

Sound Outcomes: First Voice Spoken Language data

Overview of findings from the 2018 dataset

Contents

1. Executive Summary.....	3
1.1 Key Outcomes.....	3
1.1.1 Children Cohort.....	3
1.1.2 Graduate Spoken Language Outcomes	3
2. Background.....	4
2.1 About First Voice.....	4
2.2 Assessment Protocol	4
3. Findings from the 2018 Data	5
3.1 Demographics	5
3.1.1 Client Characteristics	5
3.1.2 Graduate Outcomes	5
3.1.3 Children Identified Through Universal Newborn Hearing Screening.....	6
3.1.4 Level of Hearing Loss	6
3.1.5 Devices Used.....	9
3.1.6 Additional Diagnosed Disabilities That Impact on Learning	9
3.2 Graduate Spoken Language Outcomes Process and Tools	9
3.2.1 Assessment Process	9
3.2.2 About the Measure	10
3.2.3 Children in the Sample	10
4. Costs and Benefits from First Voice Early Intervention Programs	11
5. Summary	11
6. References	12
7. Glossary.....	13

1. Executive Summary

First Voice is an association for centres around the world which provide listening and spoken language early intervention services for children with hearing loss. Member organisations collect standardised data for children and their families receiving services, including results of a range of internationally endorsed assessments of children's total language, auditory comprehension, expressive communication, and vocabulary.

The First Voice Sound Outcomes dataset contains the outcomes of children with hearing loss enrolled in its members' services. This is the largest data set for children with hearing loss receiving listening and spoken language early intervention globally.

Outcome data is collected from the centres annually for the previous calendar year. This report presents the key findings from the analysis of 2018 data, collated for the Sound Outcomes project.

1.1 Key Outcomes

1.1.1 Children Cohort

There were 1433 children receiving services from First Voice Centres during 2018 had a hearing loss in one or both ears. Of the 1433 children supported by First Voice centres there were 207 graduating in 2018.

Criteria for Inclusion:

For inclusion in this report, all children met the following criteria:

- Under the age of 6 years as at December 31st, 2018;
- Had received listening and spoken language early intervention services from a First Voice centre during the 2018 calendar year;
- Had completed one or more assessments during the 2018 calendar year.

Children Demographics:

- 79% of children had bilateral hearing loss and 21% unilateral hearing loss;
- 18% of children had a diagnosed disability which the child's clinical team determined impacted on their learning;
- 32% spoke/used English and another language;
- 47% of children had been fitted with hearing aid/s and 32% wore cochlear implant/s while 12% wore hearing devices that were not hearing aids or cochlear implants and 9% were not fitted with a hearing device.

1.1.2 Graduate Spoken Language Outcomes

For Australia, research shows that 84% of children in the general population achieve scores within or above the normal range on the standardised assessments¹ employed to measure the children's outcomes. [From the 207 graduates there are two main findings:](#)

Finding 1:

86% of children in First Voice Centres with a hearing loss only achieved a standard score within or above the average range for typically hearing children, a level higher than the normal population.

Finding 2:

The impact of additional disabilities and/or having a language other than English is significant with 54% of all children with hearing loss achieving a standard score within or above the average range for typically hearing children.

2. Background

2.1 About First Voice

First Voice is the regional body for centres providing listening and spoken language early intervention for children with hearing loss in Australia, New Zealand and in 2018 Auditory-Verbal UK. Member centres include:

- Cora Barclay Centre; now registered as Can:Do Group, (South Australia);
- Hear & Say (Queensland);
- The Hearing House (New Zealand);
- The Shepherd Centre (New South Wales, Tasmania and the Australian Capital Territory);
- Taralye (Victoria), now the Royal Institute for Deaf and Blind Centre (RIDBC- Taralye)
- RIDBC – Greater Sydney Metro (New South Wales);
- Telethon Speech & Hearing (Western Australia);
- Auditory-Verbal UK (AVUK), (United Kingdom).

One of the key strategic objectives of First Voice is to collect, analyse and release annual outcome data for children enrolled in their listening and spoken language early intervention. The purpose of this work is to develop a dataset which can be used to inform service development and improvement.

The key features of the early intervention programs used by First Voice members include:

- A focus on early diagnosis, early amplification and immediate enrolment into early intervention programs.
- Family-centred listening and spoken language programs with a focus on empowerment of parents/caregivers to create environments promoting listening and spoken language development.
- Ongoing assessment and review of children's outcomes to further inform the future direction of therapy interventions.

2.2 Assessment Protocol

An assessment protocol is employed across all First Voice Centres. Assessments are selected from the protocol based on a child's stage of development, the type of performance being measured and the test's clinical relevance.

