handicap	52 (25%)
Significant Handicap	109 (53%)

The Hearing Handicap Inventory for Adults measures the self-reported emotional and social impact of hearing loss. The data in Table 7 shows that over 78% of all cases reported that they had a 'handicap[5]' rated from mild-significant of which, over half of all cases reported a 'significant' handicap'.

Figure III: Significant Others



[5] The wording of the original questionnaire was used, while understanding that the word 'handicap' is no longer acceptable.

Table 8: Baseline Impact of Hearing Loss: Cases vs Significant Other

CASE-Mean (SD)	SIGNIFICANT OTHER-Mean (SD)	DIFFERENCE	P-VALUE
65.9 (2.0)	71.1	5.2 (2.5, 7.9)	0.0002

Figure III identifies the wife of the case participant as the most frequently reported significant other and Table 8 shows that at baseline there is strong evidence that the significant others of cases rate hearing loss as having a higher impact (worse scores) than the case participants themselves. (p=0.0002)

During an in-depth interview, the daughter of a male agricultural farmer described her father's challenges with hearing loss;

'I am very concerned because he doesn´t go out, he says he doesn´t go out even to funerals, because he can´t hear and is ashamed to ask people to repeat again - 'He is invited to baptisms, funerals, weddings, birthdays, communions but he doesn´t go out.'

Summary of Baseline Results

Compared to controls without disabling hearing loss, cases with hearing loss:

- ☐ Were significantly poorer, as measured by income and expenditure
- ☐ Spent more money on health care products and services
- ☐ Had more depressive symptoms
- ☐ Had poorer quality of life across a range of domains
- ☐ Spent more time performing household tasks, but did not differ in other activities
- ☐ Perceived that the emotional and social impact of their hearing loss was high

Results: Follow-Up

The post-intervention fieldwork was conducted in July - August 2016. A total of 253 follow-up interviews were completed, including 159 cases (79% of Baseline) and 94 controls. (64% of Baseline). There were few differences between those cases and controls who were followed up and those who were not. A total of 22 in-depth qualitative interviews were conducted, representing both genders and a 27 to 80-year-old age range.

Hearing Aid Usage

The willingness of cases to make the subsidised payment for the hearing aid demonstrated their commitment to the aural rehabilitation programme. Hearing Aid use was generally high. The majority (71%) of case participants used their hearing aids on a daily basis and over three quarters (78%) used them for at least four hours per day. In table 1.0 *actual* hearing aid usage data, which was downloaded from the device during a follow-up clinic appointment is compared with self-reported hearing aid use which was captured at interview. The table demonstrates that the majority (60%) of case participants accurately reported their hearing aid use. The prevalence of over (23%) or under (17%) reporting was 40%.

Table 1: Self Reported & Actual Levels of Hearing Aid Usage

		Self-Reported Usage			
	Usage	<1 Hour	1- 4 Hours	4-8 Hours	8-16 Hours
Actual Usage	<1 Hour	0	0	1	1
	1-4 Hours	5	7	6	7
	4-8 Hours	4	3	11	15
	8-16 Hours	1	0	9	60

Over Report Usage
Under Report Usage

Table 2: Quality of Life

	Cases				Controls			
	Baseline (SD)	Follow Up (SD)	Mean Difference (95% CI)	p-value	Baseline (SD)	Follow Up (SD)	Mean Difference (95% CI)	p-value
Overall Quality of Life	3.6 (0.9)	3.8 (0.9)	0.20 (0.05, 0.35)	0.01	3.8 (0.7)	3.9 (0.7)	0.04 (-0.11, 0.20)	0.56
Overall Health	3.4 (1.0)	3.7 (0.8)	0.36 (0.21, 0.51)	<0.001	3.7 (0.8)	3.7 (0.8)	0.04 (-0.16, 0.25)	0.66
Physical Health	14.7 (2.4)	15.2 (2.4)	0.45 (0.13, 0.77)	0.007	15.8 (2.1)	16.2 (2.1)	0.41 (-0.05, 0.87)	0.08
Psychological	14.7 (2.1)	15.5 (1.9)	0.88 (0.58, 1.18)	<0.001	15.1 (2.1)	16.0 (1.9)	0.98 (0.47, 1.49)	<0.001
Social Relationships	15.3 (2.3)	15.5 (1.8)	0.25 (-0.16, 0.65)	0.23	15.9 (1.7)	15.3 (1.8)	-0.61 (-1.05, -0.18)	0.006
Environment	12.9 (1.9)	13.7 (1.6)	0.79 (0.49, 1.09)	<0.001	13.4 (1.6)	13.8 (1.9)	0.43 (0.06, 0.80)	0.02

Table 2.0 demonstrates that at follow-up there was a significant improvement in quality of life of case participants across all domains, except for *social relationships.*[6]

By contrast, there was no change in quality of life among the controls for three of the domains, an improvement in two domains (psychological and environment) and a reduction in one domain (social).

The improvements in quality of life after administration of hearing aids are supported by the results from the hearing specific question sets featured in module 9 of the follow-up questionnaire. The majority (88%) of case participants reported that hearing aids had positively changed their enjoyment of life.

[6] The 'Social Relationship' domain specifically relates to personal relationships, intimacy and support from friends.

Case participants reported that the most significant benefit of wearing hearing aids had been the ability to communicate with family and friends (56%) and almost a quarter reported that most significantly they felt safer and more confident. (23%) 86% of case participants felt that wearing their hearing aids had improved their self-confidence. Furthermore, the quantitative findings were backed up by the qualitative research, in terms of improvements in quality of life across a range of domains due to hearing aids.

During an in-depth interview, a 76-year old women described the difference that hearing aids had made to her ability to socially interact and engage with others;

'Before, I had to make a big effort to understand, but now I can hear. I used to hear only part of the conversation and not take part. That is what I value the most, I enjoy speaking with family and friends.'

A 65-year old Agricultural Farmer reported on the psychological impact of hearing loss and the positive experience of wearing hearing aids;

'Before, at work, it felt very uncomfortable and I felt very ashamed because they explained what I had to do and I always missed something. Now, it is a pleasure and I feel very happy speaking with others.'

A 55-year old male, employed as a Health Promotion Officer, reported that hearing aids had made a substantial difference to his safety and security whilst traveling;

'I work in the streets … I need to hear everything around me in order to take care of myself. I need to be aware of cars and anything else when I walk'

Table 3: Depression

	Cases			Controls		
Depression	**Baseline**	**Follow-Up**	**p-value**	**Baseline**	**Follow-Up**	**p-value**
No	151	156 (100%)	0.03	88	89 (100%)	
Yes	5	0 (0%)		1	0 (0%)	0.32
Symptoms						
Not	114 (73%)	131 (84%)	0.001	78 (88%)	8 (95%)	0.03
Min	22 (14%)	20 (13%)		7 (8%)	3 (3%)	
Minor	14 (9%)	4 (3%)		4 (4%)	0 (0%)	
Moderate->Severe	6 (4%)	1 (0.6%)		0 (0%)	1 (1%)	

Table 3 demonstrates that at follow-up there is a significant reduction in depression and its related symptoms and severity in case participants. At baseline, 27% of cases reported depressive symptoms (minimal-severe), which reduced to 16% at follow-up. This represents a 41% reduction in the number of cases reporting symptoms of depression. Amongst the five cases with reported depression, all (100%) improved, representing 40% with a reduced severity of symptoms at follow up and 60% of cases reporting no symptoms of depression. Amongst cases who reported moderate to severe symptoms of depression at baseline, there was a 83% reduction at follow-up. By contrast, among controls there was no change in depression prevalence, and a small reduction in depressive symptoms.

These quantitative estimates of improved mental health after uptake of hearing aids are supported by the qualitative data. During the in-depth interview process, a 63 year-old female case participant stated that with the fitting and use of her hearing aids;

> *'I hear better, I feel better.'*

During an in-depth interview, a 68-year old male described his social experiences of living with hearing loss;

> '*If I was with my family, all together and they were speaking I would be unable to understand … I couldn't share with them, I would leave and go to my room.'*

A 27-year old mother expressed her feelings about using hearing aids;

> *'When I don´t have them (my hearing aids) I do feel a little bit insecure, but when I wear them, I feel safe'*

Prior to being diagnosed with hearing loss and receiving her hearing aids, a 63-year old lady reported;

> *'I felt angry, because I thought I could hear fine'*

Table 4: Employment

Cases				Controls		
Employment Status	Baseline (N=156)	Follow-Up	P-value	Baseline (N=89)	Follow-Up	P-Value
Not Working	81 (52%)	81 (52%)	1.00	33 (37%)	37 (42%)	0.41
Working	75 (48%)	75 (48%)		56 (63%)	52 (58%)	
Not Looking for Work	72 (89%)	76 (94%)	0.32	29 (88%)	36 (97%)	0.32
Looking For Work	9 (11%)	5 6%)		4 (12%)	1 (3%)	

Table 4 identifies no significant change in employment status for both case and control groups at follow up and no changes in the proportion of people looking for work.

During the in-depth interviews, case participants shared their experiences and identified the challenges of a hearing impairment and the positive impact of wearing hearing aids at work. The qualitative interviews demonstrated that for many cases currently employed, hearing aid use improved their effectiveness and productivity at work. It is therefore possible that hearing aid acquisition did not increase employment in this group of predominantly older people, but may have improved the quality of the work experience.

A 39-year-old Educational Supervisor reflected on his experience of hearing loss in the workplace;

'At meetings in work they spoke to me and I only laughed or smiled but the truth is that I didn´t understand what the conversation was about. Now I do understand very well.'

A 35-year old male Delivery Driver described the practical challenges of hearing loss;

'My job is to deliver beauty supplies to the department stores, when I am driving I have an assistant to help me to find the addresses, and he helps me with the instructions to get there. As I can't hear and have to lip read, I have to stop the car, close the windows and pay attention to him.'

A 63-year old male Church Pastor described how a hearing impairment affected his work and how the provision of hearing aids had improved his effectiveness;

'There are persons that are very sick, so the family calls us to go and pray for them, and they are so sick that they have difficulties in speaking, so (before) I needed to be closer to them and I had to bring someone to help me understand what they said, now (with hearing aids) I can do that by myself.'

Similarly, a 68-year old female Nurse described the communication challenges and positive impact that wearing hearing aids has made to her work;

'At my work hearing aids have helped me very much because I understand the persons that are speaking to me, before I didn´t know what to do because I couldn´t understand what they wanted. … It was tough because I had to guess what they were saying - I could hear them, but could not understand.'

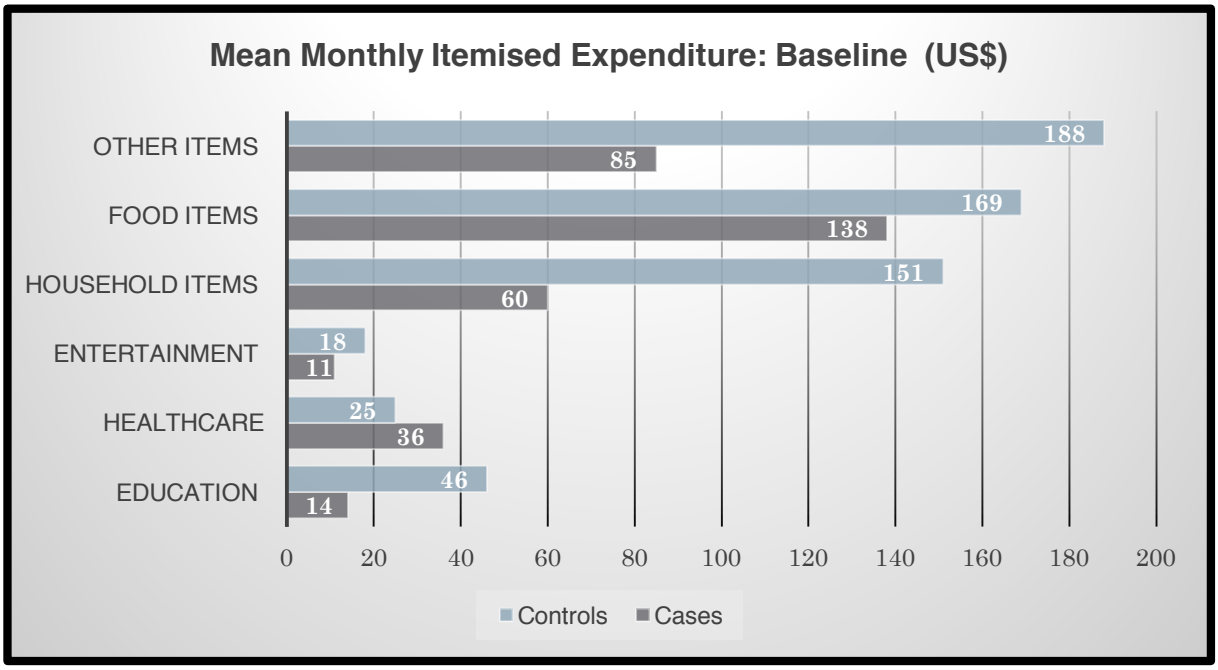
Table 5: Income & Expenditure

Financial Status Income	Cases			Controls		
	Baseline (N=156)	Follow-Up		Baseline (N=89)	Follow-Up	
Annual Income Individual (US$) (000s)	2.1 (0.0,4.8)	1.6 (0.0, 4.8)		3.2 (1.0, 5.3)	1.9 (0.0, 5.6)	
Annual Household Income (US$) (000s)	6.1 (3.3, 10.2)	6.4 (2.9, 12)		7.2 (3.8, 13.5)	6.4 (3.4, 12.7)	
Expenditure			P-Value			P-Value
Total Household Expenditure Monthly	345 (321)	382 (389)	0.27	599 (811)	414 (452)	0.02
Total Per Capita Expenditure Monthly	103 (101)	111 (140)	0.45	199 (376)	122 (165)	0.03

Table 5 demonstrates that at follow-up there was no significant change to case participant's income or expenditure at household or individual level. By comparison, at follow-up there was a substantial decline in the level of household and individual income and expenditure for the control group.

