We hope to provide useful information to stakeholders about our families, services and outcomes through this report.

Should you have any feedback, please direct this to Scott Johnston, the CEO of The Hearing House: scott@hearinghouse.co.nz or to the report’s primary author: Janet Digby, janet@levare.co.nz.

Thanks to everyone in the team who contributed to this report, particularly Carolyn Malem (Clinical Administrator) who led the work on this year’s report.
The Hearing House is a charity established in 1998 to teach deaf and hearing impaired children to listen and speak. Since its inception, it has provided services to more than 400 children.
Young children with hearing aids or cochlear implants require an abundance of listening and language stimulation\(^1\) to catch up with their hearing peers. As a result, for this group, The Hearing House focuses on intensive therapy and building parents’ skills to carry out therapy at home, as part of normal life. Older children and teenagers receive school-based therapy.

The majority of families who receive services have children with one or two cochlear implants, meaning they receive audiological services from The Hearing House. Most have hearing losses that are described as severe or profound from an audiological perspective.

The Hearing House has been based in Greenlane, Auckland since 1998. Since 2014 staff were working from temporary premises as the Greenlane site was being redeveloped. The process of moving back to the Greenlane site began with the Joyce Fisher Preschool opening in July 2015, and all remaining staff, were in the new centre by early 2018.

The organisation employs habilitationists, audiologists and administrators, as well as staff for its preschool. Team members strive to provide the best possible services for children, young people and their families.

The Hearing House (THH) partners with Kelston Deaf Education Centre (KDEC) and staff from this organisation provide cochlear implant habilitation services in the northern region (north of Turangi) for children over the age of five years.

In addition to providing services for families whose children have been, or are being, assessed for cochlear implants, The Hearing House also provides habilitation services for a number of children under the age of five, who have hearing aids.

Habilitation services provided by The Hearing House for families of children with hearing aids are not Government funded. Therefore, these services are provided on a case-by-case basis, depending on clinical capacity and the availability of private funding. All services are provided free-of-charge to deaf and hearing impaired children and their families.

The Hearing House receives about half of its funding from the Northern Cochlear Implant Trust to provide services to children and young people with cochlear implants, including those who are at school. The remaining funding is raised from the charitable sector.

Since 1998, The Hearing House has provided services to more than 400 deaf & hearing impaired children.

The number of children supported by the cochlear implant programme has grown.

- 236 supported children in 2017
- 117 supported children in 2009
Of children receiving cochlear implant services:

- **31%** have one or more additional disabilities
- **52%** are European, **22%** Māori, **11%** Pacific, **22%** Asian, **5%** MELAA;
- are from a mix of socio-economic backgrounds, with **more** from higher deprivation areas
- **40%** are not verified for additional educational funding (ORS)
- **41%** are verified **HIGH NEEDS**
- **20%** are verified **VERY HIGH NEEDS**
- **69%** attend mainstream schools
- **18%** are in KDEC ‘School Provision’
- **10%** attend Special Schools
The Hearing House’s clinical team comprises habilitationists, audiologists, clinical support staff and preschool staff who work with families in the northern region.

In addition to employing clinical and clinical support staff, The Hearing House employs reception, administrative and fundraising staff and a chief executive. Together with the Kelston Deaf Education Centre habilitationists, staff members support more than 200 children with cochlear implant(s), or in assessment for cochlear implant(s), living north of Turangi.

Audiology and habilitation staff visit families on regular visits within the region, and families also benefit from remote MAPping of their devices and habilitation services offered through the internet. The Hearing House also provides habilitation services to a number of children each year with hearing aids, on a case-by-case basis.
Funding

Funding from Government covers a little under half the costs incurred by The Hearing House in providing services to children with hearing loss. To make up the gap and provide sufficient breadth and quality of services, The Hearing House relies on fundraising from the charitable sector.

Government funding received by The Hearing House is for the provision of services to clients who have one or two cochlear implants. These children and young people make up the majority of those who receive services from The Hearing House and its partner Kelston Deaf Education Centre. No funding is received from Government for habilitation services provided to children with hearing aids.

Revenue and spending costs described below exclude those associated with Kelston Deaf Education Centre habilitation staff.

Figure 1: Funding and expenditure (2016-2017)
Habilitation

Auditory-Verbal Therapy

Technology alone is not sufficient to assist children with hearing loss to develop speech and language skills. An intensive auditory-based programme is needed to provide parents with the skills they need to cultivate their child’s spoken language potential.

The Hearing House was the first centre to provide such early intervention services – based on an Auditory-Verbal approach – to children in New Zealand.

A number of individuals played important roles in the development of Auditory-Verbal practice, including Helen Hulick Beebe and Doreen Pollack and their contemporaries. Even with the very limited technology available during the earlier days, considerably improved spoken outcomes for hearing impaired children were achieved through a focus on the use of residual hearing.

This type of therapy accelerates the natural way language develops to enable children with a cochlear implant(s) or hearing aids to catch up with the listening skills and language of their peers.

Families of children with cochlear implants generally receive one-on-one therapy for several years, in which the therapist works with the child and the parent(s) or caregiver(s). The parent, as the natural teacher of language, is the main focus for the habilitation. They learn skills and strategies to teach their child how to listen and speak, and these skills are applied during daily interactions with the child. Families may also be offered other programmes specific to their needs such as Music Therapy and Transition to School.

As children with a hearing loss often receive a number of specialised services, The Hearing House habilitation staff work collaboratively with many other professionals, including Ear, Nose and Throat (ENT) surgeons; Ministry of Education staff; private speech language therapists; child development staff; Resource Teachers of the Deaf (RTDs); Advisors on Deaf Children (AoDCs) and others.

The Hearing House provides five habilitationists to work with children under the age of five, while its partner, Kelston Deaf Education Centre, provides two habilitationists to work with children over the age of five years. The full time equivalents for staff can be seen in Figure 2.

Older children with progressive hearing loss, who already had language before their hearing deteriorated, may require less intensive habilitation support. KDEC habilitationists working with children over the age of five liaise directly with these students and their teachers.

In 2017, habilitation was offered each week in Hamilton, with therapists travelling to see families from surrounding areas. Additional outreach visits are made to Whangarei.