Centres use additional assessments (over and above those in the core protocol) to suit the needs of their children, families and clinicians. Not all children, including some with additional disabilities, and those who use a language other than English (LOTE) are able to be assessed using standardised assessments.

All language assessments are administered in English as per the test protocols – and therefore the tests measure a child's performance in English.

3. Findings from the 2018 Data

3.1 Demographics

3.1.1 Client Characteristics

In 2018, First Voice centres provided data for 1433 children who met the criteria and whose families had consented to participate. The total number of children included in the cohort was notably higher ($n=1433$ children) than for the 2017 year ($n=978$) as a result of AVUK and RIDBC (Greater Sydney Metro) recently joining FV and provided data for 2018.

A summary of the change in the cohort of children since 2015 can be summarised as:

	Children Supported	English as Second Language	Additional Disability
2015	696	125	118
2018	1433	458	258

Importantly, in the 2018 data sixty-eight percent (68%) of children spoke English as their primary language while nearly a third (32%) spoke a language other than English (LOTE), over 3.5 times as many in the 2015 Sound Outcomes report.

The distribution of clients from each First Voice Centre was as follows:

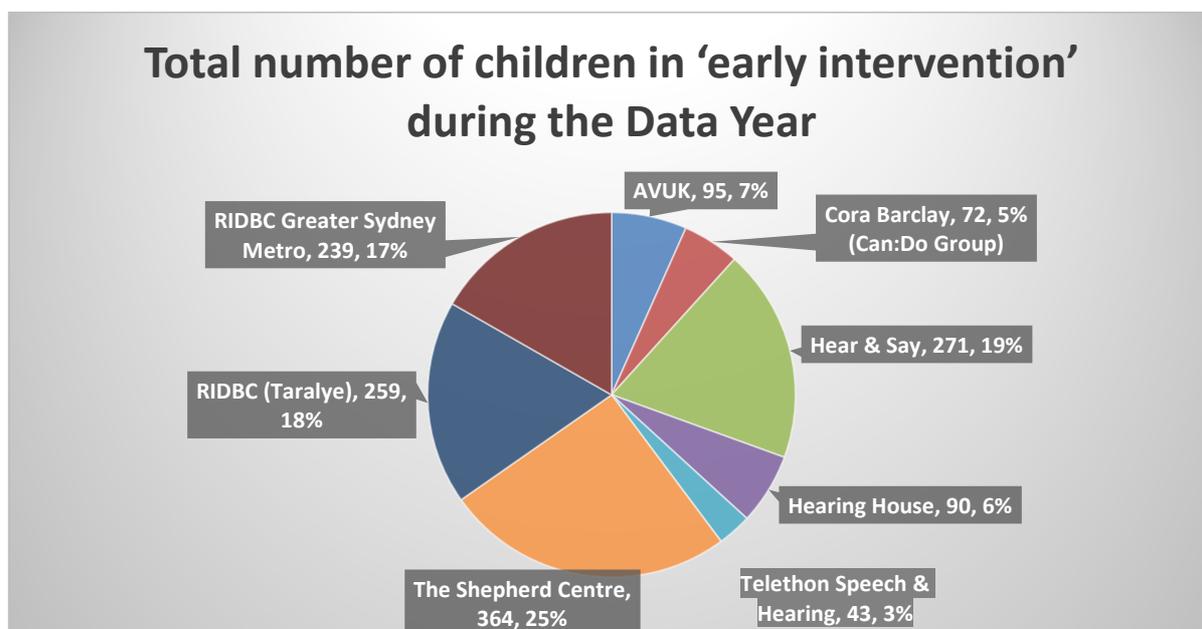


Figure 1. Number of Children from Each Centre

3.1.2 Graduate Outcomes

[From the 207 graduates from First Voice Centres' programs](#) there are two major findings as a result of Sound Outcomes in 2018:-

Finding 1:

86% of children in First Voice Centres with a hearing loss only achieved a standard score within or above the average range for typically hearing children, a level higher than the normal population.

Finding 2:

The impact of additional disabilities and/or having a language other than English is significant with **54%** of all children with hearing loss achieving a standard score within or above the average range for typically hearing children.

3.1.3 Children Identified Through Universal Newborn Hearing Screening

Advances in technology and the introduction of newborn screening of hearing have allowed earlier diagnosis of hearing loss and therefore earlier access to speech sounds for children. Overall 84% of children enrolled in the EI Programs at FV Centres had their hearing loss identified through universal newborn hearing screening. Children who were not identified through universal newborn hearing screening presented either with late onset hearing loss or they were born overseas with no screening.

