Australian Government
Australian Institute of
Health and Welfare

Northern Territory Remote Aboriginal Investment: Ear and Hearing Health Program

July 2012 to June 2016

Australian Government
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*Authoritative information and statistics
to promote better health and wellbeing*

Northern Territory Remote Aboriginal Investment: Ear and Hearing Health Program

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Contents

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Abbreviations

AIHW	Australian Institute of Health and Welfare
AOM	acute otitis media
CHCI(CtG)	Child Health Check Initiative/Closing the Gap program
CHHC	Child Hearing Health Coordinator
CNC	clinical nurse consultant
CNS	Clinical Nurse Specialist
CSOM	chronic suppurative otitis media
dB HL	decibel hearing level
ENT	ear, nose and throat
ETD	Eustachian tube dysfunction
FaFT	Families as First Teachers
HEBHBL	Healthy Ears—Better Hearing, Better Listening
HRN	hospital registration number
Hz	hertz
NT DoH	Northern Territory Department of Health
NTER	Northern Territory Emergency Response
NTRAI	Northern Territory Remote Aboriginal Investment
OME	otitis media with effusion
SFNT	National Partnership Agreement on Stronger Futures in the Northern Territory
VROA	visual reinforced orientation audiometry

Symbols

n.p.	not published because of small numbers, confidentiality or other concerns about the quality of the data
—	nil or rounded to zero
. .	not applicable
<	less than

Summary

This report presents information on ear and hearing health outreach services for Aboriginal and Torres Strait Islander children and young people in the Northern Territory. The Australian Government funded these programs and the Northern Territory Government delivered them.

Service delivery

- In 2015–16, 2,253 outreach audiology services were provided to 1,981 children and young people; and 1,011 ear, nose and throat (ENT) teleotology services were provided to 936 children and young people.
- Clinical Nurse Specialists (CNSs) conducted 1,211 visits to 1,125 children in 2015–16. This was an increase from 2014–15 when 668 CNS visits were provided to 622 children.
- From July 2012 to June 2016, 9,221 outreach audiology services were provided to 5,357 children and young people, 3,799 ENT teleotology services were provided to 2,434 children and young people, and CNS conducted 3,087 visits to 2,614 children.

Improvement in hearing health status

- The levels of hearing loss and impairment have improved slightly over the last 4 years. In 2015–16, 49% of Indigenous children had some type of hearing loss (compared with 52% in 2012–13) and 32% had a hearing impairment (compared with 37% in 2012–13).
- Between July 2012 and June 2016, hearing improved for a large proportion of children and young people who received 2 or more audiology services. Almost half (48%) of the children who had hearing loss at their first service showed improvement in hearing at their last service.
- More than half (59%) of children and young people had a reduction in the degree of their hearing impairment between July 2012 and June 2016.

Improvement in hearing health and ear conditions

- From July 2012 to June 2016, the proportion of children and young people with at least one middle ear condition decreased from 82% to 75% between their first and last service.
- Greater decreases were observed over the longer term. From August 2007 to June 2016, the proportion diagnosed with any ear condition decreased from 78% to 49% between their first and last service.

High demand on hearing and ear health services

A large number of hearing and ear health services have been provided, but there is much work yet to do. As at 30 June 2016, 3,090 children and young people were waiting for audiology services, and 1,841 for ENT teleotology services. While ensuring children most in need received services (through the priority listing system), a number of changes have been made to improve the overall efficiency of hearing health services, including enhancing CNS services, health promotion and education activities. However, the high demand on hearing and ear health services continues to be driven by the high prevalence of middle ear conditions among children and the chronic nature of the disease, which means the majority of children require repeated and long-term follow-up services.

1 Introduction

This report presents information on ear and hearing health outreach services provided to Aboriginal and Torres Strait Islander children and young people in the Northern Territory from July 2012 to June 2016. The Australian Government funds these services via various programs and the Northern Territory Government delivers them. These programs aim to provide outreach services for the early detection, treatment and management of ear diseases and hearing health problems among Indigenous children and young people. The services are provided by audiologists; ear, nose and throat (ENT) specialists; and clinical nurse specialists (CNSs).

This report is an update of *Hearing health outreach services to Aboriginal and Torres Strait Islander children and young people in the Northern Territory 2012–13 to 2014–15* (AIHW 2015). It also includes some analyses over a longer period (August 2007 to June 2016) for children and young people who have received multiple audiology or ENT services. This allows for an examination of the effects that ear and hearing health services and associated programs delivered in the Northern Territory had on children and young people's health over the life course of the programs.

1.1 Background

Middle ear disease, especially chronic otitis media, can cause hearing loss that has a severe negative impact on language development, cognitive development and socialisation, particularly in infants and young children. The consequences of chronic otitis media during early years may flow on to a lifetime of disadvantage (WHO 1996). In 2011, hearing and vision disorders contributed 1.2% of total burden of disease in Indigenous Australians, and about 77% of this burden was attributed to hearing loss and other hearing and vestibular disorders (AIHW 2016).

Middle ear disease is a common health problem among Indigenous children, particularly those who live in remote communities. Data from the National Aboriginal and Torres Strait Islander Social Survey in 2014–15 found that a higher proportion of Indigenous Australians aged 4–14 were reported to have ear or hearing conditions in *Remote* areas than in non-remote areas at the national level (13% and 10%, respectively). The difference between *Remote* areas was even greater among Indigenous children aged 0–3, with 7% having ear or hearing conditions in *Remote* areas compared with 2% in non-remote areas (ABS 2016).

A number of factors are associated with the presence of middle ear disease among Indigenous children, including low socioeconomic status (Shepherd et al. 2012) and housing and social conditions, such as household overcrowding and hygiene (Bailie et al. 2010; Spurling et al. 2014). Living in *Remote* areas may also affect access to general and ear health services, with fewer medical practitioners (including specialists) per capita and lower access to general practitioners in *Regional* and *Remote* areas than in *Major cities* (AIHW 2014a, 2014b). This can result in delays in the diagnosis, treatment and management of middle ear disease among Indigenous children, and therefore prolong periods of hearing loss and impairment. As a higher proportion of Indigenous Australians live in *Remote* areas than non-Indigenous Australians—particularly in the Northern Territory—Indigenous Australians are disproportionately affected by middle ear disease.

A study by Gunasekera and colleagues (2009) found that:

- medical practitioners working in rural and remote Aboriginal Medical Services throughout Australia managed a greater burden of chronic otitis media than practitioners in urban areas
- patients of rural and remote practitioners had less access to specialist ear health services required to manage severe otitis media
- 1 in 5 Aboriginal children in rural and remote areas waited longer than the recommended period of 3 months for audiology testing.

1.2 Australian government funded hearing health programs in the Northern Territory

The extent of poor ear health among Indigenous children and young people in the Northern Territory was corroborated during the Child Health Check Initiative (CHCI) introduced under the Northern Territory Emergency Response (NTER). Child Health Check data showed that between July 2007 and June 2009, of the 9,373 Indigenous children who received health checks, 30% had ear disease in NTER Prescribed Areas. Of these children, 1,291 (14%) were referred to audiology services and 896 (10%) were referred to an ENT specialist at their initial health check (AIHW & DoHA 2009). The WHO Burden of Disease report (WHO 2004) indicates that where the prevalence of chronic otitis media exceeds the 4% prevalence, it is 'indicative of a massive public health problem requiring urgent attention'.

The prevalence of middle ear disease among Aboriginal children in the Northern Territory was worse than that at the national level. It is possibly associated with several factors:

- the nature of otitis media, which makes it a complicated disease to manage
- the living conditions in some parts of the Northern Territory
- the geographical location and vast spread of Indigenous communities
- the inability to find children and their families during community outreach visits because of the high mobility of Indigenous families
- the difficulty in recruiting and retaining a specialist workforce.

In response to the high level of need in this area, an ear and hearing health program was established as part of the NTER in mid-2007. This program continued under the Closing the Gap program (CtG) in the Northern Territory National Partnership Agreement from mid-2009 to mid-2012. These programs targeted services to children and young people in Prescribed Areas of the Northern Territory, which were remote areas that lacked specialist services. For more background information on these two initiatives, see *Northern Territory Emergency Response Child Health Check Initiative—follow-up services for oral and ear health: final report 2007–2012* (AIHW 2012).

By the end of the CHCI and CtG programs—referred to as 'CHCI(CtG)' in this report—evidence from the data collected showed that among children and young people who received ear and hearing health services, the prevalence of middle ear conditions decreased, and the majority experienced improvements in hearing (AIHW 2012). However, despite those improvements, ear disease and hearing loss remain critical health issues of concern for this population (AIHW 2014c).

From July 2012 to June 2015, the ear and hearing health services were replaced and expanded by the National Partnership Agreement on Stronger Futures in the Northern Territory (SFNT). Since July 2015, these services have been continued through a new national partnership on the Northern Territory Remote Aboriginal Investment (NTRAI) Hearing Health Program. The funding from both the SFNT and the NTRAI (from here on simplified to NTRAI) was mainly used to provide audiology and CNS (formerly called Child Hearing Health Coordinator, or CHHC) services to children and young people aged under 16.

The Australian Government also provides funds to the Northern Territory Government through the Healthy Ears—Better Hearing, Better Listening program (HEBHBL). The Northern Territory Government used this funding to support audiology services and ENT teleotology services for children and young people aged 21 and under, especially in remote areas, where there is high demand and a lack of local services.