Figure 1.0 Monthly Case & Control Itemised Expenditure (US$)

Baseline



Follow-Up

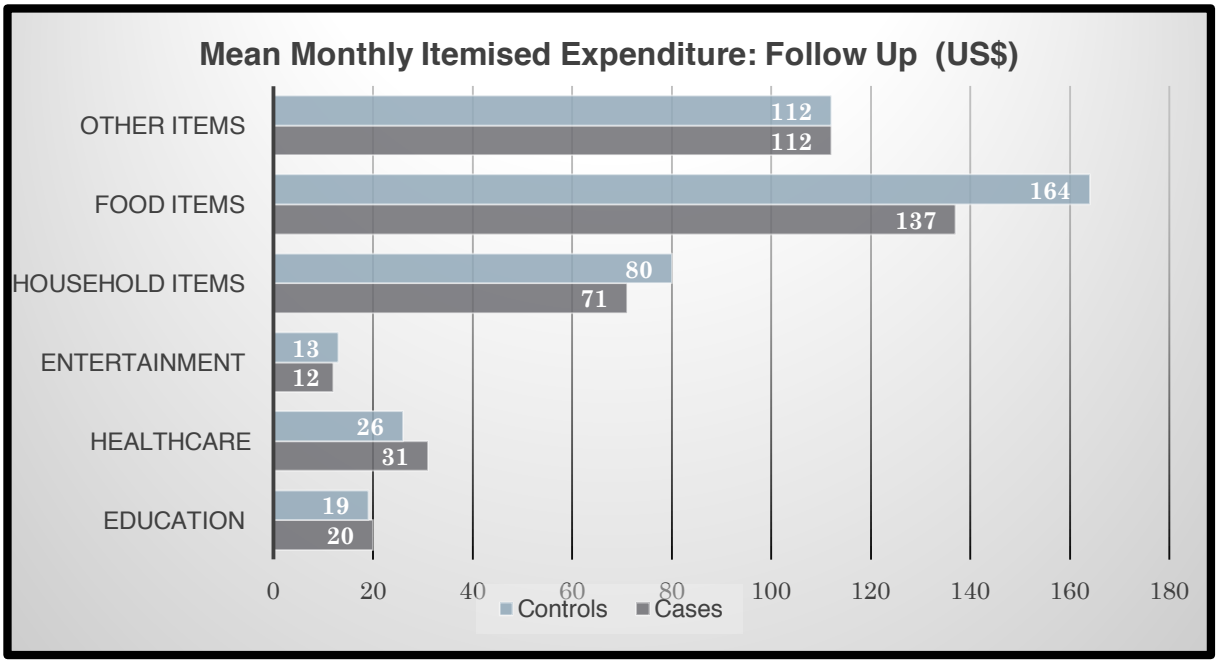


Figure 1 provides a breakdown of the monthly case and control (per-item) mean expenditure at baseline and follow-up. The chart indicates that at baseline there were large differences in patterns of expenditure between cases and controls, whereas at follow up the allocation of per capita expenditure for cases and controls was similar.

Table 6: Asset Ownership: At Baseline & Follow-Up

	Cases			Controls		
	Baseline (N=156)	Follow up	P-Value	Baseline (N=89)	Follow-up	P-Value
Q1 Q2 Q3 Q4	41 (26%) 45 (29%) 38 (24%) 32 (20%)	39 (25%) 43 (28%) 40 (26%) 34 (22%)	0.37	21 (24%) 17 (19%) 24 (27%) 27 (30%)	25 (28%) 18 (20%) 20 (22%) 26 (29%)	0.14

Table 6 demonstrates that there has been no change in asset ownership among cases or controls at follow up.

Figure II: Analysis of Daily Activities

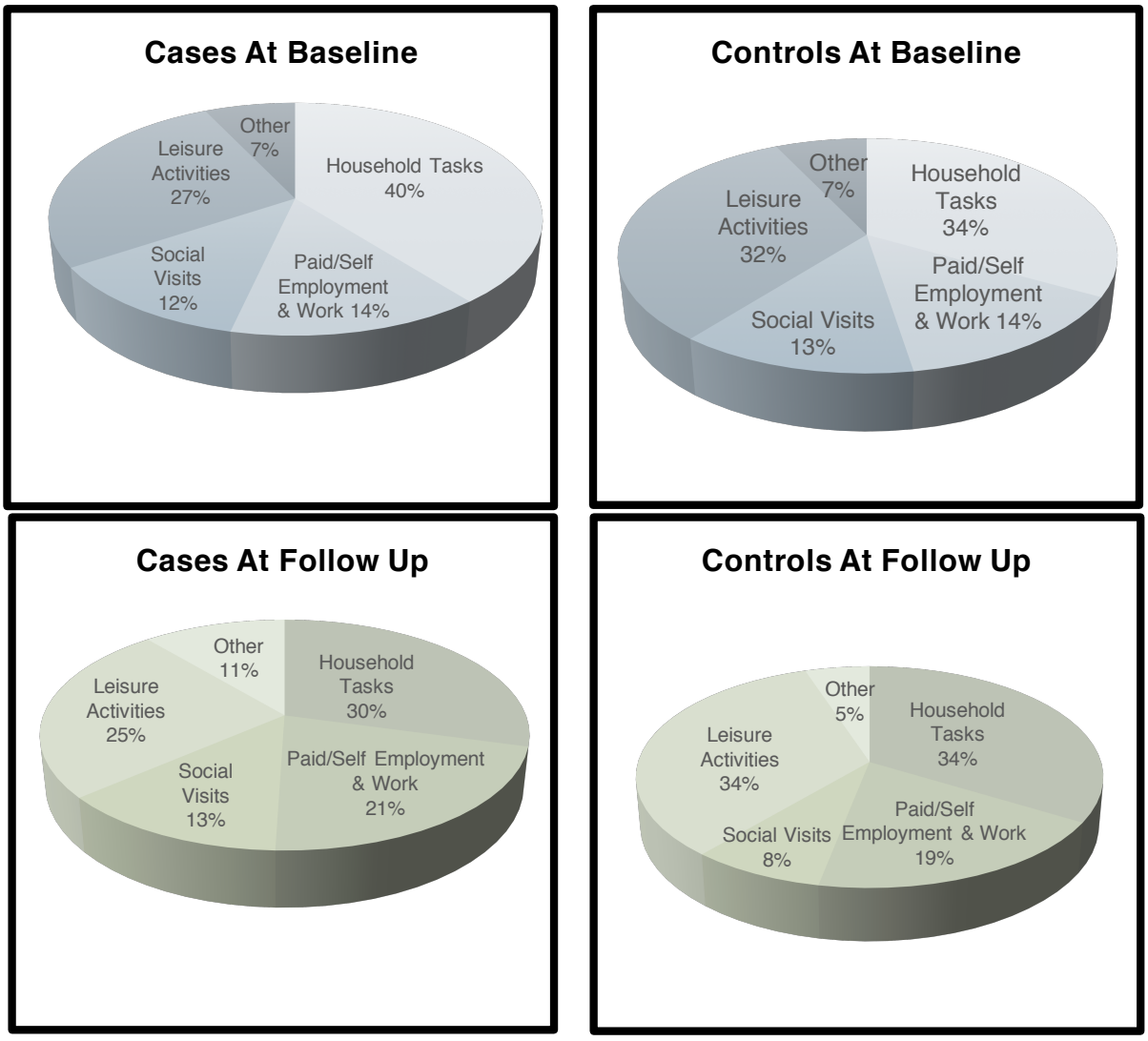


Figure 2.0 identifies the core activities of daily living and the percentage duration for case and control participants at baseline and follow-up. On follow-up, cases demonstrated an increase in work related activities and a reduction in household tasks.

Over 80% of cases participants reported that their hearing aids considerably helped them to understand the people they spoke to most frequently. Over 70% of cases reported that communication was enhanced by reducing the number of times they had to ask people to repeat. Almost 60% of all cases found that wearing hearing aids was considerably helpful when using the telephone. Daily activities may therefore be supported and enhanced by wearing hearing aids.

Such a positive experience was captured by the qualitative interviews. For instance, a 49-year old female housekeeper reported that;

> *'I wear my hearing aids all the time, if I am in the laundry sometimes the phone rings or the bell rings … before, I couldn't hear that'*

During the in-depth interview process, a 35-year old male explained his lack of activity participation prior to being fitted with hearing aids;

> *'I tried to avoid going out if there were too many persons I didn´t know - it was embarrassing to keep asking people to repeat.'*

Similarly, a 76-year-old man was interviewed and explained his negative experience of hearing loss and disengagement from social activities;

> *'I tried to avoid going out because when I did people would tell me that they tried to talk to me or say hello and I never answered them back. They were kind of angry.'*

Hearing Aid Fitting & Device Maintenance

Hearing aid assessment, fitting and ongoing maintenance was performed by the Sonrisas Foundation, based in Guatemala City. Since hearing aid fitting, 88% of cases had attended a follow-up appointment at the clinic. The case participants' perception

of service delivery and hearing aid satisfaction levels was captured in the follow-up questionnaire.

Table 7: Summary of Key Results

Device & Service Element	Rating
The person (Audiology Team) providing the hearing aid was perceived as competent	90% Satisfied
The dependability of the hearing device (Infrequent need for repair)	80% Satisfied
Access to battery supplies and to hearing aid repair and maintenance services.	74% Satisfied
Was the financially subsidised cost of hearing aids perceived as reasonable?	90% Satisfied

These high levels of satisfaction with the hearing aids and the service provided was also reflected in the qualitative findings.

One 27-year old woman reported on her experience at the clinic;

'They were all very nice to me, at the moment I was fitted, I could hear fine … I just want to say that I feel very happy now because I am able to hear'

A 39-year-old case provided feedback on the service that he had experienced and his very first experience of wearing hearing aids.

'Hearing aids basically changed my life, I am a different person since I am wearing them… I had a good, first experience, when I had to give some money, pay with the bills … the money made a sound when I counted it, a shhh! shhh! shh! My wife was with me and I told her - Wow, the bills make sounds, and she said it was normal, but I realized it was normal for her but for me, this was new.'

A 63-year-old male described his experience;

'I'm satisfied, comfortable and grateful … a big support'

Some key constraints, however, were also identified in the service provision.

A 63-year old male case identified the geographical location of the clinic as a key challenge;

'It is kind of difficult (to get to) due to the distance and the place where it is located in Guatemala City. It is not too expensive, but it is dangerous as I need to take a bus to the city.'

Satisfaction with Hearing Aids

Case participants were specifically questioned on their practical and functional experience of using hearing aids. For the quarter of case participants that did not wear their hearing aids on a daily basis, a broad range of reasons were reported. This included those that felt that the devices did not help their hearing (27%) and others who reported physical discomfort (15%). The majority of those who less frequently wore their hearing aids reported specific, 'Other Reasons'. (45%) These included case participants that would only wear their devices when they went out or needed to communicate, others who wished to maximize their battery life or believed that their devices were the cause of headaches, pre-existing tinnitus or exacerbated loud noises at work. As an example, such usage challenges were reported by a 73-year old male case participant:

'For me it is difficult to put them on and secondly that I work on the field, so I don´t wear them, I just wear them when I'm at home, or when my children come, as I don´t go out often… I don't use them because I am saving my batteries.'