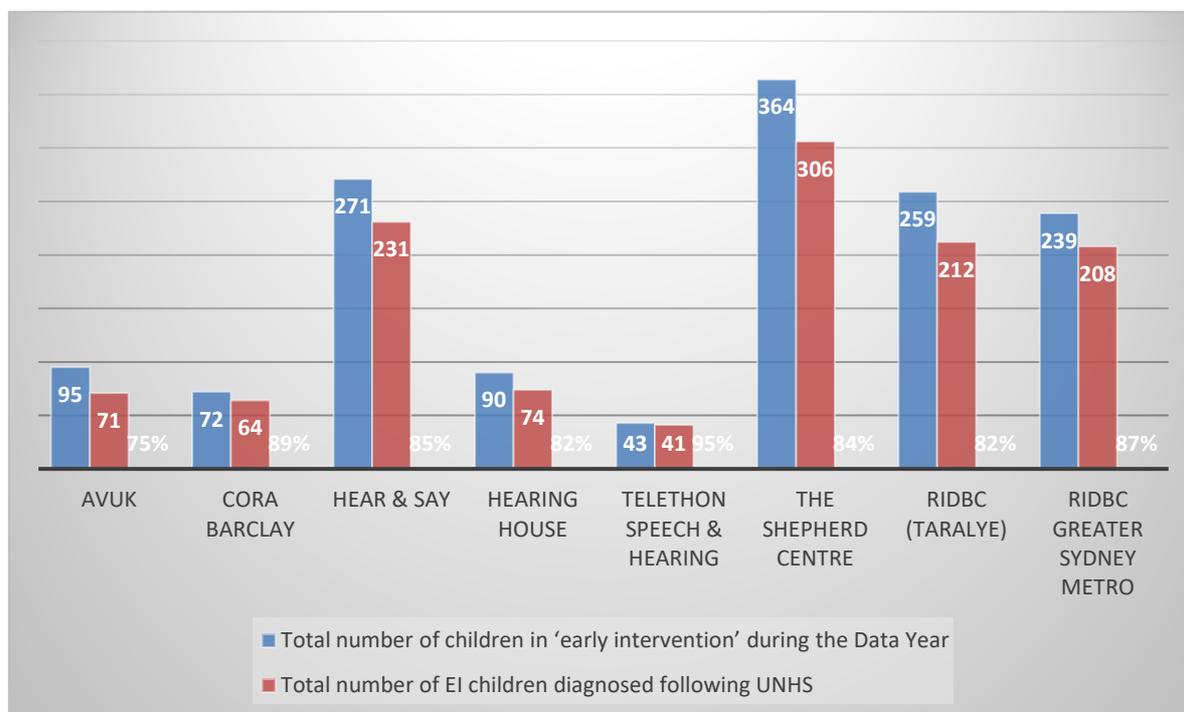


Figure 2. Number of children enrolled in EI number and percentage of children identified with hearing loss through UNHS enrolled in each FV Centre

3.1.4 Level of Hearing Loss

Hearing losses are commonly categorised by left and right pure tone averages from the child's audiogram across four frequencies (0.5, 1.0, 2.0 and 4.0 kHz). Where a hearing loss is bilateral, the degree of loss is taken from the better ear.

Of 1343 children within the cohort where the Australian Hearing Classification was used to describe the hearing loss, the majority (78%) were recorded as having a bilateral hearing loss while 22% of children had a unilateral hearing loss.

Hearing House (n=90) in New Zealand used a slightly different classification system.

Of the 1433 total of children in this dataset (including Hearing House), 79% were identified with a bilateral loss and 21% with a unilateral hearing loss.