While services provided under the CHCI(CtG) were limited to prescribed communities in the Northern Territory, services provided under the SFNT and the HEBHBL are territory-wide, and target—but are not limited to—remote communities. NTRAI services are implemented with a focus on remote communities due to high needs in these areas.

While the programs worked as effective medical interventions for ear diseases, much work remains to be done to address other factors that had a negative impact on hearing and ear health in the territory. These factors include socioeconomic factors, lifestyle and hygiene, and the challenges in recruiting and retaining a specialist workforce. These are out of the scope of this report.

1.3 How services are provided

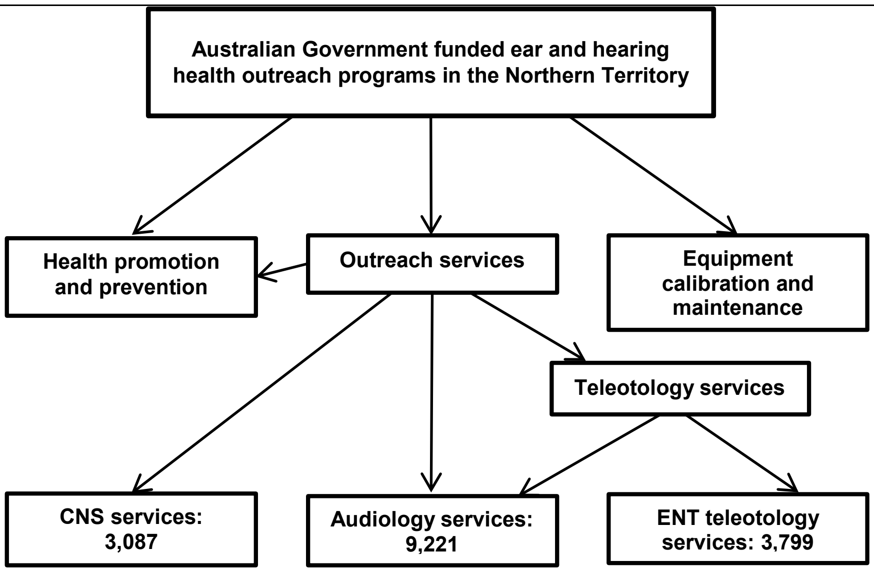
This report covers only the services provided through the Hearing Health Program funded by the Australian Government and implemented by the Northern Territory Government (Table 1.1). The program mainly provides outreach hearing health services at community level, including interventional (treatments) services, with technical support from the ENT services in the Royal Darwin Hospital. The program functions that include scheduling, logistics, information management, assets management, and communication functions are provided by core management and administration staff. The services provided by the program include four components: health promotion and prevention, audiology services, CNS services and teleotology services. The outreach teams also dedicate time and resources to maintain medical equipment to ensure these services run smoothly (Figure 1.1). Since 2010, the number of outreach visits to remote communities across regions in the Northern Territory continues to increase as integration strategies reduce costs and improve efficiencies of service delivery.

Figure 1.1 summarises information about these services, including the scope, service providers and the specific functions of each service type. The detailed information on how these services have been provided is included in the subsequent chapters of this report.

Table 1.1: Scope of hearing health outreach services funded by the Australian Government in the Northern Territory[a] in this report

Scope of service recipients	Service provider/staff	Services provided
Ear and hearing health promotion and prevention (Chapter 2)		
Whole community, including council, school, clinic and health services, women's and family groups	Hearing health outreach team members, which can include audiologists, CNSs, Aboriginal health workers, and ENT nurses	Increasing ear and hearing health knowledge by various education activities, including dissemination of health promotion material and conducting health education sections
Audiology services (Chapter 3)		
Indigenous children and young people in the Northern Territory aged 21 and under Services for children and young people aged under 16 are funded through the NTRAI National Partnership Agreement Services for those aged 21 and under are funded through the HEBHBL	Outreach teams consisting of an audiologist and at least one other member of staff, such as a registered nurse, nurse audiometrist, Aboriginal health worker, or a community hearing worker Teleotology service teams: CNS (ENT), audiologist and ENT specialist	Assessment of middle ear function Diagnosis of hearing loss and middle ear conditions Recommendations for clinical care and rehabilitation (for example, communication strategies, classroom amplification, hearing aids, speech therapy and education support) Outreach teams working with local families, primary health organisations, community personnel, schools and early childhood organisations
ENT Teleotology services (Chapter 4)		
Indigenous children and young people in the Northern Territory aged 21 and under	Teleotology service teams: CNS (ENT), audiologist and ENT specialist	ENT specialist advice and oversight Diagnosis and assessment of hearing loss Diagnosis and assessment of middle ear conditions Recommendations for treatment (for example, medications, surgery, hearing aids) Care coordination
CNS services (Chapter 5)		
Indigenous children who have a priority listing (that is, a diagnosed middle ear condition or documented hearing impairment) See Chapter 5 for more information	CNS	Coordination of treatment strategies by: establishing what support communities need and promoting hearing health supporting local staff to identify priority children managing schedules of children for audiology and other specialist services engaging and connecting communities with a range of service providers training local staff helping local staff with data recording and running reports

(a) Services presented here are only the types of hearing health services included in this report, not an exhaustive representation of all hearing health services available in the Northern Territory.



Notes

1. Children and young people may receive more than 1 type of service.
2. Services presented here are only the hearing health services funded by the Australian Government, not an exhaustive representation of all hearing health services available in the Northern Territory.

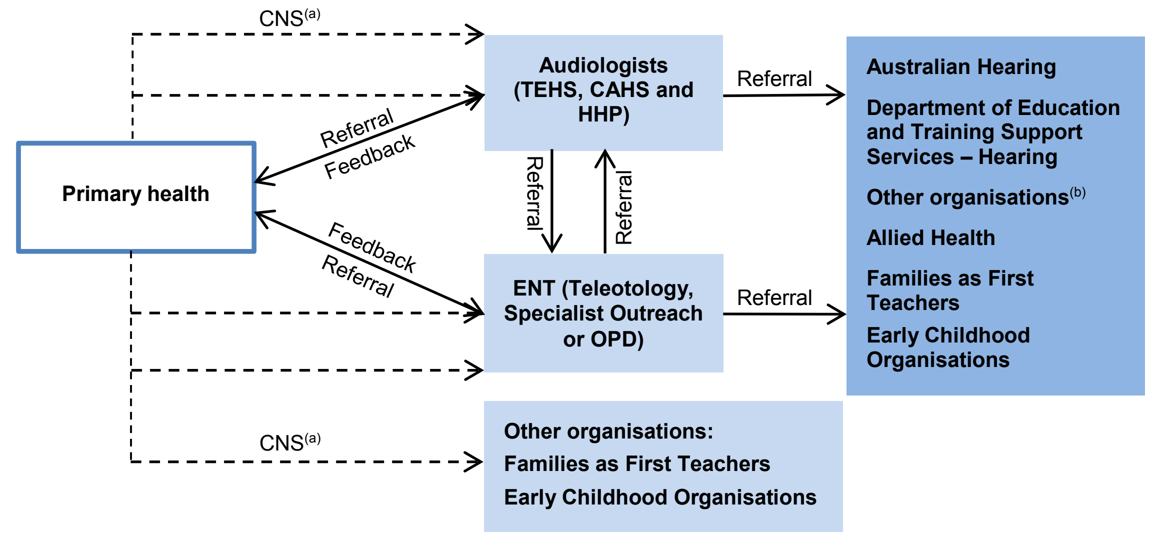
Figure 1.1: Types of hearing health outreach services funded by the Australian Government in the Northern Territory, July 2012 to June 2016

Figure 1.2 presents the components of the clinical pathway of children with ear and hearing diseases funded through the NTRAI as part of the integrated Hearing Health Program. Ear diseases and related hearing problems are usually identified and treated first by primary health-care providers. If the condition is not resolving, and persisting for longer than 3 months, clinical guidelines recommend that the patient be referred to an ENT specialist or an audiologist for further assessment and treatment if necessary.

ENT specialists and audiologists provide feedback to primary health-care providers regarding the outcomes of assessment and recommendation of further medical intervention. ENT surgery can be conducted by ENT specialists when it is required. A number of audiology assessments are required before and after ENT surgery. ENT specialists and audiologists may also refer patients to other organisations, such as Australian Hearing and the Department of Education and Training for amplification, rehabilitation and special education.

CNSs provides outreach services to Indigenous families by linking primary health care with specialist services. A key role is to provide continuity of care and to prioritise high-risk children.

This report does not cover primary health-care services but only services provided by audiologists, ENT specialists and CNSs.



Note: HHP = Hearing Health Program; TEHS = Top End Health Services; CAHS = Central Australia Health Services; OPD = Outpatients.

(a) The CNS provides outreach services to Indigenous families by linking primary health care with specialist services.

(b) For a detailed list of other organisations, see the outreach audiology data collection form in Appendix B.

Figure 1.2: Clinical pathway of children with ear and hearing diseases

1.4 Data collection, management and reporting

The AIHW was commissioned by the Department of Health to collect, manage and report on data from ear and hearing health outreach services in the Northern Territory. The information supports the monitoring of health services for Indigenous children and young people in an area of critical need—both geographically and health-wise—in the Northern Territory, and builds the evidence required for program monitoring and evaluation.

The data analysed in this report are collected by the AIHW from the following services:

- hearing health outreach audiology data collection
- ENT teleotology data collection
- CNS services data collection.

These data are collected using paper data collection forms. Health professionals responsible for providing services complete a form with information about the child or young person's demographic characteristics, types of services provided, community where the service was provided, date of service, examination results and medical interventions and recommendations.