Habilitation and administration staff moved to temporary premises in September 2015 and were excited to move to the new redeveloped facility (The Stichbury Bidwill Centre) at the end of 2017.

Auditory language enrichment

Some children benefit most from an Auditory Language Enrichment programme (ALE) which continues to follow the principles of Auditory-Verbal Therapy, but where these principles are adapted to meet the additional needs of the child.

Children on this programme use listening to develop understanding and, where possible, communicate using spoken language. They may also use additional means to communicate, such as lip patterns, Key Sign, gestures, pecs (picture exchange communication system) and augmentative alternative communication.

Figure 2: Full time equivalent staff members

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Audiology

Qualified audiologists carry out testing to establish cochlear implant candidacy as well as providing post-operative audiology services for children under the age of 19.

The audiologists ensure cochlear implants are optimally programmed for the specific needs of each child and young person. In the first year following surgery, each cochlear implant recipient is seen at least 10 times by the programme's audiology staff. After the first year, children over five are seen annually and children under five are usually seen bi-annually, or more if issues arise.

Audiologists are responsible for monitoring each child's audiological progress and they utilise various measures to establish progress and benefit. Audiologists from the service also provide training sessions to professional groups such as RTDs.

As children with a hearing loss often receive a number of specialised services, The Hearing House audiology staff work with many other professionals, including Ear, Nose and Throat surgeons; other audiologists; RTDs; and AoDCs.

Children with hearing aids receive audiology services from their local district health board, rather than from The Hearing House's audiology team.

Audiology staff moved to temporary premises in mid-2015 and were excited to move to the new redeveloped facility (The Stichbury Bidwill Centre) at the end of 2017.

Clinical support

In addition, there are staff employed to manage repairs and inventory, scheduling, clinical administration and assessment and referrals.

Joyce Fisher Preschool

After a great deal of work, The Hearing House has its own purpose-built preschool, named after Lady Joyce Fisher, whose charitable trust provided significant funding for this development. This new building opened for use in July 2015.

Staff are particularly proud of the playground, which is nature-based and features a mud-kitchen, sandpit, bridge and vegetable garden. This focus aligns with the preschool's regular visits to Cornwall Park, which encourage learning and exploration.

The preschool operates using a reverse integration approach for hearing impaired children. This means that these children are part of a classroom environment that includes their hearing peers from the local community. The rich language environment that hearing peers provide, and the utilisation of Auditory-Verbal Therapy principles within the programme, encourages the development of listening skills and spoken language.

Teachers provide both quality language input and also reinforce language modelled by children in the preschool setting.

The preschool also provides a space for hearing impaired children to engage in social interaction in order to promote dynamic relationships and foster confidence and creativity. In addition, a core part of the preschool philosophy is to provide regular exploration of the natural environment, which exposes the children to a variety of experiences and provides a catalyst for spoken language.

The preschool was offering six-hour sessions each weekday during the 2016-17 year with children generally attending a minimum of three days a week.

During the year ending 30 June 2017, 32 children – 10 of whom are hearing impaired – attended the preschool. Numbers of children are dependent on spaces available and the number of days children attend.
Programmes

In addition to programmes included in the table below, we offer families a range of events and get-togethers during the year. These include a regular playgroup, ‘Meet the Tweens’ evening, graduation, picnics, parent evenings and family workshops.

Table 1: Programmes offered by The Hearing House

<table>
<thead>
<tr>
<th>Programme (cohort)</th>
<th>Details</th>
<th>Number of children in 2016-17 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transition to school (all four-year-olds)</td>
<td>The Hearing House provides a Transition to School process to support the parent, child and new school through the child’s transition into their school setting. AoDCs are a key part of this process and they work alongside the child’s parent(s), therapist, school staff, existing preschool staff and KDEC’s cochlear implant habilitationists. This programme serves to support the parents during this important change and ensures that the school can offer the child appropriate support to enable continued language development.</td>
<td>12</td>
</tr>
<tr>
<td>Tele-CHAT and Tele-Audiology (remote MAPping) (selected children living outside Auckland)</td>
<td>The Hearing House has been offering therapy via Skype (Tele-CHAT) to some families who live outside Auckland for a number of years. Sometimes families receive a combination of face-to-face sessions in Auckland, visits from staff to their home or local area and Tele-CHAT. This programme reduces inequalities of access for these families and has demonstrated its ability to provide significant numbers of additional sessions for families. It often reduces travel for families in the process, when compared with traditional delivery methods. Recipients of cochlear implants need to attend regular mapping sessions to adjust their speech processors. For some children who live outside of Auckland, the cochlear implant is programmed remotely via ‘Remote MAPping’ either utilising KDEC habilitation staff or by staff kindly provided by Bay Audiology. This can save the family time and costs associated with travel to Auckland.</td>
<td>16 (Tele-CHAT)</td>
</tr>
<tr>
<td>Music therapy (selected AVT and ALE children under the age of five)</td>
<td>These six-week workshops are usually held twice a year (but was only held once last year) and the therapy is provided by Raukatauri Music Therapy Centre, whose staff members are highly experienced in facilitating such sessions. The overall aim of this programme is to allow parents to explore music with their child and to add a dimension of creativity and fun to their listening experiences. Children develop responses to pulse, rhythm and pitch, and self-confidence and creativity is encouraged.</td>
<td>28 (Tele-Audiology)</td>
</tr>
<tr>
<td>Parent to parent and play groups (all children under 5)</td>
<td>This is a morning coffee group open to all parents whose children are aged under five and receiving services. These groups are facilitated by the habilitation staff.</td>
<td>5</td>
</tr>
<tr>
<td>Workshops (selected children under the age of five with cochlear implants and/or hearing aids)</td>
<td>Workshops are also offered for families of young children who have recently begun receiving services. Workshops held in the 2016 – 2017 year include a ‘Meet the Tweens’ evening for the parents and family members of children aged under 5 and a ‘Starting the Journey’ workshop</td>
<td>3 children in the May 2017 workshop</td>
</tr>
<tr>
<td>Focus (some children)</td>
<td>This programme, established through funding in 2010 from the JR McKenzie Trust, focuses on how The Hearing House can work more effectively with families who are not optimally engaged with the programme and those where the child’s progress is not as the clinical team had hoped, or who are at risk of poorer outcomes. In practice this means examining changes to policy and practice within the organisation to better support these families.</td>
<td>31</td>
</tr>
</tbody>
</table>
Since the very beginning, Gethin Thompson’s enthusiasm for life has been unmistakable. He confidently takes on a slide that scares his older sister and he has a mischievous twinkle in his eye.