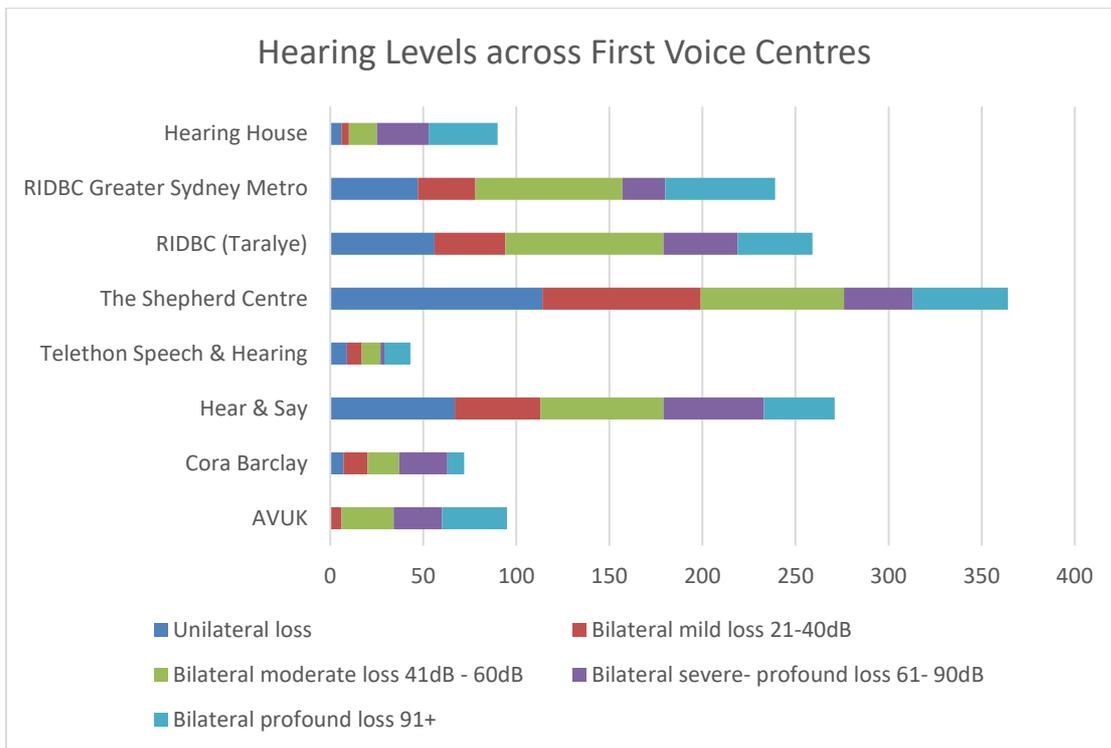


Figure 3a. Severity of hearing loss for unilateral and bilateral losses using Hearing Australia Classification system for First Voice Centres except Hearing House (see in Glossary).

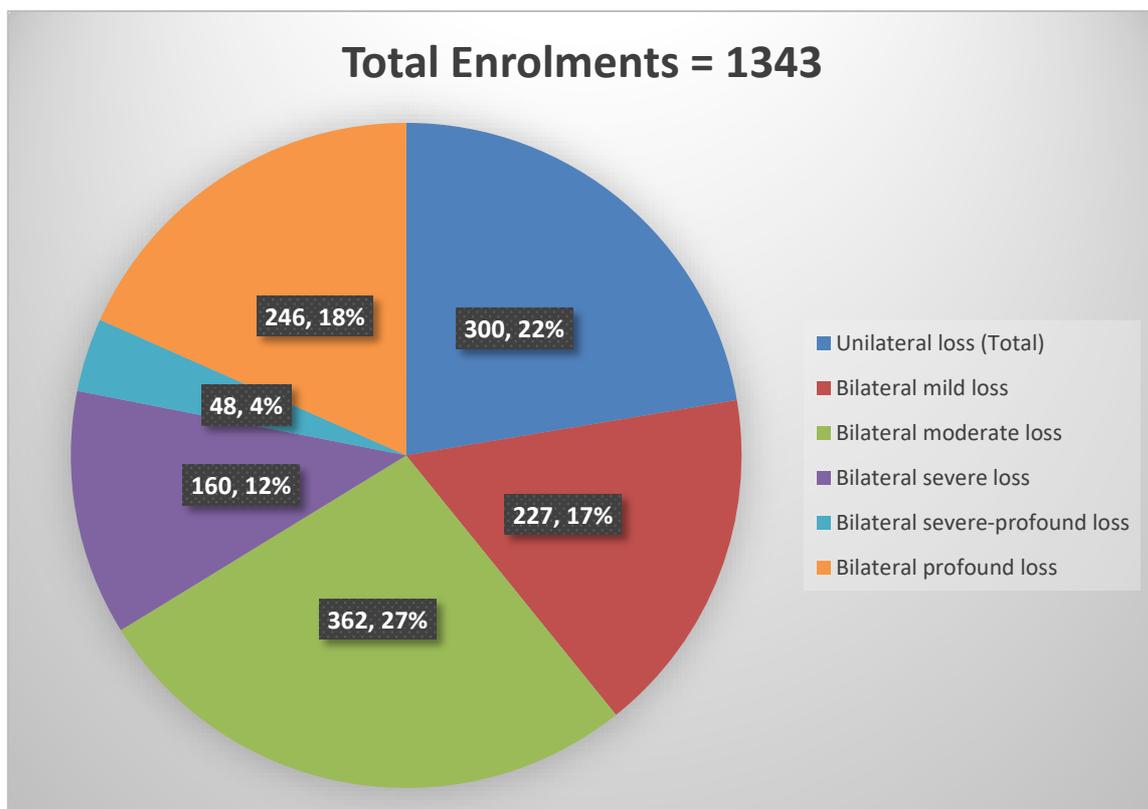


Figure 3b. Severity of hearing loss for unilateral and bilateral losses using Hearing Australia Classification system for First Voice Centres except Hearing House (see in Glossary).