How much data the AIHW receives on each child or young person depends on whether the child or young person's parent or guardian provides consent to share the information. There are two scenarios for the provision of data under the consent requirements:

- If consent is given, all de-identified data are sent to the AIHW.

- If consent is not given, a limited amount of aggregate information is provided to the AIHW. This includes the number of services provided and the number of children and young people receiving a service by 5-year age group, sex, and community where the service was provided.

Therefore, apart from aggregate numbers, data used in this report include only children and young people for whom consent was obtained from parents or guardians to share information with the AIHW.

Throughout this report, the term 'services' refers to occasions of service. A child or young person may receive a number of services and have more than 1 record in each data collection. Each record in the collection corresponds to a single service, not to a single person.

People aged 21 and under are eligible for audiology services funded under the HEBHBL; however, analyses in this report include only ages 0–20 because none of the participants in the program were aged 21.

Data limitations

The audiology, CNS and ENT data collections have some limitations that should be considered when interpreting the findings presented in this report.

- Children and young people who receive audiology, ENT or CNS services are not a random sample of Indigenous children and young people in the Northern Territory because these services are targeted at children with high need. There were over 5,000 children and young people aged under 21 receiving Northern Territory outreach audiology services, which accounted for about 17% of the Northern Territory Indigenous population of this age group. Additionally, the scope of this report is limited to programs funded by the Australian Government. Services provided through other funding sources (for example, the Northern Territory Government or private sector) are not included. Thus, the results of this report do not represent ear and hearing health services in the Northern Territory as a whole, and they are not representative of the total Indigenous population aged under 21 in the Northern Territory.
- In general, this report does not include information on children and young people if their parent or guardian did not provide consent to share the data with the AIHW. The exceptions to this are for summary tables on the total number of services and service recipients, which contain aggregate non-consent data. The accuracy of analysis results for audiology and ENT services was not greatly affected as the extent of non-consent data was minimal, at less than 1% for audiology and ENT services between July 2012 and June 2016. However, rates of non-consent were high for CNS services (see Chapter 5 for more discussion on this issue). This should be taken into account when interpreting the analyses presented in Chapter 5. However, there have been improvements to non-consent rates over time for CNS services, decreasing from 62% of children in 2012–13 to 15% of children in 2015–16.
- When using and interpreting the data, the extent of missing and 'not tested' responses should be taken into account. Where possible, tables show the percentage of missing and not tested responses.

Appendix A contains a summary of data items in each of these collections. The data collection forms for audiology, ENT teleotology and CNS services are provided in Appendix B. Data quality statements for the collections are in Appendix C.

1.5 Report structure

This report has seven chapters—this introductory chapter and a further six chapters:

- **Chapter 2**—Preventive interventions and ear health promotion: includes information about preventive interventions that were part of the hearing health programs included in this report, such as the resources and material developed to promote ear health, and health promotion campaigns.
- **Chapter 3**—Audiology services: includes information about audiology services provided, hearing status and impairment among children and young people who received these services and how this has changed over time, and types of further care recommended by audiologists.
- **Chapter 4**—Ear, nose and throat teleotology services: includes information about teleotology services provided, and recommendations provided by ENT specialists for clinical management and further actions.
- **Chapter 5**—Clinical Nurse Specialist services: includes information about the number of children who participated in the program, clinical service activities provided, contacts made with other service providers, and the ear health of children.
- **Chapter 6**—Ear conditions: uses combined data from audiology and ENT teleotology services to analyse the prevalence of ear conditions among children and young people who received these services, hearing status among children and young people diagnosed with conditions, and changes over time in the prevalence of ear conditions among those who received multiple services.
- **Chapter 7**—Special analyses: analyses young people aged 20 and over at the end of the reporting period (30 June 2016), on exiting the hearing health programs. It includes data from audiology and ENT teleotology services, and presents information on the number of services received, changes in ear and hearing health, and further actions and recommendations for these young people at their last service.

The order of the chapters does not represent the order in which children and young people move through the hearing health programs, as there is no specific pathway that must be followed through different services. For example, some children and young people receive only 1 type of service, while others move between multiple service types or receive services concurrently. A client's pathway of care depends on many factors, including the presenting otitis media condition, the disease progression, other service providers accessed, the family's level of engagement with services, mobility of clients, and the capacity of clients to attend the infrequent and time-limited visits from hearing health outreach teams.

Chapter 7—Special analyses—is new to this report series. It is expected that future reports will also include a 'special analyses' chapter, highlighting interesting findings from new analyses. A wider range of analyses will be possible as more data become available in the future.

2 Preventive interventions and ear health promotion

The hearing health programs in this report acknowledge the central role of families and community in sharing ear and hearing health promotion and prevention messages. The rationale is that preventive measures are not only essential, but also complementary to the medical model. Primary prevention is recognised by the WHO as vital in order to improve quality of life and reduce burden of ear disease. As well, many publications demonstrate the importance of ear health through the lifespan, particularly in infancy and childhood. Therefore, it is important for communities to understand that ear disease is preventable, and early identification and consistent messages and treatment can help to minimise potential long-term adverse impacts on individuals and the wider community.

There have been a variety of resources available for ear health promotion and prevention under the Hearing Health Program funded by the Australian Government. The priority areas centre on enhancing ear and hearing health literacy through education as well as through community participation, including culturally appropriate interventions such as handouts, posters and audio-visual messages.

Key hearing health promotion initiatives implemented in 2015–16 include:

- a formal training package for Aboriginal Community Hearing Workers to understand conductive hearing loss and reinforce ear disease prevention strategies
- the 'Stop the First Infection' initiative to prevent early childhood infections. It aims to increase the awareness of infection control and encourage behaviour change at the population level. 'Stop the First Infection' has broad preventive messages for all child health programs targeting children aged 0–5
- ear and hearing health promotion and prevention, including displays of video-otoscope health merchandise during community events in Alice Springs, Darwin, Katherine and Tennant Creek
- a formal partnership with local football organisations, including Northern Territory Thunder and AFL Northern Territory, to develop and promote a hearing health social marketing campaign, with football players as hearing health ambassadors. Television commercials, web promotions and radio advertisements are currently being developed for this marketing campaign; digital books with key ear health and hearing messages have been distributed in specific communities.

In particular, the Hearing Health Program developed a health promotion hip hop music video that addresses ear health, in partnership with three organisations: the Indigenous Hip Hop Project, Canteen Creek School and Canteen Creek Shire Council. This partnership has enabled the program to develop a resource that is community made and owned, and is now being widely used in the community. The video will be uploaded on YouTube, Facebook and other social media sites in the near future. The Hearing Health Program continues to explore other ways of marketing this video to ensure that as many of its target audience as possible access the key messages.

The partnership brought together different organisations that collectively contributed to the production of the health promotion resource. Canteen Creek School works closely with young people in the community; partnering with the school enabled the Hearing Health

Program not only to engage with the students, but also to build the knowledge and skills of both students and staff for good hygiene to prevent infections. At the same time, the partnership with the shire facilitated extensive engagement with community members. As a result, the program managed to work with nearly every community member, by consulting and discussing issues that affect ear health and hearing. After this, most community members were very keen to be involved in writing and recording the song. Although the Hearing Health Program coordinated this partnership for more than 6 months, the Indigenous Hip Hop Project was tasked with coordinating it during the week of recording because it has the technical expertise in music production.

More hearing health promotion activities are planned to be implemented by Community Hearing Workers, in partnership with the Department of Education and Training. A pilot program in four communities, Maningrida, Galiwinku, Oenpelli and Ngukurr began in the second half of 2016. There will be a Community Hearing Worker in each of the pilot communities based at the 'Families as First Teachers' (FaFT) centres. These workers will deliver health promotion sessions at these centres supported by the FaFT staff, and will also co-facilitate monthly sessions delivered by the CNSs. This project gives the Hearing Health Program opportunities to expand its health promotion efforts in the pilot communities.

As well as these promotion activities, a total of 59 occasions of hearing health education activities were provided to health-care staff in 2015–2016. The purposes and target audiences of education sessions and promotion activities varied (Table 2.1).

Table 2.1: Summary of hearing health promotion and prevention activities, 2015–16

Activity or topic of education session	Target audience	Number of sessions
Hearing health programs (including teleotology)	Primary health-care staff	4
Otosocopy and video-otoscopy	Health and hospital staff	6
Tympanometry	Primary health-care staff	5
Ear irrigation and audiometry	Primary health-care staff	3
Otitis media clinical care	Health and hospital staff	6
Ear and hearing health	Primary health-care staff, medical students	14
Understanding hearing loss	Community, school, FaFT workers	2
Awareness, prevention and promotion		
Hearing health promotion	Primary health-care staff	19
Total		**59**

Source: Northern Territory Department of Health.

3 Audiology services

Key findings

- In 2015–16, a total of 2,253 outreach audiology services were provided to 1,981 Indigenous children and young people aged under 21. From July 2012 to June 2016, 9,221 outreach audiology services were provided to 5,357 children and young people.
- Hearing loss (see Box 3.2) was present in 49% of the 1,976 children and young people who received outreach audiology services (and gave consent to share information) at their latest service in 2015–16—a decrease from 52% in 2012–13.
- About 32% (630) of children and young people who received outreach audiology services in 2015–16 had some form of hearing impairment (see Box 3.2 for definitions)—a decrease from 37% in 2012–13.
- Among the 1,826 children and young people who received 2 or more outreach audiology services between July 2012 and June 2016, 37% experienced improvement in hearing status, 53% no change, and 10% deterioration between the first and last service.
- Among the 924 children and young people who received 2 or more outreach audiology services between July 2012 and June 2016 and who had a hearing impairment, 59% experienced an improvement in the degree of their hearing impairment.
- Among the 1,739 children and young people aged 0–15 who received 3 or more services from August 2007 to June 2016, 84% had hearing loss at their first audiology service, which decreased to 52% at the last service.
- As at 30 June 2016, 3,090 audiology and 1,841 teleotology audiology service recipients were on the audiology service waiting list, and 87% and 83% (respectively) of them had an outstanding referral.