25% of participants were frustrated when their hearing aid transmitted sounds that kept them from hearing what they wanted to hear. Equally, 26% of case participants were dissatisfied with comfort levels from loud sounds. 22% were concerned by an inability to achieve enough loudness from their hearing aid, without receiving *whistling* feedback. 10% were dissatisfied with the inability to detect the location and direction of sound. There were also challenges to using hearing aids within certain environments and when performing specific activities. During an in-depth interview a 67-year old male Butcher explained his lack of hearing aid usage at work;

'I don´t use them most of the time, because (as a butcher, preparing meat) I work too much in the water, I am afraid I will drop them in the water … I was told that I should not get them wet. Another thing is that I walk every day to my work, around 6 kilometers for an hour. They (Foundation) told me that if I sweat I can also get them wet, so I try to avoid using them while I walk.'

A 66-year old man describes his experience of wearing hearing aids and using public transport;

'Sometimes I have problems in locating the noises. For example, when I take the public bus, they are speaking but I'm not able to see where they are coming from.'

On behalf of her father, the daughter of a 73-year old case participant identified a practical challenge;

'He (My Father) lives alone, so he can´t put them on (Hearing Aids) by himself, just when I come to visit him, I put them on him'

A 62-year-old woman reported on the role of her daughter in maintaining the use and function of the hearing aids;

'My daughters do it, they change the batteries for me and they help me to put them on'

Despite these challenges, overall 82% of cases participants were satisfied with their hearing aids.

Follow Up Results Summary

Compared to baseline, the case participant follow-up data identified:

- ☐ Significantly fewer symptoms of depression
- ☐ An improved quality of life across a range of domains
- ☐ Positive hearing aid experiences, which improved communication with family and friends and work effectiveness
- ☐ No significant change in income or expenditure
- ☐ High levels of satisfaction with hearing aids

Discussion

Summary of Results

The objective of this research study was to investigate the impact of hearing impairment and provision of hearing aids on poverty, activity participation, mental health and quality of life in Guatemala. The study compared 206 cases with audio-metrically assessed moderate to profound hearing loss and 146 control participants with confirmed 'normal' hearing or mild, non-disabling hearing loss.

Compared to controls without disabling hearing loss, cases with hearing loss:

- Were significantly poorer, as measured by income and expenditure
- Spent more money on health care products and services
- Had more depressive symptoms
- Had poorer quality of life across a range of domains
- Spent more time performing household tasks, but did not differ in other activities
- Perceived that the emotional and social impact of their hearing loss was high

Case participants were assessed and fitted with hearing aids and after a mean intervention period of 7.5 months, cases and controls were re-interviewed and the follow-up data compared with baseline.

Compared to baseline, the case participant follow-up data identified:

- Significantly fewer symptoms of depression
- An improved quality of life across a range of domains
- Positive hearing aid experiences, which improved communication with family and friends and work effectiveness
- No significant change in income or expenditure
- High levels of satisfaction with hearing aids

Results in Context

Impact of Hearing Impairment

This research study reported that case participants were significantly poorer than the control group, as measured by expenditure and at baseline case participants were 11% less likely to be in paid employment. These figures are similar to an Australian study [20] which demonstrated that hearing loss was associated with an increased rate of non-participation in employment of between 11 - 17%. This study demonstrated that cases with hearing loss ranging from moderate – profound had earnings which were 35% significantly lower than the control group. Similarly, a study conducted in the USA reported a 50-70% earnings gap amongst people with severe to profound hearing loss as compared to their non-hearing impaired peers.[24] Similar to the results demonstrated in Guatemala, a study conducted in the USA[48] reported that depressive symptoms were common in older adults with bilateral hearing loss. A research study conducted in Nigeria reported that hearing loss in elderly patients had a negative effect on their activities of daily living and functionality, especially within the emotional domain, representing depression.[49] The results of this study were also reflected in a large study conducted in the USA, in which the impact of hearing loss on quality of life in older adults was investigated.[31] The study reported that participants with moderate to severe hearing loss were almost eight times as likely as those without hearing loss to have self-reported difficulties with communication and concluded that severity of hearing loss is associated with reduced quality of life in older adults. In comparison, a research study in Yemen[32] used an adapted version of the Hearing Handicap Inventory for Adults question set and demonstrated an association between hearing loss and decreased quality of life. By applying a similar question set this study demonstrated a disability in 78% of all cases and a significantly 'high' level of disability in over half (53%) of all cases.

Hearing Aid Usage

88% of cases attended the post-fitting support clinic. During this visit objective usage data was downloaded from the hearing aid and analysed. It was identified that all cases (100%) had used their hearing aids since being fitted and 78% had used their

devices for an average of four hours per day. In comparison, the academic literature suggests that the number of people who are given a hearing aid and who do not wear them ranges from 5%[50] to 24%.[39,51] It is also reported that between 1% and 40% of all hearing aids dispensed, are never or rarely used.[52]

The high-level usage rates observed in this Guatemala study may be attributed to a multi-factorial management strategy employed by the Sonrisas que Escuchan Foundation which aims to maximise device usage and auditory benefit. This strategy is based on each case participant contributing to the subsidized cost of their devices and aural rehabilitation services, demonstrating their commitment to the hearing aid usage. In return they are provided with a high quality hearing aid, accompanied by a comprehensive assessment, fitting service and access to regular and ongoing device maintenance and supportive clinic visits.

Impact of Hearing Aids

At follow-up, case participants had shown significantly improved quality of life. The majority (88%) reported that hearing aids had positively changed their enjoyment of life. Similarly, a study conducted in Brazil reported that effective use of hearing aids improved communication, which made it possible for elderly individuals to reassume their family and social interactions, thereby improving their quality of life. [37] In this study case participants reported significantly fewer symptoms of depression at follow up and of those who reported moderate to severe symptoms of depression at baseline, there was a 83% reduction at follow-up. Similarly a small study of elderly people conducted in Turkey found a decrease of depressive signs and an increase of cognitive functions after using hearing aids. [38] In a large cross-sectional study of UK adults, hearing aid use was associated with better cognition and improved quality of life. [30] The majority (82%) of cases were satisfied with their hearing aids. Previous US and European studies have demonstrated a wide variance in satisfaction ratings, from 50% to more recent studies reporting satisfaction ratings from 68% - 80%[53–56] The importance of these ratings are that satisfied hearing aid users are often frequent users and sources of referral for other people with hearing impairment.[25] The current results from Guatemala therefore show relatively higher levels of satisfaction than in previous studies.

At follow-up there was no significant change to case participant's income or expenditure at household or individual level, however there was a substantial decline in the level of income and expenditure for the control group. External forces such as political fragmentation, reduction in public investment, increased poverty levels and insufficient GDP growth[7] may provide an explanation for these results, inferring that under more favourable economic conditions, case income and expenditure at follow up may have increased and that the hearing aids were protecting the cases from the economic losses experienced among the controls. Longer follow up may also be required to ascertain an impact of hearing aids on reducing poverty, particularly in terms of accumulating assets.

Analysis of the significant other data suggests that case participants may have under-reported the impact of their hearing loss. It could be inferred that the 'hidden' impact of hearing loss on quality of life and mental health may therefore be much greater.

Research Strengths & Limitations

This research project was planned, coordinated and managed by a Project Manager based in Guatemala for the fieldwork and supported in London by a highly qualified and experienced Research Lead and dedicated full-time researcher within the International Centre for Evidence in Disability at the London School of Hygiene & Tropical Medicine. This study was based on a relatively large sample size including 198 cases and the fitting of 367 hearing aids. Robust and systematic methodological processes were introduced during the planning and implementation phase of this research and an effective working relationship with the Sonrisas que Escuchan Foundation was established. The interviews were conducted in the participant's home, which as compared to a clinic environment, provided a rich and meaningful understanding of the participant's household living conditions and verification of their income and expenditure. In-depth data was collected on a range of facets of life, including poverty, quality of life and mental health. This research project effectively applied information technologies to facilitate timely and accurate data collection and enable hearing assessments to be conveniently performed on portable electronic tablets.

To the best of our knowledge this study is one of the first research projects to have utilised the IT-enabled quantifiable, data-logging functionality of hearing aids and correlated these with subjective outcome measures of hearing aid usage within a low-middle income setting.

This study solely focused on the impact of hearing loss within an adult population living within a pre-defined radius of Guatemala City. The three main research challenges and constraints were identified as:

Control Group Hearing Loss Detection

Based on pre-determined suitability criteria, each case participant identified a matched control. The control was screened for hearing loss using the Shoe-Box Audiometer prior to being interviewed. Unexpectedly, hearing loss was detected in 66% of all control participants. These results excluded their participation in the study and required additional matched subjects to be sourced, identified and tested prior to interview. Such findings impacted on allocated fieldwork time and efficient resource utilisation. In order to increase the number of eligible control participants, a graduated sequence of management strategies were employed. These included, extending the age criteria from 5 to 10 years and generating a wider population of eligible participants and revising the hearing loss threshold to include mild hearing loss. (<40dB) Social media platforms, safe-zone neighborhood canvassing and extending the fieldwork period by an additional four weeks were all implemented in order to reach eligible control participants. The impact of hearing loss among the cases may have been underestimated because some of the controls had mild hearing loss.

The Fieldwork Schedule

The fieldwork was conducted at baseline in October – December 2015 and at follow-up in July – August 2016. The period of time between hearing aid fitting and follow up represented a relatively short time frame, ranging between 6-8 months and a mean period of 7.5 months. Such limited timescales may account for, or contribute to no significant change in income, expenditure or asset ownership being identified at follow-up. Other contributory factors may include the age of the participants and their retired work status. 59% of cases were over the age of 60 and the mean age of cases was 61 (Median: 65) as compared with controls at 54. (Median: 57)

Generalisability of Results

The sample was restricted to adults, and cases were those on the list for subsidized hearing aids (and therefore below a poverty threshold). The results may therefore not be generalizable to children or people not poor, or indeed outside of the geographical area where the study was conducted.

Research Implications:

Advocacy

The core results show that hearing loss is related to poverty, reduced quality of life and mental health and that provision of hearing aids may alleviate these negative impacts. It is recommended that the outcome of this research is shared and appropriately communicated to a broad range of primary stakeholders, including:

National Ministries of Health*:* To inform policy decision-making and to assist with the formulation of national evidence-based strategies on auditory screening, hearing loss management and rehabilitation.

International Non-Governmental Organisations: To provide evidence that justifies and strengthens the case for supporting and funding aural rehabilitation programmes and hearing aid provision within low and middle income countries.

Specialist International Health Organisations & Research Communities:

To build collaborative partnerships which support further research, provide targeted funding and resources and lobby governments. To assist with the formulation and development of internationally agreed, hearing standards, procedures and rehabilitation protocols.

Service Provision & Development

The positive outcomes and high satisfaction ratings identified in this study were achieved by case participants being assessed and professionally fitted with quality devices of a basic specification, supplied by a reputable manufacturer. Each case participant was provided with ongoing aftercare and maintenance services. All elements of this aural rehabilitation programme are important in order to maximize usage and benefit. This study has demonstrated that by applying such a management

strategy, a higher specification, more expensive aid is not required in order to obtain positive outcomes. Case participants reported that affordability and lack of knowledge were two of the most significant barriers to not having previously obtained help for their hearing loss. These findings have implications for promoting auditory health in schools and health centres and improving service accessibility and affordability, by extending the community-based aural rehabilitation service model. The development and expansion of existing community based out-reach facilities to specifically target the most vulnerable, elderly or disabled indigenous adult populations in Guatemala. Such individuals lack the means to access or are unable to travel to central, urban based healthcare facilities.

It is proposed that trained Hearing Support Workers, supported by an experienced and qualified audiology team, would carry out basic hearing aid maintenance and aural rehabilitation services and where appropriate, provide timely and appropriate referral to a clinical audiology specialist. Home visits & preliminary hearing assessments, would enable service needs and requirements to be identified and prioritised and socio-economic status and hearing aid affordability to be objectively evaluated.
Such locally provided and sustainable services will mitigate the negative impact of hearing loss and positively contribute to improved communication, mental health and quality of life.

Further Research

Hearing Loss Prevalence Study

By performing an audiometric screening test on the control group, this research study identified a high number of control subjects with previously undetected and undiagnosed hearing loss. This may suggest that prevalence studies within LMICs, commonly using self-reported measures, may be under-reporting or masking the magnitude of hearing loss. By applying a standardised hearing test using a small, portable electronic tablet, researchers with minimal training may capture quantifiable data in the field, reaching remote areas and communities. Such information would provide reliable statistical data on the national prevalence of hearing loss and enable international comparison and classification. Such population based, epidemiological

data would provide evidence and support the introduction of national screening programmes, enable detailed economic analysis and facilitate intervention planning.