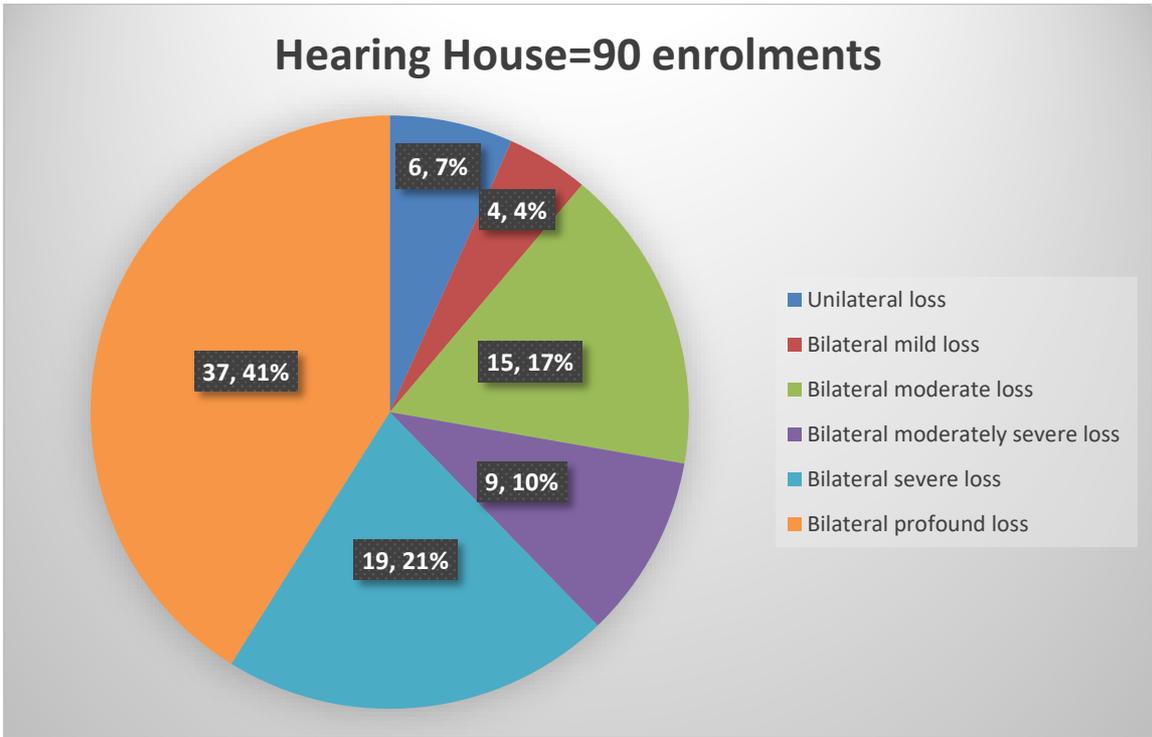


Figure 3b. Severity of hearing loss for unilateral and bilateral losses for Hearing House (refer to Glossary).