This chapter focuses on the provision of outreach audiology services to Indigenous children and young people in the Northern Territory that are funded by the Australian Government. It includes the number of services and service recipients, and the hearing loss and impairment these recipients experienced.

Audiology services include assessing middle ear function, diagnosing hearing loss and middle ear disease and recommending clinical care and rehabilitation (such as communication strategies, classroom amplification, hearing aids, speech therapy and education support). These services are delivered by audiology outreach teams, which consist of an audiologist and at least one other member of staff, such as a registered nurse, nurse audiometrist, Aboriginal health worker or community health worker.

3.1 Audiology services provided

This section reports the number of audiology services provided and the demographic characteristics of Indigenous children and young people who received these services.

Number of services

In 2015–16, a total of 2,253 outreach audiology services were provided to 1,981 children and young people aged 20 and under (Table 3.1). Among the 1,976 children and young people for whom consent to share information was obtained, the average number of services per recipient was 1.1, with 1,728 (87%) receiving only 1 service (Table 3.2).

From July 2012 to June 2016, 9,221 services were provided to 5,357 children and young people. Over this period, among those for whom consent was obtained, there was an average of 1.7 services per child or young person, with 60% receiving 1 service (tables 3.1 and 3.2). Consent was provided to share information with the AIHW for almost all service recipients.

A variety of factors contribute to changes in the number of audiology services provided each year. These include the availability of children and their families during outreach visits, logistical issues experienced by outreach teams in accessing communities (such as inclement weather and road closures) and access restrictions during community events.

Table 3.1: Number of audiology services and children and young people who received services, 2012–13 to 2015–16

	Services			Service recipients		
	Consent	**Non-consent**	**Total**	**Consent**[(a)]	**Non-consent**	**Total**[(a)]
				Number		
2012–13[(b)]	1,920	14	1,934	1,646	14	1,660
2013–14	2,106	21	2,127	1,747	21	1,768
2014–15	2,886	21	2,907	2,401	21	2,422
2015–16	2,248	5	2,253	1,976	5	1,981
Cumulative total	**9,160**	**61**	**9,221**	**5,296**	**61**	**5,357**
				%		
2012–13	99.3	0.7	100.0	99.2	0.8	100.0
2013–14	99.0	1.0	100.0	98.8	1.2	100.0
2014–15	99.3	0.7	100.0	99.1	0.9	100.0
2015–16	99.8	0.2	100.0	99.7	0.3	100.0
Cumulative total	**99.3**	**0.7**	**100.0**	**98.9**	**1.1**	**100.0**

(a) The total number of service recipients in 2012–13 to 2015–16 combined does not sum to the rows because some children and young people received services in multiple financial years; these service recipients were counted only once in the total.

(b) Some numbers are slightly different from those in previous publications due to data cleaning.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table 3.2: Average and maximum number of audiology services received, and proportion of children and young people who received only 1 service, 2012–13 to 2015–16

	2012–13	**2013–14**	**2014–15**	**2015–16**	**Cumulative total (2012–16)**[(a)]
Average number of services per child/young person	1.2	1.2	1.2	1.1	**1.7**
Maximum number of services	5	5	4	3	**12.0**
% of children/young people who received only 1 service	86.3	81.8	82.0	87.4	**59.5**

(a) Cumulative total includes data on people who received audiology services from 1 July 2012 to 30 June 2016. It does not equal the sum of the financial years. For example, the maximum number of services is that for 2012–16, not the sum of the maximum number of services from 2012–13 to 2015–16.

Note: Data are reported for children only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

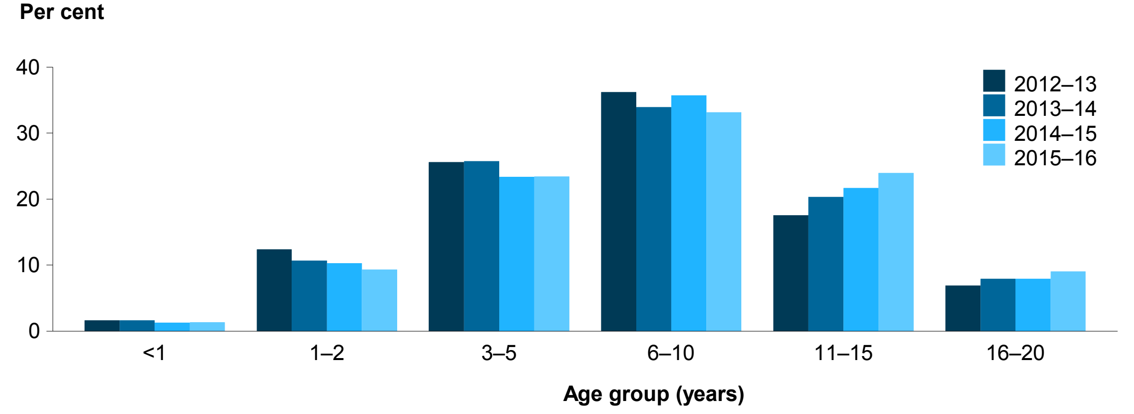
Age and sex

In 2015–16, of the 1,976 children and young people who received audiology services and for whom consent to share data was obtained:

- about one-third (33%) were aged 6–10, and almost one-quarter (in each case) were aged 11–15 (24%) and 3–5 (23%)
- those in younger and older age groups accounted for a lower proportion of service recipients. Children aged under 1 made up 1% of service recipients, 9% were aged 1–2 and 9% were aged 16–20 (Figure 3.1; Appendix Table F3.1).

While there was a general decrease in the proportion of service recipients across younger age groups between 2012–13 and 2015–16, there was a slight increase in older age groups (11–15 and 16–20).

The proportions of audiology services received by males and females were similar (49% and 51%, respectively) (Appendix Table F3.1).



Note: Data are reported only where consent was obtained.

Source: Appendix Table F3.1.

Figure 3.1: Children and young people who received audiology services, by age, 2012–13 to 2015–16

3.2 Results of hearing assessment

This section provides analyses of hearing loss status, type of hearing loss and degree of hearing impairment among children and young people who received audiology services, based on their latest audiology assessment results (see Box 3.1 for information about methods of audiological assessment). It also contains information on changes over time in children and young people who received multiple audiology services.

Caution should be taken when interpreting the data because the results are not representative of the whole population of Indigenous children and young people in the Northern Territory. Children and young people who participated in the hearing health programs included in this report are not a random sample of the population. Additionally, since January 2013, children and young people have been prioritised according to their need for services (see Table 3.3), which means that those with worse ear and hearing health are more likely to be seen and to be captured in the data collection. Therefore, the results of analyses over time could be influenced by a change in the process used to determine the order in which children and young people receive services.

Box 3.1: Methods of audiological assessment

During audiology services, middle ear and hearing status are investigated and examined by an audiologist. This includes:

- detailed clinical history of ear health, family history, general health, noise exposure, speech development and language development
- visual examination of the ear canal and tympanic membrane
- examination of the mobility of the ear membrane
- examination of functional hearing acuity.

Testing hearing loss: pure tone audiometry

Pure tone audiometry is the standard technique of testing hearing ability among children and young people who are old enough to cooperate with the test procedure. It records a subjective response to threshold (softest) sound stimuli presented through a headphone, bone conductor or speaker at discrete frequencies that are essential for detecting and discriminating speech. Any response deviation from the normal range, at any sound stimuli, in either ear, is described as a hearing loss, and the type of hearing loss is diagnosed.

Testing hearing loss in younger children: visual reinforced orientation audiometry

Visual reinforced orientation audiometry (VROA) is used to assess hearing in children aged between 9 months and 3 years. Results are obtained in a sound field where both ears are presented to test stimulus simultaneously through a calibrated speaker. As the results recorded are obtained in a sound field (both ears are being presented with stimuli without differentiation), diagnostic audiology results do not provide detailed information on separate ears and generally reflect the ear with the best hearing acuity.

Table 3.3: Priority categories for children and young people with audiology referral in the Northern Territory

Priority	Category	Description
1	VROA[(a)]	Children aged under 4 requiring audiology assessment.
2	Audio High	Children with a documented moderate or worse hearing impairment and requiring review, or a new referral from a primary health practitioner.
3	Audio Medium	Children with mild hearing impairment, unilateral hearing loss, open ear disease or those with bilateral OME*. Excludes children who are categorised as Audio High.
4	Audio Low	Audiology reviews others (should be minimal or no hearing loss, closed otitis media or Eustachian tube dysfunction).

* OME = otitis media with effusion.

(a) See Box 3.1 for more information about VROA.