When he was a newborn, Gethin wouldn’t keep still long enough for the newborn hearing screening test to provide a conclusive result, so mum Rhian took him to an audiology appointment when he was 11 weeks old. Rhian and her husband Michael expected it to be a routine visit that would last about 20 to 30 minutes, so he stayed at work while she attended the appointment. When Rhian was still there two hours later she knew something wasn’t right.

“We got the diagnosis that Gethin was profoundly deaf. It was a very big shock. That wasn’t even on our radar – there’s no family history of it. We were completely devastated – it came out of left field. You automatically start thinking of all the things he can’t do. I think I cried for a week,” Rhian says.

Rhian and Michael were quickly offered support and information about the various options available to them, and they were introduced to The Hearing House. “The first three months after his diagnosis were hectic and there were lots of appointments – therapists, audiologists, medical specialists.”

The couple, who also has a three-year-old daughter Audrey, were relieved to learn that Gethin was a suitable candidate for cochlear implants in both ears. “Obviously the surgery is not pleasant, but Gethin was a superstar. He was back to smiling the next day.”

When his implants were switched on, on November 15, 2016, he “had a really strong response”, there was an obvious look of amazement when he heard sound for the first time. Then the family had to get to grips with all the equipment and learn to live with the implants. Things have settled into a new routine for the family, “something of a normal life”, Rhian says. She says there have been many highlights throughout the journey – including hearing Gethin’s first word, “up”.

“We were sitting at the dining room table and he crawled over and said ‘up, up, up’. We all looked at each other and said ‘did you hear that?’. I just burst into tears.” And, much to mum and dad’s delight, there have been plenty of other times where Gethin has proved that he is making great progress when it comes to hearing, processing and understanding sound.

Rhian says as a one-and-a-half year old Gethin is blowing them away with his comprehension. “His level of understanding of what we are saying has been incredible, it’s gone through the roof.”

He’s also been repeating words without prompting. “He’s starting to initiate conversations with us. That’s great, because he’s gone from copying what we say to using the words himself to communicate with us. Every day we are hearing him say new words that we didn’t realise he knew or could say.”

Rhian says it is encouraging to see Gethin’s developments. “We see other kids his age and he’s doing exactly the same as them.”

She says the family is indebted to The Hearing House. “It is so nice to have someone we can talk to. Everyone made us feel so welcome. We’re so grateful that they exist. Their approach is spot on, and they’re very empathetic. We can’t quantify how thankful we are for all the support we’ve received.”

Gethin’s Auditory-Verbal Therapist Renique Tenhagen says the youngster is making great progress. “His understanding of language just kept on increasing, and then all of a sudden his words just started coming out left right and centre. He’s just started to put two words together, like ‘hi mum’, ‘hi dad’.”

Renique says Gethin’s family is 100 per cent committed. “They take everything on board in regards to what we do in therapy sessions. I know that they are implementing it at home. The outlook for Gethin is looking positive because his family is so committed,” Renique says.

Rhian says the comfort she gets from meeting fellow parents of children with cochlear implants is also very positive. “You go to a playground, and you do get people looking at him. I don’t want Gethin to be singled out. But then you come to The Hearing House and you realise there are quite a few children in his situation.” She says meeting other families who are further along in the process provides “the reassurance that Gethin’s future is bright”. “Getting Gethin to talk is something that is achievable. It’s not going to be straightforward, there are going to be challenges. But we’re not worried about it – we just take every day as it comes. He is going to live a happy life, we can now set him up for whatever he wants to do.”
The Hearing House is a provider to the cochlear implant programme in the northern region, which includes children and young people living north of Turangi who are under the age of 19. Children under the age of five referred to the programme waited an average of 16 days to begin assessment during the period, while those over five waited an average of 21 days. This difference is because 1) triage and the initial cochlear implant referral and assessment meeting take longer for the older group and 2) further audiological information is often required for older children and they sometimes require further testing from their local district health board.

Once an assessment is completed (on average this took just two months), the young person or child’s family is then told of the outcome of the assessment.

In cases where a child or young person is assessed as a cochlear implant candidate (the vast majority of the time), and where parents/guardians choose to proceed, surgery is scheduled within one month unless a family requests a later surgery date or unless an approval is needed from ACC. The average time between acceptance of candidacy and surgery was just over one month during the 2016-2017 year.

Children receiving cochlear implants

Of the 36 children who received cochlear implants during the period, as described in Figure 3:

- 28 of these children and young people (aged from birth to 19 years of age) received publicly funded cochlear implants in the northern region during the 2016-2017 year. Of these, 23 were children receiving their first cochlear implant during this period including one child who received two implants in sequential surgeries within the 2016-2017 year.
- one child received two cochlear implants funded by ACC; and
- seven children received cochlear implants paid for privately.4

While children are being triaged for CI assessment they receive a habilitation service to ensure progress is ongoing and to get a baseline measure of their language skills.

Of the referrals this year, nine young children were diagnosed and referred to the programme as a direct result of newborn hearing screening.

4 Families may decide to fund an implant for a child who has single sided deafness where this is not funded publicly, families of children who are not permanent residents or citizens may also decide to fund their implant and children who received single implants prior to July 2014 who are not entitled to a second implant publicly may also have their second side funded privately.
Children with hearing aids

Each year, a number of children with hearing aids under the age of five are referred to The Hearing House and provided with habilitation services to support their spoken language development.

The decision on the number of children to support is made on a case-by-case basis and considers the capacity of clinical staff and the availability of private funding, as this service is not Government funded.

At the end of the assessment process the young person/family is then told whether they will be accepted onto the habilitation programme. Children with age-appropriate speech and language are referred back to their local provider:

→ Six referrals for hearing aid habilitation were received during the 2016-2017 calendar year; and

→ of these, four children were accepted for services during this period. A further eight children were accepted previously and continued to receive services during the 2016-2017 year.