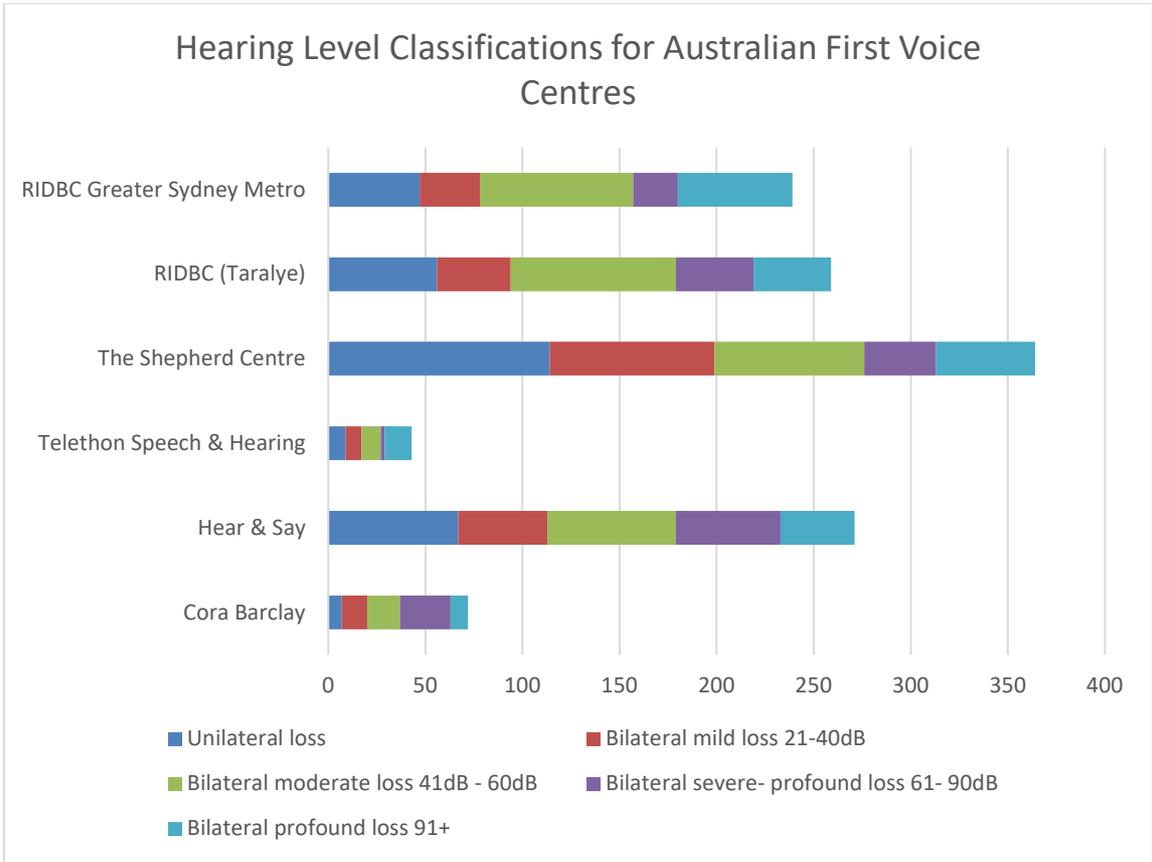


Figure 4. Severity of hearing loss for unilateral and bilateral losses for Australian First Voice Centres using Hearing Australia Classification system.

3.1.5 Devices Used

In 2018, 47% of children in the dataset wore hearing aids and an additional 32% had cochlear implants. A further 12% wore devices such as bone conduction hearing devices (e.g. BAHA, Ponto) and 9% were not fitted with a hearing device.

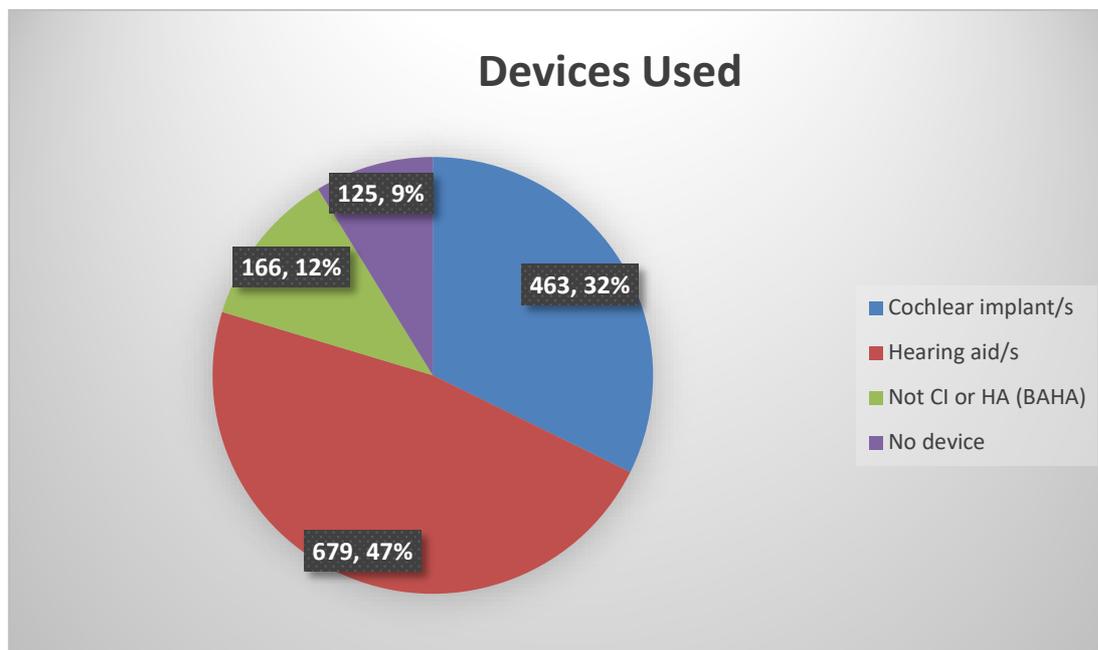


Figure 4. Total number of devices used by FV cohort (n=1433)

3.1.6 Additional Diagnosed Disabilities That Impact on Learning

Eighteen percent (18%) of children in the sample had been diagnosed with an additional physical or cognitive disability that their medical and clinical team judged would impact on their learning. The classification approach used does not include children whose additional disability is not expected to impact their learning; nor children whose disability is not yet diagnosed. As a result the underlying percentage of children with one or more additional disabilities is significantly higher than 18%.