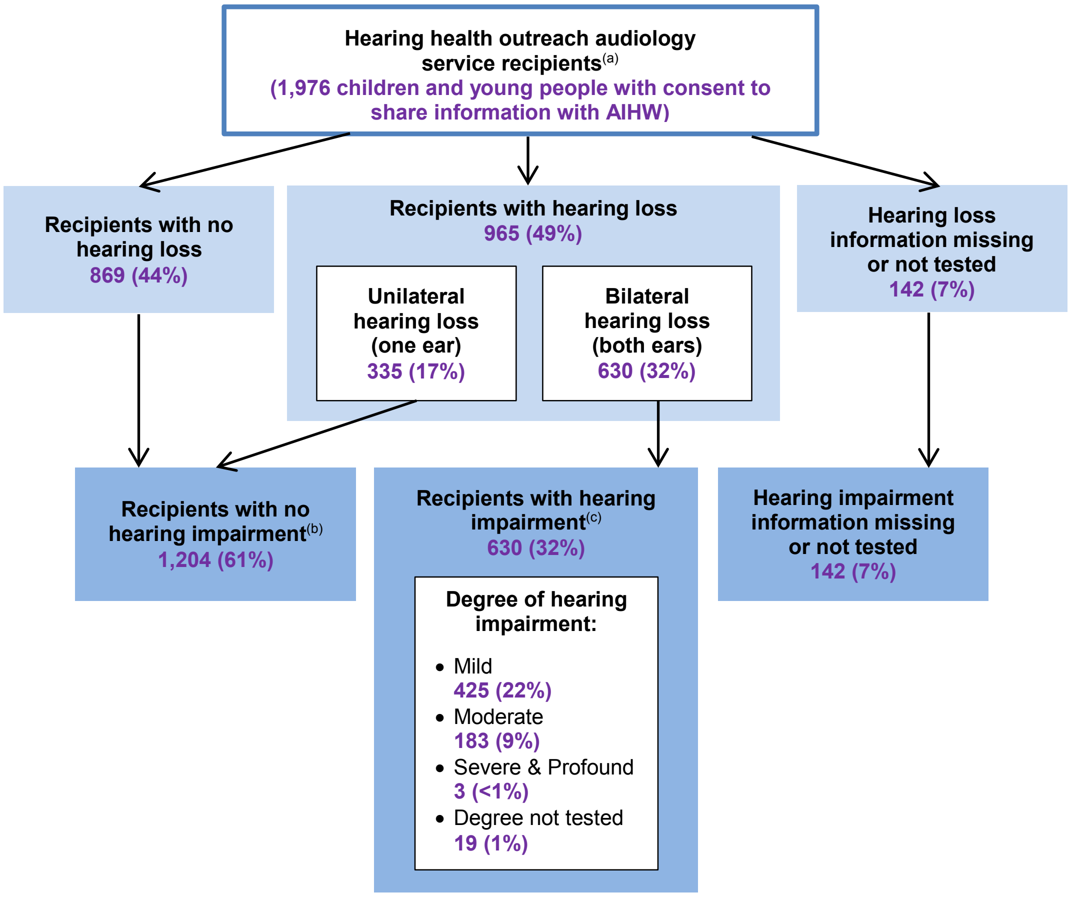
Source: NT DoH, unpublished data.

Hearing loss status, type of hearing loss, and hearing impairment

Hearing loss may affect one ear (unilateral) or both ears (bilateral). There are three types of hearing loss: sensorineural, conductive and mixed. Hearing impairment ranges from mild, moderate, severe to profound (see Box 3.2 for definitions).

Figure 3.2 shows the relationship between these components of hearing health and the number of service recipients in each category in 2015–16. Because hearing impairment is based on the better hearing ear, children and young people with unilateral hearing loss would usually have no hearing impairment; it is only those with bilateral hearing loss who would usually have some degree of hearing impairment (that is, mild, moderate, severe or profound).

The analyses in the following sections are based on the most recent service if a child or young person received more than 1 service.



(a) The outreach audiology data collection form used to derive the information in this figure is in Appendix B.

(b) Recipients with no hearing impairment include those with no hearing loss and with unilateral hearing loss.

(c) This category contains only those with bilateral hearing loss.

Figure 3.2: Relationship between hearing loss and hearing impairment in the audiology data collection, and number of service recipients in each category in 2015–16

Box 3.2: Definitions of hearing loss and degrees of hearing impairment

Hearing loss status

- *Unilateral:* hearing loss in one ear
- *Bilateral:* hearing loss in both ears
- *Tested by sound field:* where children are tested using VROA (see Box 3.1), it is not possible to determine whether hearing loss is unilateral or there is no hearing loss; instead, the test indicates hearing acuity in the better ear.

Type of hearing loss

- *Sensorineural:* deviation of hearing threshold from the normal range attributable to problems in the inner ear or the cochlear nerve
- *Conductive:* deviation of hearing threshold from normal range associated with reduced conduction of sound through the outer ear, tympanic membrane (eardrum) or middle ear, including ossicles (middle ear bones)
- *Mixed:* deviation of hearing threshold from the normal range that has combined conductive and sensorineural components.

Degree of hearing impairment

Hearing impairment describes the degree of impairment associated with hearing loss in the 'better hearing ear', using a scale of mild, moderate, severe and profound. It is based on the degree of deviation from normal thresholds in the 'better ear', calculated as a 3-frequency average of the threshold of hearing (in decibels Hearing Level—dB HL): 500 hertz (Hz), 1000 Hz and 2000 Hz.

In the AIHW's hearing health data collections included in this report, a person's degree of hearing impairment is classified based on the categorical variable in the data collection form provided by the Northern Territory Department of Health (NT DoH) (see Appendix B). The NT DoH applies a conservative categorisation of hearing impairment, as it is regarded to be more suitable for children aged under 15 (Australian Hearing, cited in Access Economics 2006). For example, this means that a child classified with moderate hearing impairment by the NT DoH might have been classified as having mild hearing impairment in the standard system (see Table E1 in Appendix E). The system used by the NT DoH is as follows:

- *Mild:* On average, the quietest sounds that people can hear with their better ear are between 16–30 dB HL in soundproof conditions and 26–35 dB HL in non-soundproof conditions. They are able to hear and repeat words spoken in normal voice at 1 metre. Counselling and hearing aids may be needed.
- *Moderate:* On average, the quietest sounds that people can hear with their better ear are between 31–60 dB HL in soundproof conditions and 36–60 dB HL in non-soundproof conditions. They are able to hear and repeat words spoken in raised voice at 1 metre and have difficulty keeping up with conversations without using a hearing aid.
- *Severe:* On average, the quietest sounds that people can hear with their better ear are between 61–90 dB HL either in soundproof conditions or non-soundproof conditions. They are able to hear some words when shouted into the better ear. Hearing aids are needed. If no hearing aids are available, lip-reading and signing may be necessary.
- *Profound:* On average, the quietest sounds that people can hear with their better ear are 91+ dB HL either in soundproof conditions or non-soundproof conditions. They are unable to hear and understand even a shouted voice. Hearing aids may help with hearing words. Additional rehabilitation and cochlear implants, as appropriate, combined with communication skills such as lip-reading and signing provide valuable support to the profoundly deaf.

Hearing loss status

Table 3.4 shows that, in 2015–16, hearing loss was present in almost half (49%) of the 1,976 children and young people who received audiology services at their latest service (32% had bilateral loss and 17% unilateral loss); about 44% of service recipients had no hearing loss.

Between 2012–13 and 2015–16, the proportion of children and young people with hearing loss fluctuated but decreased from 52% to 49% (3 percentage points), with an increase in the proportion of service recipients with unilateral hearing loss and a decrease in those with bilateral hearing loss.

The decrease in the proportion of children and young people with hearing loss was not proportionally reflected in the increase in the proportion of no hearing loss (8 percentage points, from 36% to 44%). This is partially attributed to the decrease in the proportion of children and young people with missing or not tested hearing loss status, from 13% to 7%, between 2012–13 and 2015–16. The improvement in the completeness of data is associated with standardised protocols, the use of CNSs to assist with assessment for children aged under 3, and professional development.

Table 3.4: Hearing loss status(a), children and young people who received audiology services, 2012–13 to 2015–16

Hearing loss status	2012–13	2013–14	2014–15	2015–16
Number				
Hearing loss(c)	852	960	1,110	965
Unilateral (one ear)	255	333	371	335
Bilateral (both ears)	597	627	739	630
No hearing loss	588	618	1,063	869
Missing(d)/not tested(e)	206	169	228	142
Total number received an audiology service (b)	**1,646**	**1,747**	**2,401**	**1,976**
%				
Hearing loss(c)	51.8	55.0	46.2	48.8
Unilateral (one ear)	15.5	19.1	15.5	17.0
Bilateral (both ears)	36.3	35.9	30.8	31.9
No hearing loss	35.7	35.4	44.3	44.0
Missing(d)/not tested(e)	12.5	9.7	9.5	7.2
Total number received an audiology service	**100.0**	**100.0**	**100.0**	**100.0**

(a) Where child received multiple audiology services, data are from the latest service.

(b) Total includes all children and young people who received audiology services from 1 July 2012 to 30 June 2016. It does not equal the sum of the services for the financial years, as data are based on the latest service in the period analysed and children and young people could have received services in multiple financial years.

(c) Total children and young people with unilateral and bilateral hearing loss.

(d) Missing includes not stated, unsure and invalid responses.