→ An additional two children on the programme entered Cochlear Implant Assessment during the 2016-2017 year and therefore left the hearing aid programme.
This section describes characteristics of children receiving services. The majority of children receiving services during the 2016-2017 year were those with one or two cochlear implants – and so our primary focus is on this group, although we do have some information on children with hearing aids who have received habilitation during this period.

**Children and young people with cochlear implants**

Figure 4 shows significant growth in the number of children and young people in the northern region receiving cochlear implant services during the last nine years.

A greater intensity of habilitation service is generally provided for families of children under the age of five whose hearing losses were present before they developed language. Children who receive cochlear implants when they are older generally have language and so they often require less intensive habilitation.

**Deprivation status**

‘NZDep2013’ provides scores relating to the deprivation status of every area in New Zealand. These scores are calculated by the University of Otago (Wellington) by combining census data relating to income, home ownership, employment, qualifications, family structure, housing, access to transport and communications.

Each small area in New Zealand is allocated a score and each score relates to 10% of the population. For example, those with the highest score (10) relate to the most deprived 10% (decile) of areas in New Zealand.

The Hearing House records deprivation data for families receiving services to help staff understand whether there are particular groups that may not be accessing services and to identify children who may be at risk of reduced outcomes.

Figure 5 shows children and young people receiving services span the full range of deprivation scores, with those in deciles three, five and the top two deciles (the most deprived) over-represented and those in the lowest and upper middle deciles under-represented.
Devices

Just over half of the children and teenagers with cochlear implants who are receiving services now have two cochlear implants (52%). Where clinically appropriate, bilateral implants have been routinely provided to newly referred children and young people since 1 July 2014.

Slightly greater than a third of children and teenagers (38%) with cochlear implants have a hearing aid in their other ear, while the remainder (19%) have no device in their other ear. The number of teenagers with only one cochlear implant is higher than for younger children as public bilateral funding was not available until 2014.

Other key points

Type of hearing loss – almost all children and young people with cochlear implants (98%) have sensorineural hearing loss in both ears, with the remaining (2%) having mixed losses in both ears.

Severity – as with last year’s results, the vast majority of children and young people with cochlear implants who are receiving services have a severe or profound hearing loss.

Age profile – the age profile of clients with cochlear implants is shown in Figure 6. The majority of cochlear implant recipients are currently aged between six and 15 years old.

Figure 6: Age profile of children and young people receiving cochlear implant services
Languages spoken or being learned

Children/young people on the programme can be categorised into one of four groups: those who are learning or using one or more spoken languages only, those learning only sign language, those learning only Key Sign⁵, and those learning or using a combination of one or more of these. The relative size of each of these groups can be seen in Figure 7.

The last of these groups is shown in the ‘combined’ category below. It includes children and young people learning or speaking some combination of one or more spoken languages, New Zealand Sign Language (NZSL), Key Sign and Makaton⁶. Figure 7 shows the breakdown for this category. The majority of children in this category are using or learning spoken language along with NZSL.

Within the ‘spoken only’ or ‘combined’ categories there are 19 languages being spoken or learned by children/young people with one or two cochlear implants who are receiving services. Seventy-four percent of these children are learning one spoken language, 25% are learning two spoken languages, and 1% are learning three spoken languages.

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⁵ Key Sign is the use of manual signs to support communication, using signs for key concepts and words as they are spoken.
⁶ Makaton is a communication programme for people with communication and learning difficulties.
School-aged children and funding for additional support

As at the end of June 2016, school-aged children and young people were situated in the range of school settings shown in Figure 8, with most children in mainstream provision. Please note that KDEC School Provision refers to satellite units in mainstream schools. These were previously known as ‘Deaf Units’. Children and young people may receive additional funding for their school through the Ongoing Resourcing Scheme (ORS) if they are verified as ‘high’ or ‘very high needs’. Figure 9 show the ORS status of school aged children and young people receiving services. Of the children and young people on the cochlear implant programme, the largest group are those who are verified under the ORS scheme as high needs (41%). The other large group is verified as having no ORS funding (40%), and the remaining 19% are verified ‘very high’ needs.

Aetiology

The aetiology (cause of hearing loss) can be either genetic (syndromic or non-syndromic) or non-genetic. Not all children with hearing loss have been tested for the cause of their hearing loss, and some tests may not be able to identify a cause. Figure 10 shows the breakdown of the causes of hearing loss for each of the children and young people receiving cochlear implant services. The largest group is those who have not had a cause established for their hearing loss. This includes children for whom testing was unable to identify a cause for their hearing loss or all testing has yet to be completed. Of those with a known cause for their hearing loss, the largest group have a hearing loss with a genetic cause that is syndromic in nature, while the next largest group have an acquired hearing loss.
Children with one or more additional disabilities

Among all children and young people receiving cochlear implant services, 31% have one or more disabilities in addition to their hearing loss, as seen in Figure 11.

This rate of confirmed additional disabilities (31%) is significantly higher than the rate reported in the New Zealand Deafness Notification Database 7 (20% with confirmed additional disabilities). Please keep in mind that unlike our clients, those cases included in the Deafness Notification Database range from ‘mild’ to ‘profound’ hearing loss in one or both ears, and only include additional disabilities confirmed at the time the hearing loss is diagnosed.

Overseas rates of children with additional disabilities are hugely variable as there are significant differences in the definition of what constitutes an additional disability between jurisdictions.

The presence of an additional disability may have a significant impact on outcomes and on the level of support the child or young person may require. Additional disabilities may include developmental delay(s), vision or physical impairments. Some children have a syndrome which includes a set of specific symptoms of varying severity.

Children with hearing aids

In addition to children with cochlear implants, a small number of children under the age of five with hearing aids were provided with habilitation services to support their spoken language development. Children with hearing aids who are accepted onto the programme usually receive habilitation sessions with their parent(s)/caregiver for a period of 24 months, although this is adapted based on the needs of the child;

- A total of 12 children received hearing aid habilitation;
  - These children ranged in age from one to four years old;
  - Two-thirds of these children had their hearing loss diagnosed before they turned one-year-old;
  - The majority of children were referred from within the Auckland region; and
  - Audiologists made the majority of the referrals to the hearing aid habilitation programme, followed by parents and then other professionals, such as speech language therapists, AoDC’s and ENT specialists.
Assessments

The Hearing House’s habilitation assessment protocol is continually reviewed to meet the needs of children and young people who receive services.