Note: RIDBC Greater Sydney Metro classified children with an additional disability if they have a letter from a paediatrician or psychologist stating an additional diagnosed disability.

3.2 Graduate Spoken Language Outcomes Process and Tools

3.2.1 Assessment Process

Spoken language outcomes have been calculated based on all standardised assessment data for children within the sample. The assessment results reported were all completed in the 2018 calendar year.

Where a child had more than one assessment of a particular type (e.g. PLS-5) during the calendar year, the most recent assessment result was used for analysis.

The following total scores were used for the analysis. These assessments provide data on children's performance across a range of total/core language measures.

Assessment Type	Test used across age groups	Measure reported
Language	Preschool Language Scales (PLS-5), age 0:0 – 6:0	Total language score
	Clinical Evaluation of Language Fundamentals (CELF-P2), age 3:6 to 6:0	Core language score
	Clinical Evaluation of Language Fundamentals (CELF-4 & CELF-5), age 5+	Core language score

Table 2: Key measures of performance by assessment

3.2.2 About the Measure

The average achievement range is within one standard deviation of the mean as represented by standard scores between 85 and 115. The mean score is 100 and a standard deviation (SD) of 15. Scores of less than 85 represent performance below the average range and scores greater than 115, represent performance above the average range.

By convention, in the general Australian population just over two thirds of children (68%) score in the typical range, with an additional 16% scoring above this range. Thus, 84% of children in the general population would be expected to score within or above the typical range.

3.2.3 Children in the Sample

The children in the sample all had a hearing loss in one or both ears. In addition, some children had one or more diagnosed disabilities and/or used a language other than English. All children had completed one or more standardised assessments during the reporting period. The general population used as a comparison group in the key measures described below includes very few, if any, children with hearing loss or additional needs. Using standardised assessments with children who have English as a second language is not recommended and in part may explain why a large percentage of children who completed a standardised assessment did not achieve scores within the average range.

4. Costs and Benefits from First Voice Early Intervention Programs

A study by Deloitte Access Economics in 2017 found the following costs and benefits arising from the early intervention programs provided to children with bilateral hearing loss:

Benefit <u>Area</u>	Value*	
	2015 \$	2019 \$
Higher levels of educational achievement	\$ 103,091	\$ 110,390
Improved employment	\$ 57,894	\$ 61,993
Avoided school costs	\$ 60,676	\$ 64,972
Wellbeing	\$ 220,236	\$ 235,829
Avoided deadweight costs to Government	\$ 22,815	\$ 24,430
Total	\$ 464,712	\$ 497,614

Costs <u>Area</u>	Value*	
	2015 \$	2019 \$
Early Intervention cost (borne by EI centre)	\$ 79,688	\$ 85,330
Family lost productivity (borne by family)	\$ 93,542	\$ 100,165
Transport (borne by family)	\$ 3,263	\$ 3,494
Childcare for siblings (borne by family)	\$ 802	\$ 859
Incurred deadweight costs (borne by government)	\$ 38,262	\$ 40,971
Total	\$ 215,557	\$ 230,819

* The 2019 values are calculated from the 2015 by adjusting for inflation.

Reference: <https://www.firstvoice.org.au/wp-content/uploads/2016/09/First-Voice-Deloitte-Access-Economics-Cost-Benefit-Analysis.pdf>

The overall benefit to cost ratio (\$497,614 to \$230,819) is 2.16:1. However, a large part of the cost is borne by the family and not by the community. Benefit to cost ratio for the community investment (\$497,614 to \$126,301) is 3.94:1. It is also important to note that the cost benefit of First Voice Centres to the Australian Government was shown to be 12.1:1.

5. Summary

The Sound Outcomes 2018 Report continues to show that First Centres lead the way in producing excellent language outcomes for children with hearing loss. First Voice centres have, over a long period of time, produced outcomes that exceed standards within the general population. 2018 was no different, with the following two key findings:

Finding 1:

86% of children in First Voice Centres with a hearing loss only achieved a standard score within or above the average range for typically hearing children, a level higher than the normal population.

Finding 2:

The impact of additional disabilities and/or having a language other than English is significant with 54% of all children with hearing loss achieving a standard score within or above the average range for typically hearing children.