Longitudinal Study

An extended, post intervention case and control follow-up study, performed at two years and five years would allow the longer-term impacts of hearing aids to be assessed. Specific measures of interest would include case and control comparisons in mental health, employment status, housing conditions, income and expenditure and asset ownership.

Target Population Study

It would be useful to examine the impact of hearing impairment and hearing aid provision on activity participation and quality of life in children living in Guatemala. This study would also allow the opportunity to explore the prevalence of hearing loss in children and the impact on early stage communication, social development and learning ability.

National Aural Rehabilitation Service Review

Formal evaluation of the population demand, needs, accessibility and effectiveness of screening and aural rehabilitation service provision in Guatemala would assist in programme planning.

Hearing Aid Purchase Study

No studies have been conducted in LMICs to compare patients who pay for their hearing aids or make a subsidized financial contribution to those who receive hearing aids for free. Within the context of the study, one could review methods of means testing and evaluate how different price points affect accessibility, outcomes and usage.

Comparative Study

Finally, it would be useful to conduct a comparative research study, using the same standardized measures within a low-middle income country to assess whether the findings are generalisable.

Conclusion

This research study is one of the first projects to examine the quantifiable and objective functionality of hearing aid usage and correlate this with subjective outcome measures. By applying such techniques, this research project has identified the significant impact that hearing impairment has on the socio-economic status, activity participation, mental health and quality of life of adults living in Guatemala. It has also demonstrated the positive impact that hearing aids, as part of a comprehensive fitting and aural aftercare programme may have on significantly improving quality of life and reducing symptoms of depression for people living in a low-middle income country. The outcomes of this research have implications for ministerial advocacy, aural rehabilitation programme development and community outreach as well as building a foundation for further research within low and middle income countries.

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Appendix I: Baseline Questionnaire

Questionnaire

Case & Control Group
Pre-Intervention

Version 9.0
Private & Confidential

Content & Navigation

Section		Page Number
Introduction	Title Page	1
	Contents	2
	Pre-Interview Information	3
	Pre-Interview Check-List	4

Section	Question Set	Case	Control	Number of Questions	Page Number
Part I	Hearing I	☑		3	4
Part 2	Household	☑	☑	10	5
Part 3	Home	☑	☑	18	8
Part 4	Activities & Work Participation	☑	☑	17	13
Part 5	Income	☑	☑	4	17
Part 6	Expenditure & Consumption	☑	☑	11	18
Part 7	General Health	☑	☑	6	22
Part 8	Mental Health	☑	☑	10	23
Part 9	Quality of Life	☑	☑	26	24
Part 10	Hearing II	☑		40	26
Part 11	Significant Other Question Set	☑		10	29
Appendix I	**Scale Show Card**				30

Participants	Parts	Total Number of Questions
Control Group	2-9	102
Case Group	1-11	155

Pre-Interview Information

Ref	Question	Answer ☑	
1	Subject	Case ☐	Control ☐ (Go to Q3)

Ref	Question	Answer ☑		
2	Hearing Impairment	Left Ear ☐	Right Ear ☐	Both Ears ☐

Ref	Question	Answer		
3	Subject Name	First Name	Family Name	Initials (All)

Ref	Question	Answer ☑	
4	Gender	☐ Male	☐ Female

Ref	Question	Answer			
5	Age & Date of Birth	Age (Years)	Day	Month	Year

Ref	Question	Answer			
6	Interview Date & Time	Time: AM/PM	Day	Month	Year

Ref	Question	Answer	
7	Interviewer	First & Family Name Initials	Number

Ref	Question	Answer
8	Interview Address	
9	Geographical Coordinates	

Pre-Interview Checklist	☑
Introductions & Participation Thank You	☐
Research Study Explanation	☐
Information Sheet Read	☐
Consent Form Read & Signed	☐
Question & Answer Opportunity	☐

Part I: Hearing I

Ref	Question	Answer	
1	When did you first realise that you may have a hearing problem? How many months and/or years ago?	☐ Number of Years	☐ Number of Months
2	Apart from now, have you previously tried to seek help for your hearing problem?	Yes ☐ (Go to Q3B)	No ☐ (Go to Q3A)
Ref	**Question**	**Answer**	☑
3(A)	If not, what was the **main** reason why you did not seek help before? (Please tick one answer only)	I did not know where to get help	☐
		I could not afford to get help	☐
		I felt embarrassed	☐
		I did not know what help I needed	☐
		I did not need help then	☐
		Other Reason? Specify:	☐
Ref	**Question**	**Answer**	☑
3(B)	If yes, what other **main** source of help did you seek? (Please tick one answer only)	Hearing Clinic	☐
		Hospital	☐
		Community Health Service	☐
		Family Member / Friend	☐
		Other Form of Help (Specify)	

Part 2: Household

Ref	Question	Answer ☑	
1	Are you the Head of the Household?	Yes ☐ (Go to Q4)	No ☐

Ref	Question	Answer	
2	Who is the Head of the Household? (Provide Initials)		
3	What is the Head of the Household's relationship to you? ☑	Husband	☐
		Wife	☐
		Father	☐
		Mother	☐
		Grand Parent	☐
		Sibling (Brother/Sister)	☐
		Other (Specify)	☐

Ref	Question	Adults (15 Years +)		Children (Under 15)	
4	Including you, how many household members are there? **Household Member Definition:** Lived in household at least six months of last year, eats meals together, does not pay rent and is not paid domestic help	Total Adults		Total Children	
		Number Male		Number Male	
		Number Female		Number Female	

Ref	Question	Answer ☑			
5	What is your marital status?	Married or Living Together	Divorced /Separated	Widowed	Single
		☐	☐	☐	☐

Ref	Question	Answer ☑		
6	Are you able to read?	☐ Well	☐ Little	☐ Not At All
7	Is the Head of the Household able to read?	☐ Well	☐ Little	☐ Not At All

Ref	Question	Answer ☑				
8	What is the highest level of education you have completed?	No Education	Primary	Secondary/ High School	University	Currently Studying (Also Tick Level)
		☐ To Q 9 & 10	☐	☐	☐	☐
9	What is the highest level of education that the Head of the Household has completed?	☐ To: Part 3	☐ To: Part 3	☐ To: Part 3	☐ To: Part 3	☐ To: Part 3

Ref	Question	Answer	Response ☑
10	What is the **main** reason why **you** did not receive formal education?	Absence of School	☐
		Lack of Money	☐
		Needed to Work	☐
		Education Not Very Useful	☐
		Don't Like School	☐
		Family Did Not Allow	☐
		No Transport	☐
		My Hearing Problem	☐
		Other: Please Specify	☐

Part 3: Home
(A) Interviewer To Observe & Code:

Ref	Question	Answer	☑
I	**Floor** The **main** material for the floor is:	Cement	☐
		Wood/Planks	☐
		Parquet or Polished Wood	☐
		Vinyl or Asphalt Strips	☐
		Ceramic Tiles	☐
		Earth/Sand	☐
		Carpet	☐
		Other: Specify	☐

Ref	Question	Answer	☑
II	**Roof** The **main** material for the roof is:	Metal	☐
		Wood	☐
		Cement	☐
		Tiles	☐
		Thatch/Palm Leaf/Grass	☐
		Cardboard	☐
		No Roof	☐
		Other (Please Specify)	☐

Ref	Question	Answer	Response ☑
III	**Walls** The **main** material for the exterior walls is:	Brick	☐
		Stone	☐
		Cement Blocks	☐
		Wood	☐
		Bamboo/Cane/Palm/ Trunk	☐
		Cardboard	☐
		No Walls	☐
		Other (Specify)	☐

(B) Home

Ref	Question	Answer	Response ☑
1	Do you or a household member own the home?	Owns	☐
		Rents	☐
		Uses without Paying Rent	☐
		Temporary Dwelling (Nomadic)	☐

Ref	Question	Answer
2	Including all outbuildings, how many internal rooms does your home have? Count all rooms including kitchen, toilet or bathroom but exclude any specific animal accommodation, such as stables	Number of Rooms ☐
3	How many rooms in this household are used for sleeping?	Number of Rooms ☐

Ref	Question	Answer	☑
4	What kind of toilet facility do the members of your household usually use?	Flush to piped sewer system	☐
		Flush to septic tank	☐
		Flush to pit (latrine)	☐
		Flush to unknown place/not sure/don't know where	☐
		Pit Latrine	☐
		Bucket	☐
		No toilet: use bush/field	☐
		Other (Specify)	☐

Ref	Question	Answer ☑	
5	Do you share this toilet facility with other households?	Yes ☐	No ☐

Ref	Question	Answer	☑
6	What type of fuel does your household mainly use for cooking?	Electricity	☐
		Liquid Propane Gas (LPG) Bottle	☐
		Piped Gas	☐
		Coal/Charcoal	☐
		Wood	☐
		Straw/Shrubs/Grass	☐
		Do not cook food at home	☐
		Other (Specify)	☐

Ref	Question	Answer	☑
7	What is the **main** source of drinking water for the household members?	Piped into home	☐
		Piped into yard or plot	☐
		Public tap/standpipe	☐
		Borehole (Hand Pump)	☐
		Well	☐
		Water from Spring	☐
		Surface Water (From River, Stream, Lake)	☐
		Bottled Water	☐
		Other (Specify)	☐

Ref	Question	Answer	☑
8	How do you dispose of your household waste?	Composting	☐
		Recycling some items	☐
		Burning	☐
		Municipal Garbage pick-up	☐
		Dump in forest/open land/river/stream	☐
		Other (Specify)	☐

Ref	Question	Answer ☑	
9	Does any member of this household own any land?	Yes ☐	No ☐ (Go to Q12)

10	If yes, how much land do they own?	

		☐ M2

Ref	Question	Answer	☑
11	What do they use this land for?	Crop Farming	☐
		Grazing Animals	☐
		Building	☐
		Rent To Others	☐
		Other (Specify)	☐

Ref	Question	Answer ☑	
12	Does any member of the household own any livestock? For example: Herds of cattle, sheep, horses, oxen or chickens Excluding pets.	Yes ☐	No ☐ (Go to Q14)

Ref	Question	Answer			
		Livestock	**No ☑**	**Yes ☑**	**Number**
13	If yes, what type of livestock and how many?	Horses/Pony			
		Cows / Bull			
		Sheep			
		Pigs			
		Goats			
		Donkey			
		Chickens			
		Other (Specify)			
		Total			

Ref	Question	Answer ☑	
14	Does your household have access to electricity?	Yes ☐	No ☐ (Go to Q16)

Ref	Question	Answer	☑
15	How does your household access electricity?	Legal Connection	☐
		Informal Connection	☐
		Self-Generated Connection (Fuel Generator	☐
		Don't Know	☐

Number	Question	Answer	Response	
16	Does your household have any of the following items that are in working order?		Yes ☑	No ☑
		Radio	☐	☐
		Refrigerator	☐	☐
		Television	☐	☐
		Landline Telephone	☐	☐
		Mobile Phone	☐	☐
		Mattress or Bed	☐	☐
		Computer/Laptop/ Electronic Tablet	☐	☐
		Washing Machine	☐	☐
		Watch or Clock	☐	☐
		Bicycle	☐	☐
		Motorcycle or Motor scooter	☐	☐
		Non-motorised Cart	☐	☐
		Car or Truck	☐	☐
		Boat With Motor	☐	☐

Ref	Question	Answer	
17	Including you, how many household members contribute to the household income?	☐	
18	Does any member of this household hold a bank account? ☑	Yes ☐	No ☐

Part 4: Activity & Work Participation

Ref	What activities do you perform and how frequently?	Did you spend any time in the last **week** performing?		Did you spend any time **yesterday** performing?		How many hours did you spend on these activities **yesterday**?
	Activity	**No ☑**	**Yes ☑**	**No ☑**	**Yes ☑**	**Minutes & Hours**
1	**Household Tasks** For Example: On behalf of you and other household members, looking after others/cooking, washing dishes, cleaning, shopping, traveling	☐	☐	☐	☐	
2	**Paid or Self Employment** For Example: Making & selling products from home/working for a business	☐	☐	☐	☐	Include Transport Time
3	**Household Work** Any work for your own or household use and benefit? Including farming fetching firewood, processing own agricultural products, childcare	☐	☐	☐	☐	
4	**Social Visits** **(**Ceremonies, Celebrations, Meetings, Church, Visiting Friends & Family	☐	☐	☐	☐	
5	**Leisure Activities** Including reading, listening to the radio, watching TV, entertaining, hobbies and interests	☐	☐	☐	☐	
6	**Daytime Sleeping**	☐	☐	☐	☐	
7	**Other Activity:** Specify:	☐	☐	☐	☐	