For more information on assessments used by habilitationists from The Hearing House and Kelston Deaf Education Centre, please refer to the Appendix on page 29.

The assessment results described in this section refer to overall achievement on three specific types of language assessment: CELF-4, CELF-P2* and PLS-4 or PLS-5 and to tests on the EVT (which measures expressive vocabulary) and PPVT (which measures receptive vocabulary).

Our graduates

The results in this section relate to children who have received habilitation services from The Hearing House. These children have hearing loss in both ears. The majority of these children have one or two cochlear implants and have severe or profound hearing loss.

Information in this section describes the range of language outcomes achieved by individual children aged between four and five and a half years. These children were assessed using standardised language assessments between 1 July 2013 and 30 June 2017. They have hearing loss in both ears. The majority of these children have one or two cochlear implants and have severe or profound hearing loss.

We have termed this group ‘graduates’ to make it easier to describe them – they are graduating or have recently graduated from the early intervention programme (i.e. they are about to, or have just started school). In describing the achievement of graduates, we have split the children into two groups:

→ Standard graduates: This group includes children with hearing loss who did not have significant delays starting intervention, those who do not have additional needs which affect their learning; and those who are predominantly exposed to English at home (at least 50% of the time); and

→ Non-standard graduates: This group includes children with hearing loss who have additional disabilities that impact on their learning, and/or children who had significant delays in identification of their hearing loss or in the start of intervention.

Please note that this section only includes information about children who are able to be tested using standardised assessments. There are children who are not able to be tested using these assessments.

Children assessed around the time they go to school – language

There are 31 graduates who have been assessed using specific standardised assessments during this timeframe (CELF, CELF-P and PLS).

Devices worn by these children are: two cochlear implants (n=24), a single cochlear implant and a hearing aid (n=1), two hearing aids (n=5) and those with a single cochlear implant and no device in their second ear (n=1).

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11 These are children who have received habilitation services from The Hearing House.
12 CELF, CELF-P and PLS – see the Appendix on page 29 for more information on these assessments. For children with more than one assessment result during this period these scores were averaged.
13 Standard score: Most standardised educational tests provide standard scores that are based on a scale that has a statistical mean (average) of 100. Most students achieve standard scores on tests that fall in the range of 85–115. This is the range in which 68% of the general population performs and, therefore, is considered the normal limits of functioning.
14 We have used this cohort (group) to ensure we can describe outcomes for a good-sized group of children.
15 Please note that this section only includes information about children who are able to be tested using standardised assessments. For example, there are children who do not speak English in the home and therefore they are not able to be tested with an assessment that is done in English. Another example might be a child who has a severe disability (such as cerebral palsy) and who therefore cannot participate in the assessment in a standardised way, such as being unable to point to pictures which would indicate their understanding during a test. A number of children within the age and date range to be included in the outcomes data above were not tested. Reasons for this included (for language assessments): Child has no language n=2, child is unable to engage with assessment n=3, child’s first language is not English (NZSL or other language) n=3, child did not attend multiple appointments n=3, language too limited for test n=3, child’s first language is not English. For the receptive and expressive vocabulary tests the reasons included: Child has no language n=3, child is unable to engage with assessment n=2, child’s first language is not English (NZSL or other language) n=3, child did not attend multiple appointments n=2, language too limited for test n=8, child’s first language is not English n=5. Some children had more than one reason for being non-testable over the period on the range of assessments in the protocol.
Language results for children from the general population

When children from the general population are tested using these assessments:

→ The average score for children from the general population is a 100,
→ Scores between 85 and 115 are considered 'age appropriate',
→ 84 of every 100 children from the general population have language scores in the normal range or higher.

16 When we talk about the general population, the CELF and CELF-P tests used were standardised large samples of children from Australia and New Zealand. The PLS was standardised on a large sample of children from the United States, but this test has been ‘language adapted’ to fit our local setting.

Language scores

The overall average language score (standard score) for all 31 graduates is 83. Please note that this overall average includes 14 children with one of three significant challenges in addition to their hearing loss; 13 of these 31 graduates were assessed as having age-appropriate language or better.

The average language score for standard graduates is 96 while the average for children from the general population is 100.

This means 11 of the 17 standard graduates are going to school with age-appropriate language, compared to almost 16 of 19 for their counterparts from the general population.

17 Please note the lowest score on these tests is 40, while the highest is 160, hence the Y axis scale used here in Figure 12.
18 In previous reports the scores for children who speak English less than 50% of the time were included within the analysis (where they had been testable). This year the decision was made to exclude the scores for those children (n = 5). This was due to changing practice among other First Voice Centres within their reporting and largely because a number of these assessments exclude application of the tests on children not exposed to English spoken by native speakers. If scores from these five graduates were included in the analysis the overall language score (standard score) for 36 graduates is 80. The average language score for the standard graduates is 96 while the average language score for non-standard graduates is 66.
Table 2: Standard and non-standard graduates – groups of children, sample sizes and language scores

<table>
<thead>
<tr>
<th>Key groups of children</th>
<th>Standard graduates</th>
<th>Non-standard graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With no significant delays in identifying their hearing loss, or in the onset of early intervention services.</td>
<td>With significant delays in identifying their hearing loss, or in the onset of early intervention services.</td>
</tr>
<tr>
<td></td>
<td>Without additional disabilities affecting their learning.</td>
<td>With additional disabilities affecting their learning.</td>
</tr>
<tr>
<td></td>
<td>Who are exposed to English most of the time at home.</td>
<td>Who are exposed to English less than 50% of the time at home.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of children</th>
<th>n=17</th>
<th>n=14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language scores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 of 17 children had age-appropriate language or better.</td>
<td>2 of 14 children had age-appropriate language or better.</td>
<td></td>
</tr>
<tr>
<td>Five standard graduates achieved language scores above the normal range.</td>
<td>The average language score (standard score) was 67, with a median of 69.</td>
<td></td>
</tr>
<tr>
<td>The average language score (standard score) was 96, with a median of 100.</td>
<td>These children had a range of scores from 50 to 92.</td>
<td></td>
</tr>
<tr>
<td>These children had a range of scores from 66 to 120.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 13: Average language scores for The Hearing House graduates compared with children from the general population

---

All graduates from The Hearing House (with hearing loss and with or without additional difficulties) | Standard graduates (with hearing loss) | Non-standard graduates (with hearing loss and with one or more significant additional challenges)
Children assessed around the time they go to school – *expressive & receptive vocabulary*

Our graduates

These children were assessed using standardised assessments\(^{19}\) between 1 July 2013 and 30 June 2017.