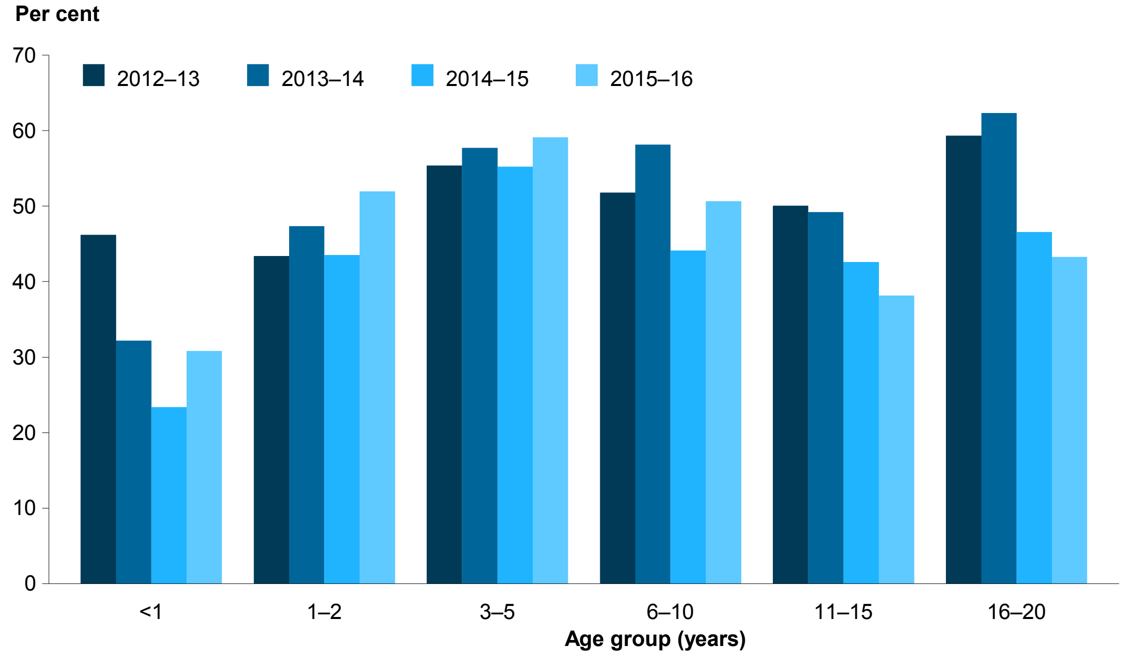
(e) Some children and young people might not be tested because they may find it difficult to cooperate with the procedure.

Note: Data are reported only for children and young people where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology data collection (services provided on or before 30 June 2016).

Patterns of hearing loss varied by age:

- In 2015–16, among the 965 children and young people who received outreach audiology services and had hearing loss, the proportion of children and young people with hearing loss ranged from 31% of children aged under 1 to 59% among children aged 3–5 (Figure 3.3; Appendix Table F3.2).
- Despite fluctuations between 2012–13 and 2015–16, the proportions of children and young people who had hearing loss generally decreased for those aged under 1, 6–10, 11–15 and 16–20 but increased for those aged 1–2 and 3–5.



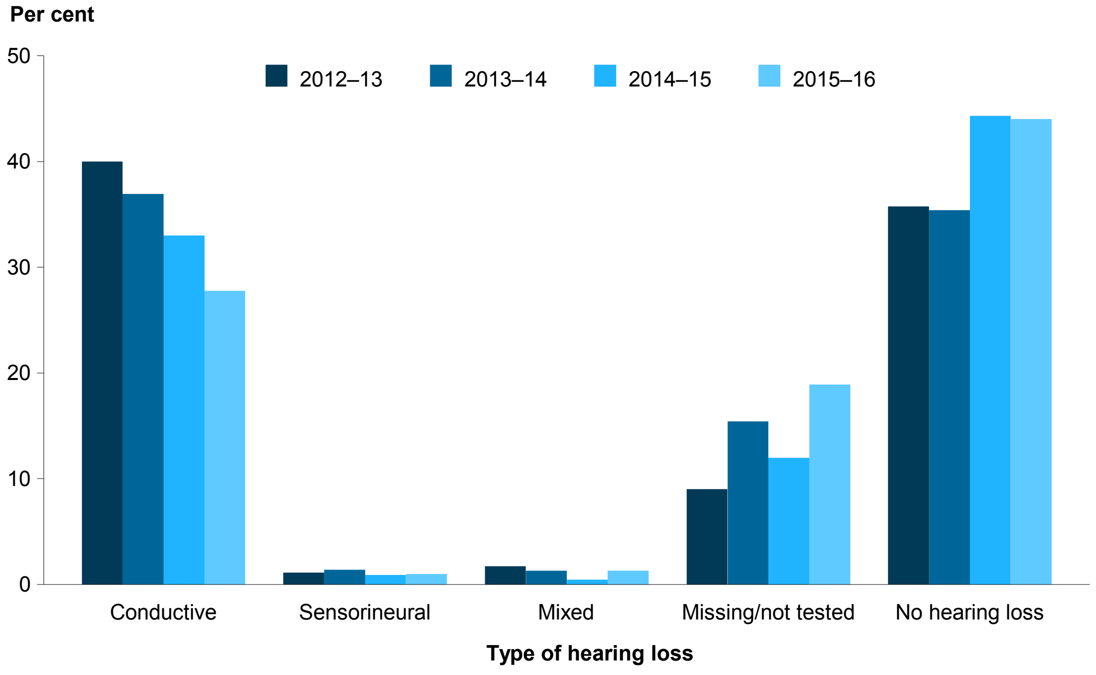
Note: Data are reported only where consent was obtained.

Source: Appendix Table F3.2.

Figure 3.3: Proportion of children and young people with hearing loss who received audiology services, by age, 2012–13 to 2015–16

Type of hearing loss

In 2015–16, among the 1,976 children and young people who received outreach audiology services and gave consent to share information with the AIHW, 49% had some type of hearing loss: conductive for 28%, sensorineural or mixed for a small proportion (1% each) (see Box 3.2 for definitions), and type of hearing loss missing or not tested for 19% (Figure 3.4; Appendix Table F3.3).



Note: Data are reported only where consent was obtained.

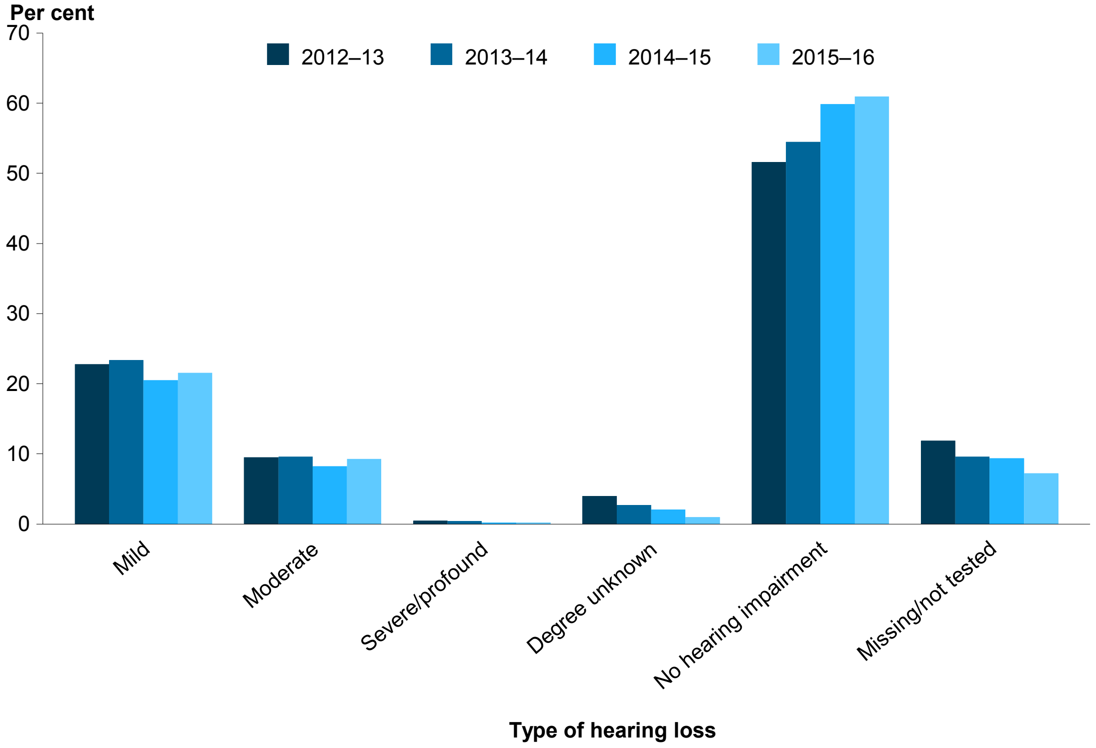
Source: Appendix Table F3.3.

Figure 3.4: Type of hearing loss among children and young people who received outreach audiology services, 2012–13 to 2015–16

Hearing impairment

In 2015–16, among the 1,976 children and young people who received outreach audiology services, 630 (32%) had some form of hearing impairment—425 (22%) mild, 183 (9%) moderate, 3 (less than 1%) severe or profound, and 19 (1%) whose degree of hearing impairment was not known (Figure 3.5; Appendix Table F3.4).

Between 2012–13 and 2015–16, the proportion of children and young people with a hearing impairment decreased from 37% to 32%. While general patterns in the degree of hearing impairment were similar for all of the 4 years, there was an increase in those with no hearing impairment, from 52% to 61%.



Note: Data are reported only where consent was obtained.

Source: Appendix Table F3.4.