Ref	Question	Answer	☑
8	Did you do any type of work in the last 4 weeks that contributes to the household income?	☐ Yes (Go to Q11)	☐ No
9	Have you been looking for work and ready for work in the last 4 weeks?	☐ Yes (Go to Q11)	☐ No
Ref	**Question**	**Answer**	☑
10	What was the **main** reason for not working or looking for work in the last 4 weeks?	Household & Family / Child Care Role	☐
		Seasonal Inactivity	☐
		Student	☐
		No Work Available	☐
		Too Old / Young	☐
		My Hearing Problem	☐
		Other	☐
11	How many jobs did you have in the last year?		**Number** ☐ **If 0: Skip To Part 5**
12	Please name **the three main jobs** in order of importance (Greatest income source first)	Over the last **12 months,** how many months did you work on this job?	How many hours per week did you work in the **last month?**
	Job 1 Title:	☐	☐
	Job 2 Title:	☐	☐
	Job 3 Title:	☐	☐

Ref	Question	Answer	☑
13	Did you work relatively more or less than usual in the last month?	More than usual	☐
		Same as usual	☐
		Less than usual	☐
14	How were you paid for the main job? (Job 1)	Wages/Salary	☐
		Payment in Kind	☐
		Casual (hourly/daily)	☐
		Unpaid or Volunteer	☐
		Self-employed	☐
15	For whom did you work for in your main job?	Government	☐
		Non-Government Organisation	☐
		Private Business	☐
		Private Person/Household	☐
		Other (Specify)	☐
16	What is the **main activity** at the place of your main job?	Agriculture/Farming	☐
		Manufacturing/ Processing	☐
		Building & Construction	☐
		Transport	☐
		Shop/Selling/Vendor	☐
		Hospitality (Waiter/Chef/Housekeeper)	☐
		Education/Health	☐
		Other (Specify)	☐

Ref	Question	Answer	No ☑	Yes ☑
17	Are you entitled to any of the following?	Paid Sick Leave	☐	☐
		Paid Holiday	☐	☐
		Maternity/Paternity Leave	☐	☐
		Retirement Pension	☐	☐
		Social Security Benefits	☐	☐
		Health Insurance/ Free Medical Care	☐	☐

Part 5: Income

Ref	Statement	Answer ☑	
1	I'm now going to ask you some questions regarding you and your household's financial income.	☐ Yes: Proceed To Part 5 Q2	☐ Refused Go to Part 6

Ref	Question	Weekly Amount (Q)	Monthly Amount (Q)
2	What is your weekly / monthly income from your job?		
3	What is the total weekly/monthly income from other household members jobs?		
4	Does the household have any other sources of income? If so, how much? For Example: Do You/Your Household: ▪ Sell products, wash clothes or make food for others? ▪ Have a pension? ▪ Have financial support from your family ▪ Receive any remittances? ▪ Receive any interest on savings or on loans you have made?		
	Total Income Per Week / Month		
	Calculation	**X52**	**X12**
	Total Annual Household Income		

Part 6: Household Spending & Consumption

1. In the past 7 days, has any member of your household spent money on any of the following items?			How much did your household spend on each item?
Items	**No ☑**	**Yes ☑**	**QUETZAL Q.**
Tobacco, cigarettes, cigars	☐	☐	
Newspapers or magazines	☐	☐	
Lottery tickets	☐	☐	
Fares for public transport: busses, taxis, etc.	☐	☐	
Petrol, oil and car service	☐	☐	
Parking	☐	☐	
Charity	☐	☐	
Restaurant or Café Meals, Beverages & Snacks	☐	☐	
Total: Week			

2. Over the **past week** has your **household** eaten the following food Items?	**Eaten**		**Value**	**Purchased**	**Gift**	**Payment**
	Yes ☑	**No ☑**	**Q.**	**☑**	**☑**	**☑**
Vegetable Oils & Cooking Fat	☐	☐		☐	☐	☐
Butter or Margarine	☐	☐		☐	☐	☐
Milk Fresh/Sterilised/UHT/Powder	☐	☐		☐	☐	☐
Eggs	☐	☐		☐	☐	☐
Other Dairy Products Example: Yoghurt & Cheese	☐	☐		☐	☐	☐
Vegetables Example: Potato/Salad/Avocado	☐	☐		☐	☐	☐
Fresh Meat & Poultry	☐	☐		☐	☐	☐
Fresh Fish	☐	☐		☐	☐	☐
Fruit: Water Melon/Papaya	☐	☐		☐	☐	☐
Beans	☐	☐		☐	☐	☐
Rice	☐	☐		☐	☐	☐
Nuts	☐	☐		☐	☐	☐
Tortilla	☐	☐		☐	☐	☐
Weekly Total						

3. Over the **past month** has your **household** eaten the following Food Items?	**Eaten**		**Value**	**Purchased**	**Gift**	**Payment**
	Yes ☑	**No** ☑	**Q.**	☑	☑	☑
Breakfast Cereal	☐	☐		☐	☐	☐
Flour / Grain	☐	☐		☐	☐	☐
Sugar	☐	☐		☐	☐	☐
Baby Formula	☐	☐		☐	☐	☐
Chocolate	☐	☐		☐	☐	☐
Canned Foods (fish, fruit)	☐	☐		☐	☐	☐
Soft Drinks	☐	☐		☐	☐	☐
Beer and Alcoholic Beverages	☐	☐		☐	☐	☐
Biscuits and Cakes	☐	☐		☐	☐	☐
Spices and Condiments	☐	☐		☐	☐	☐
Jam	☐	☐		☐	☐	☐
Tea	☐	☐		☐	☐	☐
Coffee	☐	☐		☐	☐	☐
Any Other Food Items Not Listed Specify:	☐	☐		☐	☐	☐
Monthly Total						

4. Over the **past month** has your **household** spent money on any of the following Items?	**Spent**		**Value**
	Yes ☑	**No** ☑	**Q.**
Personal care items (haircuts, cosmetics, shampoo, toothpaste)	☐	☐	
Clothing or shoes for adults	☐	☐	
Clothing or shoes for children (including school uniform)	☐	☐	
Material to make clothing, curtains and other items	☐	☐	
Telephone (service + calls + prepaid) Including Cell Phone	☐	☐	
Holidays & Excursions	☐	☐	
Jewellery, watches and other luxury goods	☐	☐	
Birthdays & Ceremonies (Weddings & Funerals)	☐	☐	
Membership Fees	☐	☐	
Monthly Total			

5. Entertainment: Over the **past month** has your **household** spent money on any of the following Items?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Books & Stationary (Excluding Textbooks)	☐	☐	
Postal Expenses	☐	☐	
Entertainment/Leisure (Cinema, DVD Rentals, Music, Sporting Events)	☐	☐	
Internet & TV / Cable	☐	☐	
Sports / Hobby Equipment	☐	☐	
Total			

6. Healthcare Expenses: Over the **past month** has your **household** spent money on any of the following?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Medical Insurance Fees	☐	☐	
Hospital/Clinic Costs: Dentists/Doctor/Nurse Fees	☐	☐	
Medical Supplies: Medicines, Bandages	☐	☐	
Natural / Complementary Therapy	☐	☐	
Total			

7. Household Expenses: Over the **past month** has your **household** spent money on any of the following?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Household Cleaning (soap, washing powder)	☐	☐	
Kitchen Equipment (pots, pans, lamps, torches)	☐	☐	
Bedding Sheets, Blankets and Towels	☐	☐	
Furniture and Household Appliances	☐	☐	
Home Maintenance and Repairs	☐	☐	
Fuel (Firewood, Charcoal, Cooking Gas)	☐	☐	
All Other Household Expenses Specify:	☐	☐	
Total			

8. Education Fees: Over the **past month** has your **household** spent money on the following?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
School Fees and Tuition	☐	☐	
University Fees	☐	☐	
Other School Expenses (books, transport, meals at school)	☐	☐	
Total			

9. Tax & Legal Fees: Over the **past month** has your **household** spent money on any of the following? (Prompt: An annual 1/12th Proportion)	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Income Tax	☐	☐	
Land Tax/Land Rates	☐	☐	
Housing and property tax	☐	☐	
Legal or notary services	☐	☐	
Total			

10. Insurance & Fees: Over the **past month** has your **household** spent money on any of the following?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Insurance (Car & Property)	☐	☐	
Total			

11. Other Expenses: Over the **past month** has your **household** spent money on any other items or services? Please specify below.	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Specify:	☐	☐	
Specify:	☐	☐	
Total			

Total Monthly Expenditure (Q)	

Part 7: General Health (Show Card: Scale A)

Ref	Question	No ☑	Yes: Some Difficulty ☑	Yes: Lots of Difficulty ☑	Cannot Do At All ☑
1	Do you have difficulty seeing, even if wearing Glasses?	☐	☐	☐	☐
2	Do you have difficulty hearing, even if using a hearing aid?	☐	☐	☐	☐
3	Do you have difficulty walking or climbing steps?	☐	☐	☐	☐
4	Do you have difficulty remembering or concentrating?	☐	☐	☐	☐
5	Do you have difficulty (with self care such as) with washing all over or dressing?	☐	☐	☐	☐
6	Using your usual (customary) language, do you have difficulty communicating, for example, understanding or being understood?	☐	☐	☐	☐

Part 8: Mental Health (Show Card: Scale B)

Ref	**Read Question:** Over the **last two weeks**, how often have you been bothered by any of the following problems?	Not at all ☑	Several Days ☑	More than half the days ☑	Nearly every day ☑
1	Little interest or pleasure in doing things	☐	☐	☐	☐
2	Feeling down, depressed or hopeless	☐ Go To Part 9	☐	☐	☐
3	Trouble falling or staying asleep, or sleeping too much	☐	☐	☐	☐
4	Feeling tired or having little energy	☐	☐	☐	☐
5	Poor appetite or overeating	☐	☐	☐	☐
6	Feeling bad about yourself…or that you are a failure or have let yourself or family down?	☐	☐	☐	☐
7	Trouble concentrating on things, such as reading the newspaper or watching television?	☐	☐	☐	☐
8	Moving or speaking so slowly that other people could have noticed. Or the opposite, being so fidgety or restless that you have been moving around a lot more than usual?	☐	☐	☐	☐
9	Thoughts that you would be better off dead, or of hurting yourself	☐	☐	☐	☐
Ref	**Question**	Not difficult at all ☑	Somewhat difficult ☑	Very difficult ☑	Extremely difficult ☑
10	If you have experienced any of these problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	☐	☐	☐	☐

Part 9: Quality of Life **(Show Card: Scales C-G)**

Ref	Question	Very Poor ☑	Poor ☑	Neither Poor nor Good ☑	Good ☑	Very Good ☑
1	How would you rate your quality of life?	☐	☐	☐	☐	☐

Ref	Question	Very Dissatisfied ☑	Dissatisfied ☑	Neither satisfied nor Dissatisfied ☑	Satisfied ☑	Very Satisfied ☑
2	How satisfied are you with your health?	☐	☐	☐	☐	☐

Ref	The following questions ask about how much you have experienced certain things over the **last four weeks?**	Not at all ☑	A Little ☑	A Moderate Amount ☑	Very Much or Mostly ☑	An Extreme Amount /Completely ☑
3	To what extent do you feel that physical pain prevents you from doing what you need to do?	☐	☐	☐	☐	☐
4	How much do you need any medical treatment to function in your daily life?	☐	☐	☐	☐	☐
5	How much do you enjoy life?	☐	☐	☐	☐	☐
6	To what extent do you feel your life to be meaningful?	☐	☐	☐	☐	☐
7	How well are you able to concentrate?	☐	☐	☐	☐	☐
8	How safe do you feel in your daily life?	☐	☐	☐	☐	☐
9	How healthy is your physical environment?	☐	☐	☐	☐	☐
10	Do you have enough energy for everyday life?	☐	☐	☐	☐	☐
11	Are you able to accept your bodily appearance?	☐	☐	☐	☐	☐
12	Have you enough money to meet your needs?	☐	☐	☐	☐	☐