There are 32 graduates in total who have been assessed using specific standardised assessments during this timeframe. (32 were tested with the PPVT, and 29 of these graduates were tested using the EVT).

Devices worn by these children are: two cochlear implants (n=24), a single cochlear implant and a hearing aid (n=1), two hearing aids (n=6) and those with a single cochlear implant and a second ear with no device (n=1).

**Expressive and receptive vocabulary results for children from the general population\(^{20}\)**

When children from the general population are tested using these assessments:

→ The average score for children from the general population is a 100,
→ Scores between 85 and 115 are considered ‘age appropriate’,
→ 84 of every 100 children from the general population have language scores in the normal range or higher.

Receptive and expressive vocabulary scores

The standard score for receptive vocabulary for all 32 graduates tested on the PPVT is 88 and the expressive vocabulary score of the 29 (of those 32) graduates tested on the EVT is 98\(^{21}\). Please note that this overall average includes nine children with one of three significant challenges in addition to their hearing loss. Nineteen of these 32 graduates were assessed as having age-appropriate receptive vocabulary or better.

The average standard score for standard graduates is 97 on the PPVT and 105 on the EVT while the average for children from the general population is 100.

This means 17 of the 18 standard graduates are going to school with age-appropriate expressive vocabulary and 12 of the 18 standard graduates are going to school with age-appropriate receptive vocabulary. These proportions can be compared with the almost 16 of 19 for their counterparts from the general population who enter school with scores in the age appropriate range for these tests.

\(^{19}\) CELF, CELF-P and PLS – see Appendix A for more information on these assessments. For children with more than one assessment result during this period these scores were averaged.

\(^{20}\) When we talk about the general population, the CELF and CELF-P tests used were standardised large samples of children from Australia and New Zealand. The PLS was standardised on a large sample of children from the United States, but this test has been ‘language adapted’ to fit our local setting.

\(^{21}\) Please note the lowest score on these tests is 40, while the highest is 160, hence the Y axis scale used in Figures 12 and 13.
Table 3: Average receptive and expressive vocabulary scores for The Hearing House graduates compared with children from the general population

<table>
<thead>
<tr>
<th>Key groups of children</th>
<th>Standard graduates</th>
<th>Non-standard graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With no significant delays in identifying their hearing loss, or in the onset of early intervention services.</td>
<td>With significant delays in identifying their hearing loss, or in the onset of early intervention services.</td>
</tr>
<tr>
<td></td>
<td>Without additional disabilities affecting their learning.</td>
<td>With additional disabilities affecting their learning.</td>
</tr>
<tr>
<td></td>
<td>Who are exposed to English most of the time at home.</td>
<td>Who are exposed to English less than 50% of the time at home.</td>
</tr>
<tr>
<td>Number of children</td>
<td>EVT: n=18</td>
<td>EVT: n=11</td>
</tr>
<tr>
<td></td>
<td>PPVT: n=18</td>
<td>PPVT: n=14</td>
</tr>
<tr>
<td>Vocabulary scores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive (PPVT)</td>
<td>12 of 18 children had age appropriate receptive vocabulary or better.</td>
<td>Seven of 14 children had age appropriate receptive vocabulary or better.</td>
</tr>
<tr>
<td></td>
<td>Three standard graduates had received receptive vocabulary scores above the normal range.</td>
<td>The average standard score was 75 with a median of 84.</td>
</tr>
<tr>
<td></td>
<td>The average standard score was 97 with a median of 97.</td>
<td>These children had a range of scores from 42 to 97.</td>
</tr>
<tr>
<td></td>
<td>These children had a range of scores from 75 to 130.</td>
<td></td>
</tr>
<tr>
<td>Expressive (EVT)</td>
<td>17 of 18 children had age appropriate expressive vocabulary or better.</td>
<td>Eight of 11 children had age appropriate expressive vocabulary or better.</td>
</tr>
<tr>
<td></td>
<td>Four standard graduates received expressive vocabulary scores above the normal range.</td>
<td>The average standard score was 88 with a median of 92.</td>
</tr>
<tr>
<td></td>
<td>The average standard score was 105 with a median of 102.</td>
<td>These children had a range of scores from 52 to 104.</td>
</tr>
<tr>
<td></td>
<td>These children had a range of scores from 84 to 144.</td>
<td></td>
</tr>
</tbody>
</table>
School achievement

The Hearing House has been working to include National Certificate of Educational Achievement (NCEA) results within its database so it can track how young people who have received an early intervention service have been doing when they reach high school.

The National Certificate of Educational Achievement (NCEA) is the main qualification for secondary school students in New Zealand. NCEA is recognised by employers, and used for selection decisions by universities and polytechnics, both in New Zealand and overseas.

Young people who are generally in years 11 to 13 at secondary school study several courses or subjects and their skills and knowledge in these are assessed against a number of standards through internal and external assessments.

Students achieving a standard receive credits and a specific number of credits are needed to get an NCEA certificate. Those who do well get a ‘merit’ or ‘excellence’ for that level.

Our cohort

Young people whose results are reported here all have a hearing loss in both ears, and the majority (93%) have a hearing loss which is severe or profound in severity. 41% of those young people have one or more additional disabilities.

Students who received an early intervention service from The Hearing House before the age of five were included in this analysis22. They had their hearing loss identified at an average age of 1 year, 6 months23. This resulted in a cohort of n = 17.

Four students were then excluded as they were not participating in NCEA 24. Of those remaining (n = 13), 76% of students who received an early intervention service before the age of five from The Hearing House participated in NCEA.

One of the children included in this group had a progressive hearing loss. 35% speak a language other than English more than 50% of their time at home, and 47% had delays in identifying their hearing loss.