Figure 3.5: Degree of hearing impairment, children and young people who received outreach audiology services, 2012–13 to 2015–16

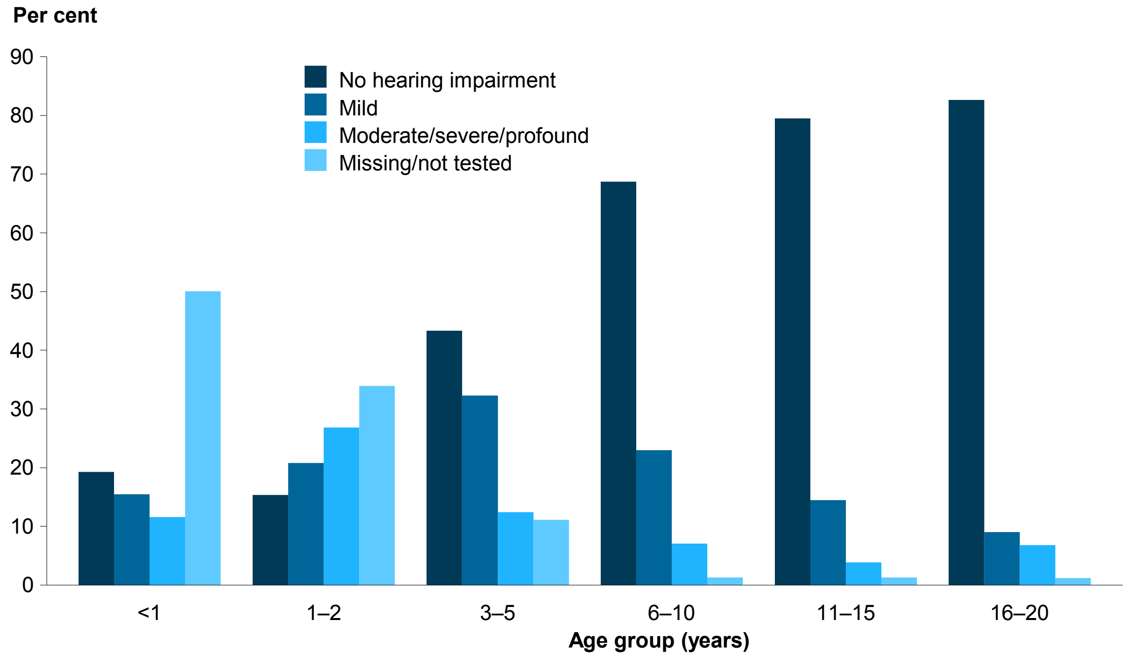
There was wide variation between age groups in degrees of hearing impairment. Hearing impairment tended to be more severe in younger age groups than in older age groups. As shown in Figure 3.6, in 2015–16:

- among younger age groups there were relatively high proportions of children with moderate, severe or profound hearing impairment—at 12% for those aged under 1 and 27% for those aged 1–2. The increase in the proportions between these two age groups may be partly due to ear conditions having more time to affect hearing in the older group (aged 1–2), and not yet manifesting in the younger group (aged under 1). With increased age, there were generally decreases in the proportion of service recipients with moderate, severe or profound hearing impairment, from 12% of those aged 3–5 to 4% of those aged 11–15

- the proportion of service recipients with mild hearing impairment increased from 15% of those aged under 1 to 32% of those aged 3–5, and then decreased with age to 9% of those aged 16–20
- there was a general increase with age in the proportion of service recipients with no hearing impairment, ranging from 15% of those aged 1–2 to 83% of those aged 16–20.

Aside from the confounding factor of missing or not tested records, these shifts in the severity of hearing impairment with age can be partly explained by the effects of both medical intervention and natural development (whereby people typically grow out of ear conditions and associated hearing loss with age). At older ages (3–5 onwards in the analysis here), it is likely that medical treatment and interventions for those with ear conditions help to reduce the severity of hearing impairment, and therefore reduce the proportion of children and young people with hearing impairment.

Note that there were high proportions of children aged under 1 and 1–2 with missing or not-tested hearing impairment in 2015–16 (50% and 34% in 2015–16, respectively) as it is difficult to test hearing loss and impairment among children in these age groups.



Note: Data are reported only where consent was obtained.

Source: Appendix Table F3.5.

Figure 3.6: Degree of hearing impairment by age, children and young people who received outreach audiology services, 2015–16

Further actions recommended

During audiology consultations, audiologists can recommend further action for the continued care of service recipients.

In 2015–16, of the 1,976 children and young people who received audiology services and gave consent to share information with the AIHW, 66% required at least one further action (Appendix Table F3.7). The most common actions recommended were ongoing monitoring by a Northern Territory hearing health service (62%), case management by a primary health-care centre (15%), referral to Australian Hearing (12%) and referral to the Department of Education and Training (11%). These proportions do not add up to the total (66%) because some children and young people were recommended for more than 1 further action.

Among the 965 service recipients who had hearing loss, almost all required at least 1 further action (96%). In comparison, among the service recipients who did not have hearing loss, only 28% required at least 1 further action (Appendix Table F3.7). For those with no hearing loss, further actions may be required to monitor ear and hearing health (for example, if the service recipient was diagnosed with an ear condition).

Between 2012–13 and 2015–16, among service recipients who had hearing loss at their most recent service (Appendix Table F3.8), there was an increase in the proportion of service recipients who were recommended for:

- referral to the Department of Education and Training (from 8% to 22%)
- referral to Australian Hearing (from 13% to 22%)
- ongoing monitoring by Northern Territory Hearing Services (from 85% to 91%).

Among service recipients who did not have hearing loss at their latest outreach audiology service, there was an increase in the proportion recommended for ongoing monitoring by Northern Territory Hearing Services (from 24% in 2012–13 to 25% in 2015–16).

3.3 Changes in hearing loss and impairment

The following sections present information about changes in hearing loss and impairment experienced by children and young people on the treatment pathway in the hearing health program—that is, for those who received more than 1 audiology service. These analyses allow an understanding of the effectiveness of hearing health outreach services in improving outcomes over time. With appropriate and timely treatment, it may be possible for a child or young person's hearing health to improve, through reductions in hearing loss (for example, from bilateral to unilateral hearing loss) and through reductions in the severity of hearing impairment experienced (for example, from moderate to mild).

The changes in hearing loss and impairment are measured both by short-term and long-term trends, which are summarised in Table 3.5. Short-term trend analyses cover 4 financial years, from July 2012 to June 2016, and examine changes over time for the NTRAI program. The table includes the participants who received 2 or more services (with a minimum interval of 3 months between services) and compares their hearing assessment results cross-sectionally (see Box 3.3 for a definition of cross-sectional analysis).

The long-term trend analyses cover 9 years, from August 2007 to June 2016, and examine changes that occurred since the start of the audiology program funded by the Australian Government, initially through the CHCI(CtG). It includes participants who received 3 or more services, and compares their hearing assessment results cross-sectionally between their first, second last and last services. In addition, cohort analyses were undertaken to track the progress of individual service recipients over the period. Using this method, it was possible to assess the proportion of children and young people whose hearing health improved, deteriorated, stabilised and fluctuated over time (see Box 3.3).

Table 3.5: Summary of scope and methods for trend analyses (short and long term) for change in hearing loss and impairment among audiology service recipients

		Scope		Type of analysis	
Trend analysis	**Period**	**Program**	**Number of services per child**	**Cross-sectional**	**Cohort**
Short-term	4 years (July 2012–June 2016)	NTRAI HEBHBL	2 or more	Table 3.6	Table 3.7 Table 3.8
Long-term	9 years (August 2007–June 2016)	CHCI(CtG) NTRAI HEBHBL	3 or more	Figure 3.8 Figure 3.10 Figure 3.11	Figure 3.7 Figure 3.9

Children and young people who received at least 2 services

Changes in hearing loss

There were improvements in hearing over time among the 1,826 children and young people who received 2 or more hearing health outreach audiology services between July 2012 and June 2016. The data analysed in this section are cross-sectional (see Box 3.3). Between first and last service, there was a decrease of 22 percentage points in the proportion with hearing loss (from 76% at the first service to 54% at the last service):

- The proportion with bilateral hearing loss decreased by 18 percentage points, from 53% at the first service to 35% at the last service.
- The proportion with unilateral hearing loss decreased by 4 percentage points, from 24% at the first service to 20% at the last service (Table 3.6).

Table 3.6: Change in hearing status, children and young people who received at least 2 outreach audiology services(a), July 2012 to June 2016

	First NTRAI audiology service		Last NTRAI audiology service			
Hearing loss status	**Number**	**% (x)**	**Number**	**% (y)**	**% change (y–x)/x(b)**	**% point difference (y–x)(c)**
Hearing loss(d)	1,392	76.2	993	54.4	–28.7	–21.9
Unilateral	430	23.5	359	19.7	–16.5	–3.9
Bilateral	962	52.7	634	34.7	–34.1	–18.0
No hearing loss	434	23.8	833	45.6	91.9	21.9
Total service recipients(e)	**1,826**	**100.0**	**1,826**	**100.0**	. .	. .

(a) Median interval between first and second service: 18 months. Minimum interval: 3 months.

(b) The change in a variable from one period to another, expressed as a percentage of its value in the first period (that is, proportion at the last service minus proportion at the first service, divided by proportion at the first service).

(c) The difference between the percentages at two time periods (that is, proportion at the last service minus proportion at the first service).

(d) Total children and young people with unilateral and bilateral hearing loss.

(e) Indigenous children and young people who received 2 or more outreach audiology services. Excludes children with missing or not tested responses for hearing status.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Another way to assess changes in hearing loss status is through a cohort analysis, which examines the proportion of children and young people with unilateral, bilateral and no hearing loss at their first service, compared with hearing loss status at their last service, by type of change. Table 3.7 shows that both positive and negative changes in hearing status can be found in children and young people at their first and last services.