13	How available to you is the information that you need in your day-to-day life?	☐	☐	☐	☐	☐
14	To what extent do you have the opportunity for leisure activities?	☐	☐	☐	☐	☐
Ref	**Question**	Very Poor ☑	Poor ☑	Neither Poor nor Good ☑	Good ☑	Very Good ☑
15	How well are you able to physically move and get around?	☐	☐	☐	☐	☐
Ref	**Question**	Very Dissatisfied ☑	Dissatisfied ☑	Neither Satisfied nor Dissatisfied ☑	Satisfied ☑	Very Satisfied ☑
16	How satisfied are you with your sleep?	☐	☐	☐	☐	☐
17	How satisfied are you with your ability to perform your daily living activities?	☐	☐	☐	☐	☐
18	How satisfied are you with your capacity to work?	☐	☐	☐	☐	☐
19	How satisfied are you with yourself?	☐	☐	☐	☐	☐
20	How satisfied are you with your personal relationships?	☐	☐	☐	☐	☐
21	How satisfied are you with your close (intimate) relationships?	☐	☐	☐	☐	☐
22	How satisfied are you with the support you get from your friends?	☐	☐	☐	☐	☐
23	How satisfied are you with the conditions of your living place?	☐	☐	☐	☐	☐
24	How satisfied are you with your access to health services?	☐	☐	☐	☐	☐
25	How satisfied are you with transport?	☐	☐	☐	☐	☐
Ref	The following question refers to how often you have felt or experienced certain things in the last four weeks.	Never ☑	Seldom ☑	Quite Often ☑	Very Often ☑	Always ☑
26	How often do you have negative feelings such as blue moods, despair, anxiety or depression?	☐	☐	☐	☐	☐

Part 10: Hearing

Ref	Question	Yes ☑	Sometimes ☑	No ☑
1	Does a hearing problem cause you to use the phone less often than you would like?	☐	☐	☐
2	Does a hearing problem cause you to feel embarrassed when meeting new people?	☐	☐	☐
3	Does a hearing problem cause you to avoid groups of people?	☐	☐	☐
4	Does a hearing problem make you irritable?	☐	☐	☐
5	Does a hearing problem cause you to feel frustrated when talking to members of your family?	☐	☐	☐
6	Does a hearing problem cause you difficulty when attending a party?	☐	☐	☐
7	Does a hearing problem cause you difficulty hearing/understanding co-workers, clients, or customers?	☐	☐	☐
8	Do you feel handicapped by a hearing problem?	☐	☐	☐
9	Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbours?	☐	☐	☐
10	Does a hearing problem cause you to feel frustrated when talking to co-workers, clients, or customers?	☐	☐	☐
11	Does a hearing problem cause you difficulty in the movies or theatre?	☐	☐	☐
12	Does a hearing problem cause you to be nervous?	☐	☐	☐
13	Does a hearing problem cause you to visit friends, relatives, or neighbours less often than you would like?	☐	☐	☐
14	Does a hearing problem cause you to have arguments with family members?	☐	☐	☐
15	Does a hearing problem cause you difficulty when listening to TV or radio?	☐	☐	☐
16	Does a hearing problem cause you to go shopping less often than you would like?	☐	☐	☐
17	Does any problem or difficulty with your hearing upset you at all?	☐	☐	☐
18	Does a hearing problem cause you to want to be by yourself?	☐	☐	☐
19	Does a hearing problem cause you to talk to family members less often than you would like?	☐	☐	☐
20	Do you feel that any difficulty with your hearing limits or hampers your personal or social life?	☐	☐	☐
21	Does a hearing problem cause you difficulty when sitting at a table and eating a meal with relatives or friends?	☐	☐	☐

Ref	Question	Yes ☑	Sometimes ☑	Never ☑
22	Does a hearing problem cause you to feel depressed?	☐	☐	☐
23	Does a hearing problem cause you to listen to TV or the radio less often than you would like?	☐	☐	☐
24	Does a hearing problem cause you to feel uncomfortable when talking to friends?	☐	☐	☐
25	Does a hearing problem cause you to feel left out when you are with a group of people?	☐	☐	☐
	Total			

Ref	Question **Scale: 1= Never 5 = Sometimes 10 = Always (Show Scale G)**	1-10 Response
26	Do you experience communication difficulties in situations, which involve speaking with one other person? For example: Home/Work/Social Situation	
27	Do you experience communication difficulties when watching television or listening to the radio?	
28	Do you experience communication difficulties in situations when conversing with a small group of several persons? For example: With friends or family, co-workers or over dinner	
29	Do you experience communication difficulties when you are in an unfavourable listening environment, such as at a noisy party, when there is background music, when riding on the bus or when someone whispers/talks from across the room?	
30	How often do you experience communication difficulties in a situation when you need or want to hear well? For example: Trying to hear instructions or information	
31	Do you feel that any difficulty with hearing negatively affects or hampers your personal or social life?	
32	Does any problem or difficulty with hearing worry, annoy or upset you?	
33	Do your family, friends or co-workers seem to be concerned, annoyed or suggest that you have a hearing problem?	
34	How often does hearing loss negatively affect your enjoyment of life?	
35	How often has your hearing problem potentially caused or contributed to a safety or security concern? For example: At home or at work. Please explain what happened?	
	Total Score	

Ref Number	Question	Answer
36	Today, as you are, what would you like to do? What are your current dreams and aspirations?	

Ref Number	Question	Answer
37	Thank you for your help in answering these questions today. Do you have any final comments you wish to share?	

Ref Number	Question	Answer ☑		
38	With your consent, I would now like to ask another member of your household a few questions about your hearing.	Consent Yes ☐ **Q39 + Part 11**	Unavailable ☐ **End Interview**	Refused ☐ **End Interview**

Ref Number	Question	Answer ☑	
39	What is this member's relationship to you?	Husband	☐
		Wife	☐
		Daughter	☐
		Son	☐
		Other: Specify	☐

Interviewer Notes & Extended Answers

End of Interview

Part 11: Significant Other Question Set

Ref Number	Question 1 = Never 5 = Sometimes 10 = Always (Show Scale G)	1-10 Response
1	Does he/she experience communication difficulties in situations, which involve speaking with one other person? For example: At home, in work or during a social situation?	
2	Does he/she experience communication difficulties when watching television or listening to the radio?	
3	Does he/she experience communication difficulties in situations when conversing with a small group of several persons? For example: With friends or family, co-workers or over dinner	
4	Does he/she experience communication difficulties when they are in an unfavourable listening environment, such as at a noisy party, when there is background music, when riding on the bus or when someone whispers/talks from across the room?	
5	How often does he/she experience communication difficulties in a situation when they need or want to hear well? For example: Unable to hear instructions or information being provided	
6	Do you feel that any difficulty with hearing negatively affects or hampers his or her personal or social life?	
7	Do you feel that any problem of difficulty with hearing worries, annoys or upsets him/her?	
8	Do you or others seem to be concerned, annoyed or suggest that he/she has a hearing problem?	
9	How often does hearing loss negatively affect his/her enjoyment of life?	
10	How often has his/her hearing problem potentially caused or contributed to a safety or security concern? For example: At home or at work. Please explain what happened? (Write notes below)	
	Total Score	

Appendix II: Follow-Up Questionnaire

Case & Control Group

Questionnaire

Post-Intervention

Guatemala
2016

Version 4.0
Private & Confidential

Content & Navigation

Section					Page Number
Introduction	Title Page				1
	Contents				2
	Pre-Interview Check-List				3
Section	**Question Set**	**Case**	**Control**	**Number of Questions**	**Page Number**
Part 01	Participant Information	☑	☑	12 (8 + 4)	3
Part 02	Household	☑	☑	7	5
Part 03	Activities & Work Participation	☑	☑	17	7
Part 04	Income	☑	☑	4	11
Part 05	Expenditure & Consumption	☑	☑	11	12
Part 06	General Health	☑	☑	6	16
Part 07	Mental Health	☑	☑	10	17
Part 08	Quality of Life	☑	☑	26	18
Part 09	Hearing (A-F)	☑		76	20
Part 10	Significant Other Question Set	☑		11	28
Appendix I	**Scale Show Card**				29

Participants	Section: Parts	Total Number of Questions
Control Group	01-08	89
Case Group	01-09 (+10)	180

Pre-Interview Checklist	☑
Introductions	☐
Thank You for Participating	☐
Research Study Explanation	☐
Read Information Sheet	☐
Read Consent Form & Sign	☐
Question & Answer Opportunity	☐

Part 01: Participant Information

Ref	Question	Answer ☑	
1	Subject	Case ☐	Control ☐

Ref	Question	Answer		
2	Subject Name	First Name	Family Name	Initials (All)

Ref	Question	Answer ☑	
3	Gender	☐ Male	☐ Female

Ref	Question	Answer			
4	Age & Date of Birth	Age (Years)	Day	Month	Year

Ref	Question			
5	**Post Intervention** Interview Date	Day	Month	Year

Ref	Question	Answer	
6	Interviewer	First & Family Name	Team Number

Ref	Question	Answer
7	Interview Address	
8	Geographical Coordinates	

Case Specific Information

Ref	Question	Answer ☑		
9	Hearing Impairment	Left Ear ☐	Right Ear ☐	Both Ears ☐

Ref	Question	Answer ☑		
10	Hearing Aids Fitted	Left Ear ☐	Right Ear ☐	Both Ears ☐

Ref	Question	Answer		
11	Date of Hearing Aid Fitting	Day:	Month:	Year:

Ref	Question	Answer
12	Total number of **complete months** in possession of hearing aids	☐ **Complete Months**

Part 02: Household

Ref	Question	Answer ☑			
1	What is your marital status?	Married or Living Together ☐	Divorced /Separated ☐	Widowed ☐	Single ☐

Ref	Question	Answer	
2	**Including you,** how many household members are there? **Household Member Definition:** Lived in household for at least six months of last year, eat meals together, do not pay rent and are not paid domestic help	☐ Adults (15 years+)	☐ Children (Under 15)

Ref	Question	Answer
3	**Including you,** how many household members contribute to the household income?	☐

Ref	Question	Answer ☑	
4	Does any member of this household own any land?	Yes ☐	No ☐ (Go to Q6)
5	If yes, how much land do they own?	☐ M^2	

Ref	Question	Answer ☑	
6	Does any member of the household own any livestock? For example: Herds of cattle, sheep, horses, oxen or chickens. Excluding pets.	Yes ☐	No ☐

Ref	Question	Answer	Response	
7	Does your household have any of the following items that are in working order?		Yes ☑	No ☑
		Radio	☐	☐
		Refrigerator	☐	☐
		Television	☐	☐
		Landline Telephone	☐	☐
		Mobile Phone	☐	☐
		Mattress or Bed	☐	☐
		Computer/Laptop/Electronic Tablet	☐	☐
		Washing Machine	☐	☐
		Watch or Clock	☐	☐
		Bicycle	☐	☐
		Motorcycle or Motor-Scooter	☐	☐
		Non-Motorised Cart	☐	☐
		Car or Truck	☐	☐
		Boat With Motor	☐	☐

Part 03: Activity & Work Participation

Ref	What activities do you perform and how frequently?	Did you spend any time in the last **week** performing?		Did you spend any time **yesterday** performing?		How many hours did you spend on these activities **yesterday**?
	Activity	**No**	**Yes**	**No**	**Yes**	**Minutes & Hours**
1	**Household Tasks** For Example: On behalf of you and other household members, looking after others/cooking, washing dishes, cleaning, shopping, traveling	☐	☐	☐	☐	
2	**Paid or Self Employment** For Example: Making & selling products from home/working for a business	☐	☐	☐	☐	Include Transport Time
3	**Household Work** Any work for your own or household use and benefit? Including farming fetching firewood, processing own agricultural products, childcare	☐	☐	☐	☐	
4	**Social Visits** **(**Ceremonies, Celebrations, Meetings, Church, Visiting Friends & Family	☐	☐	☐	☐	
5	**Leisure Activities** Including reading, listening to the radio, watching TV, entertaining, hobbies and interests	☐	☐	☐	☐	

6	**Daytime Sleeping**	☐	☐	☐	☐	
7	**Other Activity:** Specify:	☐	☐	☐	☐	

Ref	Question	Answer	☑
8	Did you do any type of work in the last 4 weeks that contributes to the household income?	☐ Yes (Go to Q11)	☐ No
9	Have you been looking for work and ready for work in the last 4 weeks?	☐ Yes (Go to Q11)	☐ No
Ref	**Question**	**Answer**	**☑**
10	What was the **main** reason for not working or looking for work in the last 4 weeks?	Household & Family / Child Care Role	☐
		Seasonal Inactivity	☐
		Student	☐
		No Work Available	☐
		Too Old / Young	☐
		My Hearing Problem	☐
		Other	☐
11	How many jobs did you have in the last year?		**Number** ☐ **If 0: Skip To Part 4**
12	Please name **the three main jobs** in order of importance (Greatest income source first)	Over the last **12 months,** how many months did you work on this job?	How many hours per week did you work in the **last month?**