22 Nine students in the age range for NCEA who had not received an early intervention service from The Hearing House, having been referred for assessment after the age of five.

23 For children on the programme aged five, six and seven this average age is now younger, at 1 year, 2 months, due largely to the introduction of newborn hearing screening.

24 Three students in our cohort group were not participating in NCEA and were instead pursuing an alternative learning pathway. One student had no results published; this could be due to that young person also pursuing an alternative learning pathway or as NZQA fees had not been paid.
Results

Results listed below show ‘all’, ‘standard’ and ‘non-standard’ groups compared to national cumulative data.

The rates shown in Figure 14 are the percentage of all participating students who achieved NCEA Level 1 by the end of Year 13 in 2016.

Five participants achieved excellence (38%), two participants achieved merit (15%), of the remaining students three achieved NCEA Level 1 (23%) and three had part-achieved by the end of the 2016 academic year (23%).

Figure 14: NCEA cumulative achievement rates for students at the end of Year 13 in 2016.

Looking to the future

It is anticipated that the gap between the students who received an early intervention service from The Hearing House’s achievement rate and the nationwide achievement rate will close in the future. This is due to a range of factors including:

→ earlier identification of hearing loss nationally due to the advent of universal newborn hearing screening (the effects of early identification take some time to flow through to secondary school students as implementation nationwide didn’t begin until 2008)

→ higher rates of cochlear implant usage than in the early 2000’s when these children were born (23 children implanted per year as opposed to 10 per year in the early 2000s)

→ increasingly younger provision of cochlear implants cohort (implantation at six months of age is now standard whereas the youngest to be implanted in this cohort born in the early 2000’s was almost 12 months at implantation).

We expect that in the coming years the number of children with NCEA results will increase, meaning a more detailed analysis of their results can be included in these annual reports. Analysis has been limited to participation rates due to the relatively small cohort.
Summary of Results

Since 2007 The Hearing House has conducted client satisfaction surveys. The purpose of these surveys is to improve our understanding of what we are doing well, and where we need to focus our improvement efforts.

In addition to seeking feedback from families, referring audiologists and Advisors on Deaf Children, the 2017 surveys were added for parents of children with hearing aids who are receiving habilitation services, and also for families of children who attend Joyce Fisher Preschool. These surveys were completed during March and April 2017.

A total of 106 individual responses were received across all six of the surveys with an average response rate of 37%.

Each group was asked to give an understanding of their satisfaction with the service on a one to five scale, where five was the highest possible rating. The overall satisfaction ratings given by each group are seen in Figure 15, the maximum possible rating is five, scores between four and five are considered in the high to very high range.

Figure 15: Average overall satisfaction ratings by sample (2017)
Assessment protocols

Rationale

The Hearing House's habilitationists have been conducting assessments on children receiving services since soon after the organisation's formation, in accordance with evidence-based practice.

Regular assessments are done for several reasons:

→ to inform planning, habilitation and the setting of personalised goals for the child through the identification of strengths, difficulties and concerns;
→ to monitor a child's progress over time;
→ to ascertain whether progress is sufficient for this stage taking into account other factors (such as age at identification, degree of hearing loss);
→ to inform family decision-making and provide information to audiologists to assist them in optimal amplification;
→ to identify areas that require further exploration by other professionals; and
→ to better understand programme efficacy, inform programme development and resource allocation.

Assessing 'language'

The three assessments (CELF-4, CELF-P2 and PLS-5) provide an overall score that describes a child's expressive and receptive language outcomes at the time of the test. This is called a standard score.

What is receptive language?

Receptive language is what a child understands. This can range from single words to complex instructions, e.g. the child might be asked to point to a picture that shows “the big spotty dog is sitting under the tree”.

Receptive vocabulary is measured using an assessment called the PPVT. The child's knowledge and understanding of individual words.

What is expressive language?

Expressive language is what a child says. This can include the ability to name items, put words together to make sentences and use different types of grammatical structures.

Expressive vocabulary is measured using an assessment called the EVT. This test is a measure of the individual spoken words a child can use in the correct context.

Speech

Speech is different to language. Speech comprises articulation (how the child produces individual sounds and combines them to say words), voice (how the vocal-folds move), and fluency (the rhythm of speech). Please note that speech skills are not being reported in this document.

The habilitation assessment schedule for children with cochlear implants is shown in Table 5. Assessments are conducted 3, 6, 12 and 24 months after the device is fitted/child receives their cochlear implant(s), and at 3, 4, 5, 6, 8 and 12 years of age. Assessments which are standardised are shown in the table with an asterisk. Children are assessed at 3 months post switch on, 10 and/or 14 years of age should parents request this or at the clinician's discretion.

Children with hearing aids are assessed using the tests below at the start of service and then annually based on their chronological age.

Tests have been chosen based on their topics of measurement (e.g. language, audition, speech), their reliability (consistent results for children of similar ability and internal reliability within a test) and validity (whether the test is measuring what it aims to measure).

25 Adapted from “What is speech? What is language”. Retrieved from https://www.asha.org/public/speech/development/language_speech/
No single test can accurately assess a child’s language so The Hearing House and Kelston Deaf Education Centre habilitationists use a variety of assessments along with their experience working with each child to understand language performance and to set personalised goals and plans for work with each child.

---

**Table 4: Assessments which may be used, by age, March 2015 (standardised assessments are marked with an asterisk)**

<table>
<thead>
<tr>
<th>Area to be assessed</th>
<th>CA: 0–2:11</th>
<th>CA: 3–3:5</th>
<th>CA: 3:6 – 4:0</th>
<th>CA: 4:0 – 4:11</th>
<th>CA: 5:0 onwards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>PLS-5*</td>
<td>PLS-5*</td>
<td>CELF-P2*/PLS-5*</td>
<td>CELF-P2*/PLS-5*</td>
<td>CELF-4*/PLS-5*/CELF-P2*</td>
</tr>
<tr>
<td>Rossetti, REEL, language sample, Bloom and Lahey, Brown’s MLU, Grammatical Features checklist, Bracken Basic Concept Scale, Early Songs and Phrases List, Auditory-Verbal Listening Skills Curriculum, ELTL Sounds List, St Gabriel’s Curriculum, expressive language and receptive language checklist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary checklist</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Speech</td>
<td>–</td>
<td>GFTA-2*</td>
<td>GFTA-2*</td>
<td>GFTA-2*</td>
<td>GFTA-2*</td>
</tr>
<tr>
<td>Articulation attainment chart</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Audition</td>
<td>PEACH CAP Scales</td>
<td>PEACH CAP Scales</td>
<td>PEACH CAP Scales</td>
<td>PEACH CAP Scales</td>
<td>PEACH CAP Scales</td>
</tr>
<tr>
<td>General Development</td>
<td>E-LAP</td>
<td>E-LAP</td>
<td>E-LAP</td>
<td>E-LAP</td>
<td>E-LAP</td>
</tr>
</tbody>
</table>
Types of assessments used

There are two main types of assessments used by the habilitationists, and each of these types has their uses. Assessments of each type are outlined in Table 5.