6. References

- Hearing Australia (2018) Demographic details of young Australians aged less than 26 years with a hearing impairment who have been fitted with a hearing aid or cochlear implant at 31 December 2018. Hearing Australia
- Ching, T. Y., Dillon, H., Leigh, G., & Cupples, L. (2018). [Learning from the Longitudinal Outcomes of Children with Hearing Impairment \(LOCHI\) study: Summary of 5-year findings and implications](#). *International journal of audiology*, 57(sup2), S105-S111
- Cole, E., & Flexer, C. (2016) (3rd Edition). *Children with hearing loss: Developing listening and talking, birth to six*. San Diego: Plural Publishing.
- Dettman, S., Wall, E., Constantinescu, G., & Dowell, R. (2013). Communication Outcomes for Groups of Children Using Cochlear Implants Enrolled in Auditory-Verbal, Aural-Oral, and Bilingual-Bicultural Early Intervention Programs. *Otology & Neurotology*, 34(3), 451-459.
- Dornan, D., Hickson, L., Murdoch, B., & Houston, T. (2009). Longitudinal study of speech and language for children with hearing loss in Auditory-Verbal Therapy programs. *The Volta Review*, 109, 61-85.
- Dornan, D., Hickson, L., Murdoch, B., Houston, T., & Constantinescu, G. (2010). Is Auditory-Verbal Therapy effective for children with hearing loss? *The Volta Review*, 110, 361-387.
- Fulcher, A., Purcell, A.A., Baker, E., & Munro, N. (2012). Listen up: children with early identified hearing loss achieve age-appropriate speech/language outcomes by 3 years-of-age. *International Journal of Pediatric Otorhinolaryngology*, 76, 1785-1794. doi: 10.1016/j.ijporl.2012.09.001.
- Geers, A. E., & Nicholas, J. G. (2013). Enduring advantages of early cochlear implantation for spoken language development. *Journal of Speech, Language, and Hearing Research*, 56(2), 643-653.
- Joint Committee on Infant Hearing (2007). Year 2007 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs. *Paediatrics* 120, 898-921
- National Acoustic Laboratories. (2018). LOCHI – Key Findings. Retrieved 20 September 2019, from <https://www.outcomes.nal.gov.au/key-findings>
- Rhoades, E.A., & Chisolm, T.H. (2000). Global language progress with an Auditory-Verbal approach for children who are deaf and hard of hearing. *The Volta Review*, 102, 5-24.
- Semel, E., Wiig, E., & Secord, W. (2006). *Clinical Evaluation of Language Fundamentals - Australian standardised edition (4th ed.)*. Marickville, NSW: Harcourt Assessment.
- Semel, E., Wiig, E., & Secord, W. (2017). *Clinical Evaluation of Language Fundamentals - Australian standardised edition (5th ed.)*. Marickville, NSW: Harcourt Assessment.
- Wiig, E.H., Secord, W.A., & Semel, E. (2006). *Clinical Evaluation of Language Fundamentals - Preschool - Australian and New Zealand Standardised Edition (2nd ed.)*. Marickville, NSW: Harcourt Assessment.
- Yoshinaga-Itano, C. (2004). Levels of evidence: universal newborn hearing screening (UNHS) and early hearing detection and intervention systems (EHDI). *Journal of Communication Disorders*, 37(5), 451-465.
- Zimmerman, I.L., Steiner, V.G., & Pond, R.E. (2012). *Preschool Language Scale (5th ed.)*. San Antonio, TX: The Psychological Corporation.

7. Glossary

Technical terms used within this report are contained below.

Aetiology	The cause or set of causes; in the case of this report this refers to cause(s) of a child or young person's hearing loss.
Audiometric data	Audiometric data is about a person's hearing acuity given variations in sound intensity and pitch (frequency). The database collects information at 0.5, 1.0, 2.0 and 4.0 kHz wherever possible, and at higher frequencies for children and young people whose hearing loss meets the criteria for inclusion as a 'high frequency hearing loss'.
Bilateral hearing loss	Hearing loss affecting both ears.
Confirmation of hearing loss	For the purposes of this database, this is the date at which the hearing loss was first diagnosed.
Cochlear implant	A cochlear implant is an implanted electronic device which provides a sense of sound to the recipient by directly stimulating the auditory nerve with current pulses, rather than via amplified sound as occurs in hearing aids.
Unilateral hearing loss	Hearing loss affecting one ear.

Hearing Australia - Hearing Level Classification (used by AVUK, Cora Barclay (CanDo), Hear and Say, Telethon Speech and Hearing), The Shepherd Centre and RIDBC (Taralye) & RIDBC (Greater Sydney Metro)

Normal	Up to 20dB
Mild	21-40dB
Moderate	41-60dB
Severe	61-80dB
Severe to Profound	81-90dB
Profound	91+dB

NZ Hearing Level Classifications (used by Hearing House)

Normal	Up to 20dB
Mild	20-40dB
Moderate	41-55dB
Moderately-severe	56-70dB
Severe	71-90dB
Profound	91+dB