	Job 1 Title:	☐	☐
	Job 2 Title:	☐	☐
	Job 3 Title:	☐	☐

Ref	Question	Answer	☑
13	Did you work relatively more or less than usual in the last month?	More than usual	☐
		Same as usual	☐
		Less than usual	☐
14	How were you paid for the main job? (Job 1)	Wages/Salary	☐
		Payment in Kind	☐
		Casual (hourly/daily)	☐
		Unpaid or Volunteer	☐
		Self-employed	☐
15	For whom did you work for in your main job?	Government	☐
		Non-Government Organisation	☐
		Private Business	☐
		Private Person/Household	☐
		Other (Specify)	☐

16	What is the **main activity** at the place of your main job?	Agriculture/Farming	☐
		Manufacturing/ Processing	☐
		Building & Construction	☐
		Transport	☐
		Shop/Selling/Vendor	☐
		Hospitality (Waiter/Chef/Housekeeper)	☐
		Education/Health	☐
		Other (Specify)	☐

Ref	Question	Answer	No ☑	Yes ☑
17	Are you entitled to any of the following?	Paid Sick Leave	☐	☐
		Paid Holiday	☐	☐
		Maternity/Paternity Leave	☐	☐
		Retirement Pension	☐	☐
		Social Security Benefits	☐	☐
		Health Insurance/ Free Medical Care	☐	☐

Part 04: Income

Ref	Statement	Answer ☑	
1	I'm now going to ask you some questions regarding you and your household's financial income.	☐ Yes: Proceed To Part 4: Q2	☐ Refused Go to Part 5

Ref	Question	Weekly Amount (Q)	Monthly Amount (Q)
2	What is your weekly / monthly income from your job?		
3	What is the total weekly/monthly income from other household members jobs?		
4	Does the household have any other sources of income? If so, how much? For Example: Do You/Your Household: ▪ Sell products, wash clothes or make food for others? ▪ Have a pension? ▪ Have financial support from your family ▪ Receive any remittances? ▪ Receive any interest on savings or on loans you have made?		
	Total Income Per Week / Month		
	Calculation	**X52**	**X12**
	Total Annual Household Income		

Part 05: Household Spending & Consumption

1. In the past 7 days, has any member of your household spent money on any of the following items?			How much did your household spend on each item?
Items	**No ☑**	**Yes ☑**	**QUETZAL Q.**
Tobacco, cigarettes, cigars	☐	☐	
Newspapers or magazines	☐	☐	
Lottery tickets	☐	☐	
Fares for public transport: busses, taxis, etc.	☐	☐	
Petrol, oil and car service	☐	☐	
Parking	☐	☐	
Charity	☐	☐	
Restaurant or Café Meals, Beverages & Snacks	☐	☐	
		Total: Week	

2. Over the **past week** has your **household** eaten the following food Items?	**Eaten**		**Value**	**Purchased**	**Gift**	**Payment**
	Yes ☑	**No ☑**	**Q.**	☑	☑	☑
Vegetable Oils & Cooking Fat	☐	☐		☐	☐	☐
Butter or Margarine	☐	☐		☐	☐	☐
Milk (Liquid/Powder)	☐	☐		☐	☐	☐
Eggs	☐	☐		☐	☐	☐
Other Dairy Products Example: Yoghurt & Cheese	☐	☐		☐	☐	☐
Vegetables Example: Potato/Salad/Avocado	☐	☐		☐	☐	☐
Fresh Meat & Poultry	☐	☐		☐	☐	☐
Fresh Fish	☐	☐		☐	☐	☐
Fruit: Water Melon/Papaya	☐	☐		☐	☐	☐
Beans	☐	☐		☐	☐	☐
Rice	☐	☐		☐	☐	☐
Nuts	☐	☐		☐	☐	☐
Tortilla	☐	☐		☐	☐	☐
		Weekly Total				

3. Over the **past month** has your **household** eaten the following Food Items?	**Eaten**		**Value**	**Purchased**	**Gift**	**Payment**
	Yes ☑	**No** ☑	**Q.**	☑	☑	☑
Breakfast Cereal	☐	☐		☐	☐	☐
Flour / Grain	☐	☐		☐	☐	☐
Sugar	☐	☐		☐	☐	☐
Baby Formula	☐	☐		☐	☐	☐
Chocolate	☐	☐		☐	☐	☐
Canned Foods (fish, fruit)	☐	☐		☐	☐	☐
Soft Drinks	☐	☐		☐	☐	☐
Beer and Alcoholic Beverages	☐	☐		☐	☐	☐
Biscuits and Cakes	☐	☐		☐	☐	☐
Spices and Condiments	☐	☐		☐	☐	☐
Jam	☐	☐		☐	☐	☐
Tea	☐	☐		☐	☐	☐
Coffee	☐	☐		☐	☐	☐
Any Other Food Items Not Listed Specify:	☐	☐		☐	☐	☐
Monthly Total						

4. Over the **past month** has your **household** spent money on any of the following Items?	**Spent**		**Value**
	Yes ☑	**No** ☑	**Q.**
Personal care items (haircuts, cosmetics, shampoo, toothpaste)	☐	☐	
Clothing or shoes for adults	☐	☐	
Clothing or shoes for children (including school uniform)	☐	☐	
Material to make clothing, curtains and other items	☐	☐	
Telephone (service + calls + prepaid) Including Cell Phone	☐	☐	
Holidays & Excursions	☐	☐	
Jewellery, watches and other luxury goods	☐	☐	
Birthdays & Ceremonies (Weddings & Funerals)	☐	☐	
Membership Fees	☐	☐	
Monthly Total			

5. Entertainment: Over the **past month** has your **household** spent money on any of the following Items?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Books & Stationary (Excluding Textbooks)	☐	☐	
Postal Expenses	☐	☐	
Entertainment/Leisure (Cinema, DVD Rentals, Music, Sporting Events)	☐	☐	
Internet & TV / Cable	☐	☐	
Sports / Hobby Equipment	☐	☐	
		Total	

6. Healthcare Expenses: Over the **past month** has your **household** spent money on any of the following?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Medical Insurance Fees	☐	☐	
Hospital/Clinic Costs: Dentists/Doctor/Nurse Fees	☐	☐	
Medical Supplies: Medicines, Bandages	☐	☐	
Natural / Complementary Therapy	☐	☐	
		Total	

7. Household Expenses: Over the **past month** has your **household** spent money on any of the following?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Household Cleaning (soap, washing powder)	☐	☐	
Kitchen Equipment (pots, pans, lamps, torches)	☐	☐	
Bedding Sheets, Blankets and Towels	☐	☐	
Furniture and Household Appliances	☐	☐	
Home Maintenance and Repairs	☐	☐	
Fuel (Firewood, Charcoal, Cooking Gas)	☐	☐	
All Other Household Expenses Specify:	☐	☐	
		Total	

8. Education Fees: Over the **past month** has your **household** spent money on the following?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
School Fees and Tuition	☐	☐	
University Fees	☐	☐	
Other School Expenses (books, transport, meals at school)	☐	☐	
		Total	

9. Tax & Legal Fees: Over the **past month** has your **household** spent money on any of the following? (Prompt: An annual 1/12th Proportion)	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Income Tax	☐	☐	
Land Tax/Land Rates	☐	☐	
Housing and property tax	☐	☐	
Legal or notary services	☐	☐	
		Total	

10. Insurance & Fees: Over the **past month** has your **household** spent money on any of the following?	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Insurance (Car & Property)	☐	☐	
		Total	

11. Other Expenses: Over the **past month** has your **household** spent money on any other items or services? Please specify below.	**Spent**		**Value**
	Yes ☑	**No ☑**	**Q.**
Specify:	☐	☐	
Specify:	☐	☐	
		Total	

Total Monthly Expenditure (Q)	

Part 06: General Health (Show Card: Scale A)

Ref	Question	No ☑	Yes: Some Difficulty ☑	Yes: Lots of Difficulty ☑	Cannot Do At All ☑
1	Do you have difficulty seeing, even if wearing Glasses?	☐	☐	☐	☐
2	Do you have difficulty hearing, even if using a hearing aid?	☐	☐	☐	☐
3	Do you have difficulty walking or climbing steps?	☐	☐	☐	☐
4	Do you have difficulty remembering or concentrating?	☐	☐	☐	☐
5	Do you have difficulty (with self care such as) with washing all over or dressing?	☐	☐	☐	☐
6	Using your usual (customary) language, do you have difficulty communicating, for example, understanding or being understood?	☐	☐	☐	☐

Part 07: Mental Health (Show Card: Scale B)

Ref	**Read Question:** Over the **last two weeks**, how often have you been bothered by any of the following problems?	Not at all ☑	Several Days ☑	More than half the days ☑	Nearly every day ☑
1	Little interest or pleasure in doing things	☐	☐	☐	☐
2	Feeling down, depressed or hopeless	☐ Go To Part 08	☐	☐	☐
3	Trouble falling or staying asleep, or sleeping too much	☐	☐	☐	☐
4	Feeling tired or having little energy	☐	☐	☐	☐
5	Poor appetite or overeating	☐	☐	☐	☐
6	Feeling bad about yourself…or that you are a failure or have let yourself or family down?	☐	☐	☐	☐
7	Trouble concentrating on things, such as reading the newspaper or watching television?	☐	☐	☐	☐
8	Moving or speaking so slowly that other people could have noticed. Or the opposite, being so fidgety or restless that you have been moving around a lot more than usual?	☐	☐	☐	☐
9	Thoughts that you would be better off dead, or of hurting yourself	☐	☐	☐	☐
Ref	**Question**	Not difficult at all ☑	Somewhat difficult ☑	Very difficult ☑	Extremely difficult ☑
10	If you have experienced any of these problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	☐	☐	☐	☐

Part 08: Quality of Life (Show Card: Scales C-G)

Ref	Question	Very Poor ☑	Poor ☑	Neither Poor nor Good ☑	Good ☑	Very Good ☑
1	How would you rate your quality of life?	☐	☐	☐	☐	☐

Ref	Question	Very Dissatisfied ☑	Dissatisfied ☑	Neither satisfied nor Dissatisfied ☑	Satisfied ☑	Very Satisfied ☑
2	How satisfied are you with your health?	☐	☐	☐	☐	☐

Ref	The following questions ask about how much you have experienced certain things over the **last four weeks?**	Not at all ☑	A Little ☑	A Moderate Amount ☑	Very Much or Mostly ☑	An Extreme Amount /Completely ☑
3	To what extent do you feel that physical pain prevents you from doing what you need to do?	☐	☐	☐	☐	☐
4	How much do you need any medical treatment to function in your daily life?	☐	☐	☐	☐	☐
5	How much do you enjoy life?	☐	☐	☐	☐	☐
6	To what extent do you feel your life to be meaningful?	☐	☐	☐	☐	☐
7	How well are you able to concentrate?	☐	☐	☐	☐	☐
8	How safe do you feel in your daily life?	☐	☐	☐	☐	☐
9	How healthy is your physical environment?	☐	☐	☐	☐	☐
10	Do you have enough energy for everyday life?	☐	☐	☐	☐	☐
11	Are you able to accept your bodily appearance?	☐	☐	☐	☐	☐
12	Have you enough money to meet your needs?	☐	☐	☐	☐	☐

13	How available to you is the information that you need in your day-to-day life?	☐	☐	☐	☐	☐
14	To what extent do you have the opportunity for leisure activities?	☐	☐	☐	☐	☐
Ref	**Question**	Very Poor ☑	Poor ☑	Neither Poor nor Good ☑	Good ☑	Very Good ☑
15	How well are you able to physically move and get around?	☐	☐	☐	☐	☐
Ref	**Question**	Very Dissatisfied ☑	Dissatisfied ☑	Neither Satisfied nor Dissatisfied ☑	Satisfied ☑	Very Satisfied ☑
16	How satisfied are you with your sleep?	☐	☐	☐	☐	☐
17	How satisfied are you with your ability to perform your daily living activities?	☐	☐	☐	☐	☐
18	How satisfied are you with your capacity to work?	☐	☐	☐	☐	☐
19	How satisfied are you with yourself?	☐	☐	☐	☐	☐
20	How satisfied are you with your personal relationships?	☐	☐	☐	☐	☐
21	How satisfied are you with your close (intimate) relationships?	☐	☐	☐	☐	☐
22	How satisfied are you with the support you get from your friends?	☐	☐	☐	☐	☐
23	How satisfied are you with the conditions of your living place?	☐	☐	☐	☐	☐
24	How satisfied are you with your access to health services?	☐	☐	☐	☐	☐
25	How satisfied are you with transport?	☐	☐	☐	☐	☐
Ref	The following question refers to how often you have felt or experienced certain things in the last four weeks.	Never ☑	Seldom ☑	Quite Often ☑	Very Often ☑	Always ☑
26	How often do you have negative feelings such as blue moods, despair, anxiety or depression?	☐	☐	☐	☐	☐

Case Group Only: Proceed to Part 09: Hearing

Control Group Only: The Last Question

Ref	Control Last Question	Answer
CONLQ	Thank you for your help in answering these questions today. Do you have any final comments you wish to share?	