Table 5: Standardised versus criterion referenced assessments, a comparison

<table>
<thead>
<tr>
<th>Criterion referenced assessments</th>
<th>Standardised norm-referenced assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td></td>
</tr>
<tr>
<td>Determine whether a student has achieved specific skills or understands specific concepts (Salvia and Ysseldyke, 2004).</td>
<td>Measure student achievement and progress made compared with large numbers of hearing students (groups) of the same age (benchmarking).</td>
</tr>
<tr>
<td>Help us understand whether a child knows/has specific skills before and after they receive services.</td>
<td>Allow comparison of various groups and their level of performance compared with hearing peers.</td>
</tr>
<tr>
<td>Measures specific skills and incremental progress.</td>
<td>Measure general performance and progress made in set areas, often over a longer period of time (e.g. annually).</td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td></td>
</tr>
<tr>
<td>These tests enable professionals to understand in more detail how a child is progressing and whether they meet particular pre-determined standards for achievement.</td>
<td>Using tests standardised on groups of hearing children allows us to compare deaf children with other peers, which is essential if we are to raise standards for deaf children, and close the attainment gap.</td>
</tr>
<tr>
<td>Enable judgements to be made around behaviours or progress against identified targets, e.g. to find out whether the child has learnt the material or can carry out the behaviour being assessed.</td>
<td>These tests are carefully set so the results conform to a bell curve and have been found to be reliable and valid. This means it is possible to understand how a child is doing based on the normal distribution and also to understand how many children have performance within the normal range for children in the general population.</td>
</tr>
<tr>
<td>The child’s level of functioning is measured on a regular basis, including through the use of criterion referenced assessments which help the therapist and parent understand the child’s progress.</td>
<td>Standardised tests also have a standard error of measurement – this is a calculation of the probability that a given speech testing score is a true reflection of the child’s ability.</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
<td></td>
</tr>
<tr>
<td>These tests should not be adapted for use with deaf and hearing-impaired students as this may invalidate results.</td>
<td>Standardised tests don’t tell you detailed information about nuances of performance that characterise a full range of student skill, ability and learning style.</td>
</tr>
<tr>
<td>It is not possible with these tests to compare performance of children with other groups of children.</td>
<td>Children with additional needs and some children who are primarily learning spoken languages other than English may not be able to be tested using standardised assessments. Some of these children are able to be assessed using criterion referenced tests, while for others outcomes may be considered based on goals and progress.</td>
</tr>
<tr>
<td>It is not possible with these tests to understand how a child’s performance ranks when compared to their counterparts.</td>
<td>Only some standardised tests have been standardised with Australian/New Zealand children (CELF-4, CELF-P2) or are adapted for our local language usage PLS-5.</td>
</tr>
</tbody>
</table>

Advisor on Deaf Children (AoDC): AoDC’s are employed by the Ministry of Education. AoDC’s work closely with parents, caregivers and other professionals involved to help a child with a hearing loss learn, develop and prepare for early childhood education and then school. AoDC’s provide support and resources from birth until year 3 at school.

Aetiology (Etiology): The cause, or set of causes or manner of causation of a disease or condition. Aetiology is used in this report to refer to the cause of a child’s hearing loss.

ALE: Auditory Language Enrichment follows the principles of Auditory-Verbal Therapy but where these principles are adapted to meet the additional needs of the child. Children on this programme use listening to develop understanding and, where possible, communicate using spoken language. They may also use additional means to communicate, such as lip patterns, Key Sign, gestures, pecs (picture exchange communication system) and augmentative alternative communication.

AVT: Auditory-Verbal Therapy accelerates the natural way language develops to enable children with a cochlear implant(s) or hearing aids to catch up with the listening skills and language of their peers.

Expressive Vocabulary: Measured by the EVT, expressive vocabulary refers to the single words a child can recognise in the correct context.

Kelston Deaf Education Centre (KDEC): Staff from this organisation provide cochlear implant habilitation services in the northern region (north of Turangi) for children over the age of five years.

KDEC School Provision: Classes are taught by a specialist teacher of the deaf. Each student develops an individualised programme, with their teachers and parents that best meet their need to establish a strong educational and social foundation.

Ongoing Resource Scheme (ORS): This provides additional support for children with the highest level of need for special education, to help them join in and learn alongside other children at school.

MAPping: The process of programming a cochlear implant to the specifications and needs of cochlear implant recipient.

Newborn hearing screening (NBHS): Newborn hearing screening (also known as universal newborn hearing screening and early intervention programme (UNHSEIP)) refers to the screening of hearing carried out soon after birth. A child is referred to an Audiologist for further assessment if a ‘refer’ result is obtained on the screening.

Receptive Vocabulary: Measured by the PPVT, receptive vocabulary refers to the single words a child can use verbally in the correct context.

Resource Teacher of the Deaf (RTD): RTDs are specialist teachers who assess a child’s needs in either a classroom, in a one-to-one setting or in a child’s home. Then they team up with other specialists to help teachers adapt their teaching to suit the child’s needs. They work with teachers and families to set achievement goals and create learning plans for children and students who are deaf or hard of hearing. RTDs work through the Deaf Education Centres (this being KDEC in the region north of Turangi).

The Hearing House (THH): Charity established in 1998 to provide services to children with hearing loss (Audiology and Habilitation for the under 5’s) with the northern region (north of Turangi). In 2018 The Hearing House began providing services to adults with a hearing loss.