Part 09: Hearing

Ref	Question	Never ☑	One Day Per Week ☑	2-6 Days Per Week ☑	Everyday ☑
1	How many days per week do you wear your hearing aids?	☐	☐	☐	☐

Ref	Question	None ☑	Less than 1 Hour Per Day ☑	1-4 Hours Per Day ☑	4-8 Hours Per Day ☑	8-16 Hours Per Day ☑
2	On a daily basis, how often do you use your hearing aids?	☐	☐	☐	☐	☐

Ref	Question	Answer	☑
3	**If answered 'Everyday' AND '8-16 Hours' skip this question.** What is the **main reason** why you don't wear your hearing aids **all day, every day.** Tick **one** box only.	They are uncomfortable	☐
		They don't help my hearing	☐
		They are broken	☐
		They were lost or stolen	☐
		I only wear them when I go out	☐
		I don't need to communicate all of the time	☐
		I feel embarrassed wearing them	☐
		Other Reason: Please State:	☐

Part 9a: Hearing

Ref: SADL	Question (See Show Card H)	A Not a lot ☑	B A Little ☑	C Somewhat ☑	D Medium ☑	E Considerably ☑	F Greatly ☑	G Tremendously ☑
1	Compared to using no hearing aids at all, do your hearing aids help you understand the people you speak with most frequently?	☐	☐	☐	☐	☐	☐	☐
2	Are you frustrated when your hearing aids pick up sounds that keep you from hearing what you want to hear?	☐	☐	☐	☐	☐	☐	☐
3	Are you convinced that obtaining your hearing aids was in your best interest?	☐	☐	☐	☐	☐	☐	☐
4	Do you think people notice your hearing loss more when you wear your hearing aids?	☐	☐	☐	☐	☐	☐	☐
5	Do your hearing aids reduce the number of times you have to ask people to repeat?	☐	☐	☐	☐	☐	☐	☐
6	Do you think your hearing aids are worth the trouble?	☐	☐	☐	☐	☐	☐	☐
7	Are you bothered by an inability to get enough loudness from your hearing aids without feedback? (whistling)	☐	☐	☐	☐	☐	☐	☐
8	How content are you with the appearance of your hearing aids?	☐	☐	☐	☐	☐	☐	☐
9	Does wearing your hearing aids improve your self-confidence?	☐	☐	☐	☐	☐	☐	☐
10	How natural is the sound from your hearing aid's?	☐	☐	☐	☐	☐	☐	☐
11	How helpful are your hearing aids on the telephone? (with no amplifier on loudspeaker)	☐	☐	☐	☐	☐	☐	☐
12	How competent was the person who provided you with your hearing aids?	☐	☐	☐	☐	☐	☐	☐
13	Do you think wearing your hearing aids makes you seem less capable?	☐	☐	☐	☐	☐	☐	☐
14	Does the cost of your hearing aids seem reasonable to you?	☐	☐	☐	☐	☐	☐	☐

15	How pleased are you with the dependability (how often they need repair) of your hearing aids?	☐	☐	☐	☐	☐	☐	☐

Part 9b: Hearing

Ref: IOI-HA	**Question**	None ☑	Less than 1 Hour Per Day ☑	1-4 Hours Per Day ☑	4-8 Hours Per Day ☑	More Than 8 Hours Per Day ☑
1	Think about how much you have used your hearing aids over the past two weeks. On an average day, how many hours did you use the hearing aids?	☐	☐	☐	☐	☐
Ref: IOI-HA	**Question**	Helped Not At All	Helped slightly	Helped moderately	Helped quite a lot	Helped very much
2	Think about the situation where you most wanted to hear better before you got your hearing aids. Over the past two weeks, how much has your hearing aids helped in that specific situation?	☐	☐	☐	☐	☐
Ref: IOI-HA	**Question**	Very much difficulty	Quite a lot of difficulty	Moderate difficulty	Slight difficulty	No difficulty
3	Think again about the situation where you most wanted to hear better. When you use your hearing aids how much difficulty do you **still** have in that situation?	☐	☐	☐	☐	☐
Ref: IOI-HA	**Question**	Not At All Worth It	Slightly Worth It	Moderately Worth It	Quite a Lot Worth It	Very Much Worth It
4	Considering everything, do you think your hearing aid(s) are worth the trouble?	☐	☐	☐	☐	☐
Ref: IOI-HA	**Question**	Affected very much	Affected quite a lot	Affected moderately	Affected slightly	Affected not at all

5	Over the past two weeks, with using your hearing aids, how much have your hearing difficulties affected the things you can do?	☐	☐	☐	☐	☐
Ref: IOI-HA	**Question**	Bothered very much	Bothered quite a lot	Bothered moderately	Bothered slightly	Bothered not at all
6	Over the past two weeks, with using your hearing aids, how much do you think other people were bothered by your hearing difficulties?	☐	☐	☐	☐	☐
Ref: IOI-HA	**Question**	Worse	No change	Slightly better	Quite a lot better	Very much better
7	Considering everything, how much have your hearing aids changed your enjoyment of life?	☐	☐	☐	☐	☐

Part 9c: Hearing

Ref	Question: When you are using your hearing aids:	Yes ☑	Sometimes ☑	No ☑
1	Does a hearing problem cause you to use the phone less often than you would like?	☐	☐	☐
2	Does a hearing problem cause you to feel embarrassed when meeting new people?	☐	☐	☐
3	Does a hearing problem cause you to avoid groups of people?	☐	☐	☐
4	Does a hearing problem make you irritable?	☐	☐	☐
5	Does a hearing problem cause you to feel frustrated when talking to members of your family?	☐	☐	☐
6	Does a hearing problem cause you difficulty when attending a party?	☐	☐	☐
7	Does a hearing problem cause you difficulty hearing/understanding co-workers, clients, or customers?	☐	☐	☐
8	Do you feel handicapped by a hearing problem?	☐	☐	☐
9	Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbours?	☐	☐	☐
10	Does a hearing problem cause you to feel frustrated when talking to co-workers, clients, or customers?	☐	☐	☐
11	Does a hearing problem cause you difficulty in the movies or theatre?	☐	☐	☐

12	Does a hearing problem cause you to be nervous?	☐	☐	☐
13	Does a hearing problem cause you to visit friends, relatives, or neighbours less often than you would like?	☐	☐	☐
14	Does a hearing problem cause you to have arguments with family members?	☐	☐	☐
Ref	**Question: When you are using your hearing aids:**	**Yes** ☑	**Sometimes** ☑	**Never** ☑
15	Does a hearing problem cause you difficulty when listening to TV or radio?	☐	☐	☐
16	Does a hearing problem cause you to go shopping less often than you would like?	☐	☐	☐
17	Does any problem or difficulty with your hearing upset you at all?	☐	☐	☐
18	Does a hearing problem cause you to want to be by yourself?	☐	☐	☐
19	Does a hearing problem cause you to talk to family members less often than you would like?	☐	☐	☐
20	Do you feel that any difficulty with your hearing limits or hampers your personal or social life?	☐	☐	☐
21	Does a hearing problem cause you difficulty when sitting at a table and eating a meal with relatives or friends?	☐	☐	☐
22	Does a hearing problem cause you to feel depressed?	☐	☐	☐
23	Does a hearing problem cause you to listen to TV or the radio less often than you would like?	☐	☐	☐
24	Does a hearing problem cause you to feel uncomfortable when talking to friends?	☐	☐	☐
25	Does a hearing problem cause you to feel left out when you are with a group of people?	☐	☐	☐
	Total			

Part 9d: Hearing

Ref	**Hearing Aid Features (Show Scale D)**	Very Dissatisfied ☑	Dissatisfied ☑	Neither Satisfied nor Dissatisfied ☑	Satisfied ☑	Very Satisfied ☑
1	Overall fit / comfort	☐	☐	☐	☐	☐
2	Visibility to others	☐	☐	☐	☐	☐
3	Ease of changing battery	☐	☐	☐	☐	☐

4	Battery life	☐	☐	☐	☐	☐
5	Access to battery supplies	☐	☐	☐	☐	☐
6	Ability to adjust volume*	☐	☐	☐	☐	☐
7	Access to repair and maintenance services	☐	☐	☐	☐	☐
8	Frequency of cleaning required	☐	☐	☐	☐	☐
9	Ability to tell the location and direction of sounds	☐	☐	☐	☐	☐
10	The sound of your own voice	☐	☐	☐	☐	☐
11	Comfort with loud sounds	☐	☐	☐	☐	☐
12	Overall, how satisfied are you with your hearing aid(s)?	☐	☐	☐	☐	☐

Part 9e: Hearing

Ref	Question	Answer	☑
1	In your experience, with using hearing aids what has been **the most significant** benefit? None ☐ **(Tick one box only)**	Communication with family & friends	☐
		Watching TV / Listening to music	☐
		Able to now work and earn money	☐
		Feeling safer and / or more confident	☐
		Going out and participating in social activities	☐
		Other: Please State:	☐

Part 9f: Hearing

Ref	**Question: When you are using your hearing aids …** **Scale: 1 = Never - 10 = Always**	**1-10 Response (Show Scale G)**
1	Do you experience communication difficulties in situations, which involve speaking with one other person? For example: Home/Work/Social Situation	
2	Do you experience communication difficulties when watching television or listening to the radio?	

3	Do you experience communication difficulties in situations when conversing with a small group of several persons? For example: With friends or family, co-workers or over dinner	
4	Do you experience communication difficulties when you are in an unfavorable listening environment, such as at a noisy party, when there is background music, when riding on the bus or when someone whispers/talks from across the room?	
5	How often do you experience communication difficulties in a situation when you need or want to hear well? For example: Trying to hear instructions or information	
6	Do you feel that any difficulty with hearing negatively affects or hampers your personal or social life?	
7	Does any problem or difficulty with hearing worry, annoy or upset you?	
8	Do your family, friends or co-workers seem to be concerned, annoyed or suggest that you have a hearing problem?	
9	How often does hearing loss negatively affect your enjoyment of life?	
10	How often has your hearing problem potentially caused or contributed to a safety or security concern? Either at home or at work? Can you explain what happened?	
	Total Score	

Final Question Set:

Ref Number	Question	Answer
1	Thank you for your help in answering these questions today. Do you have any final comments you wish to share?	

Ref Number	Question	Answer ☑		
2	With your consent, I would now like to ask another member of your household a few questions about your hearing.	Consent Yes ☐ **Q3 + Part 10**	Unavailable ☐ **End Interview**	Refused ☐ **End Interview**

Ref Number	Question	Answer ☑	
3	What is this member's relationship to you?	Husband	☐
		Wife	☐
		Daughter	☐
		Son	☐
		Other: Specify	☐

Interviewer Notes & Extended Answers

End of Interview

Part 10: Significant Other Question Set

Ref	Question	None ☑	Less than 1 Hour Per Day ☑	1-4 Hours Per Day ☑	4-8 Hours Per Day ☑	8-16 Hours Per Day ☑
A	How often does he/she use their hearing aids?	☐	☐	☐	☐	☐

Ref Number	**Question: With using their hearing aids …** **Scale: 1 = Never - 10 = Always (Show Scale G)**	1-10 Response
1	Does he/she experience communication difficulties in situations, which involve speaking with one other person? For example: At home, in work or during a social situation?	
2	Does he/she experience communication difficulties when watching television or listening to the radio?	
3	Does he/she experience communication difficulties in situations when conversing with a small group of several persons? For example: With friends or family, co-workers or over dinner	
4	Does he/she experience communication difficulties when they are in an unfavorable listening environment, such as at a noisy party, when there is background music, when riding on the bus or when someone whispers/talks from across the room?	
5	How often does he/she experience communication difficulties in a situation when they need or want to hear well? For example: Unable to hear instructions or information being provided	
6	Do you feel that any difficulty with hearing negatively affects or hampers his or her personal or social life?	
7	Do you feel that any problem of difficulty with hearing worries, annoys or upsets him/her?	
8	Do you or others seem to be concerned, annoyed or suggest that he/she has a hearing problem?	
9	How often does hearing loss negatively affect his/her enjoyment of life?	
10	Since using their hearing aids, how often has his/her hearing problem potentially caused or contributed to a safety or security concern? Either at home or at work? If so, can you explain what happened?	
	Total Score	

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