- Among the 1,392 children and young people with hearing loss at their first service, 48% experienced improvement at their last service, 46% experienced no change and 6% experienced deterioration.
    - Of the 430 children and young people who had unilateral hearing loss at their first service, 47% had recovered from hearing loss at their last service, 35% had remained the same and 19% had changed to bilateral hearing loss.
    - Of the 962 children and young people who had bilateral hearing loss at their first service, 49% moved to no hearing loss or unilateral hearing loss at their last service and 51% saw no change.
- Among the 434 children and young people with no hearing loss at their first service, 75% remained the same at their last service and 25% changed to either unilateral or bilateral hearing loss.

Table 3.7: Change in hearing status, children and young people who received at least 2 outreach audiology services (cohort analysis), 2012–16[a][b]

	Hearing loss status at last service							
	Improved[c]		No change[d]		Deteriorated[e]		Total	
Hearing loss status at first service	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Hearing loss[f]	673	48.3	639	45.9	80	5.7	1,392	100.0
Unilateral	200	46.5	150	34.9	80	18.6	430	100.0
Bilateral	473	49.2	489	50.8	—	—	962	100.0
No hearing loss	—	—	324	74.7	110	25.3	434	100.0
Total	**673**	**36.9**	**963**	**52.7**	**190**	**10.4**	**1,826**	**100.0**

(a) Minimum interval between first and last service: 3 months.

(b) Includes children and young people who received 2 or more outreach audiology services. Excludes service recipients with missing or not tested responses for hearing loss status.

(c) Refers to the number of children and young people who experienced changes from unilateral or bilateral hearing loss to no hearing loss, or from bilateral to unilateral hearing loss.

(d) Refers to the number of children and young people who did not experience change in hearing status between their first and last services, including those who had no hearing loss, unilateral hearing loss and bilateral hearing loss.

(e) Refers to the number of children and young people who experienced changes from no hearing loss to unilateral or bilateral hearing loss, or from unilateral to bilateral hearing loss.

(f) Total children with unilateral and bilateral hearing loss.

Note: Data are reported only for children and young people where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Box 3.3: Definitions of cross-sectional and cohort analyses

Cross-sectional analysis

Cross-sectional analysis is the analysis of data collected from a population, or a subset, at one specific point in time. In this report, cross-sectional analyses were undertaken to compare the hearing health of children and young people who received multiple services between this group's first and last audiology checks. Among those who received multiple services, the proportion of service recipients with hearing loss or impairment at their first service is compared with the proportion with hearing loss or impairment at their last service.

Cohort analysis

Cohort analysis is the analysis of data for a population, or a subset, over time. It allows the progress of individual service recipients to be tracked over the period analysed. In this report, individual service recipients who received multiple services were tracked to determine whether their hearing loss and hearing impairment improved, deteriorated, fluctuated or stabilised.

Categories for changes in hearing loss and degree of hearing impairment

- *Improved hearing loss and impairment:* Hearing loss and impairment was classified as 'improved' if a child or young person's hearing loss status or degree of hearing impairment improved between the first and second services and the second and third services, or if there was an improvement between 2 services and no change between the other 2 services.
    - *Improved hearing loss* was defined as a change in hearing loss status between audiology services in the following scenarios: (1) from bilateral hearing loss to unilateral hearing loss or no hearing loss and (2) from unilateral hearing loss to no hearing loss.
    - *Improved hearing impairment* was defined as a movement between audiology services to a lower degree of hearing impairment (for example, from profound hearing impairment to severe, moderate or mild hearing impairment).
- *Deteriorated hearing loss and impairment:* Hearing loss status and degree of hearing impairment was classified as 'deteriorated' if a child or young person's hearing loss status or degree of hearing impairment deteriorated between services (between the first and second services, and between the second and third services), or if there was a deterioration between only 2 services and no change between the other 2 services.
    - *Deteriorated hearing loss status* was defined as a change between audiology services in the following scenarios: (1) from no hearing loss to unilateral or bilateral hearing loss and (2) from unilateral hearing loss to bilateral hearing loss.
    - *Deteriorated hearing impairment* was defined as a movement between audiology services to a higher degree of hearing impairment (for example, from mild hearing impairment to moderate, severe or profound hearing impairment).
- *Stabilised hearing loss and impairment:* Hearing loss and impairment was classified as 'stabilised' if a service recipient's hearing loss status or degree of hearing impairment was the same in all 3 audiology services included for analysis in this study.
- *Fluctuated hearing loss and impairment:* Hearing loss and impairment were classified as 'fluctuating' if a child or young person's hearing loss status or degree of hearing impairment differed between services included for analysis in this study, without a clear pattern in either improvement or deterioration (that is, if hearing loss status or degree of hearing impairment improved between the first and second services and deteriorated between the second and third services, or vice versa).

Changes in hearing impairment

Among children and young people who received 2 or more outreach audiology services, 924 had some degree of hearing impairment at their first check (Table 3.8). Of these service recipients, between their first and last service:

- more than half (59%, or 546) had an improvement in the degree of their hearing impairment (that is, a movement to a less severe hearing impairment category)
- 30% (279) had no change in their degree of hearing impairment
- 6% (56) experienced deteriorated hearing impairment (that is, a movement to a more severe hearing impairment category).

A number of factors might contribute to the observed improvements in hearing health. These include:

- the effectiveness of medical interventions provided at audiology services
- the effect of health promotion activities in:
  - increasing awareness and knowledge of hearing health among families
  - improving the acceptance of and attendance at audiology services provided by outreach teams
- the maturation of service recipients
- the confounding factor of missing and not tested records.

Table 3.8: Change in degree of hearing impairment, children and young people who received at least 2 outreach audiology services (cohort analysis), 2012–16(a)(b)

Change in hearing impairment	Number	%
Improved(c)	546	59.1
No change	279	30.2
Deteriorated(d)	56	6.1
Missing	43	4.7
Total service recipients	**924**	**100.0**

(a) Median interval between first and second service: 20 months. Minimum interval: 3 months.

(b) Indigenous children and young people who had 2 or more audiology services and had some degree of hearing impairment at their first service. Excludes children with missing or not tested responses for hearing impairment.

(c) Defined as a movement to a less severe hearing impairment category; for example, from moderate to mild.

(d) Defined as a movement to a more severe hearing impairment category; for example, from mild to moderate.

Notes

1. Data are reported only where consent was obtained.
2. Percentages may not sum to 100.0% due to rounding.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Children and young people who received at least 3 services

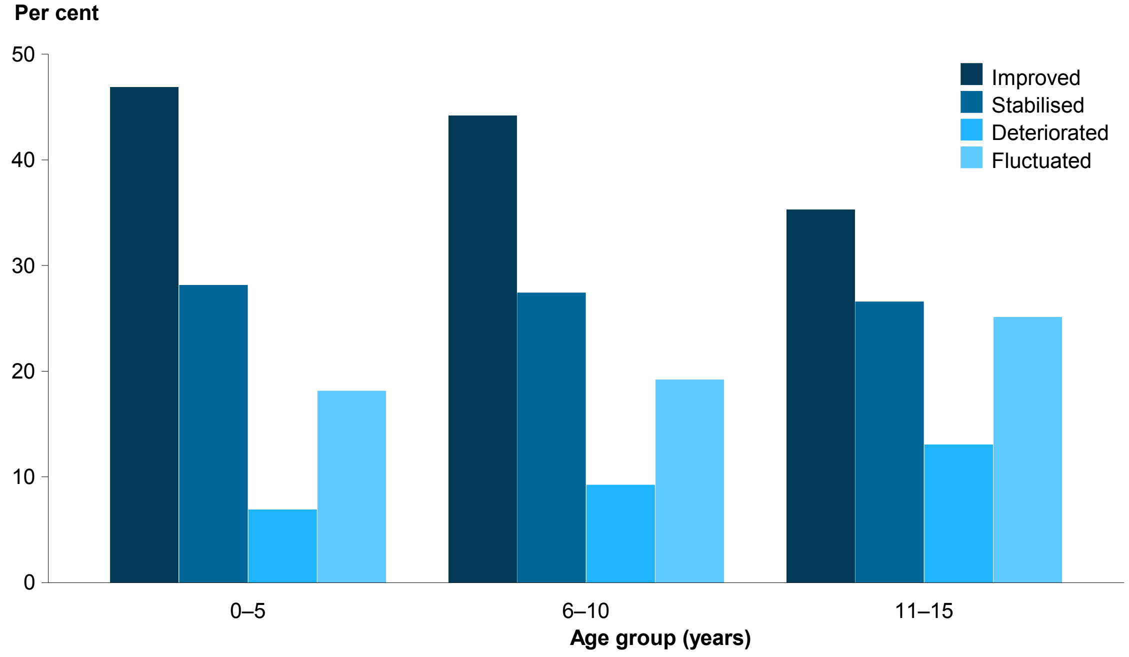
This section analyses changes in hearing loss and impairment among children and young people who received at least 3 audiology services over the course of the CHCI(CtG), SFNT and NTRAI programs—that is, from August 2007 to June 2016. Analyses of services from the CHCI(CtG) have been included here to assess long-term hearing health outcomes since the start of the CHCI(CtG).

The data in this section are based on age at first service, with age groups 0–5, 6–10 and 11–15 analysed. These age ranges were chosen to separately analyse the profiles of service recipients based on the age at which they first received outreach audiology services, as they often differ in hearing conditions, treatment pathways and outcomes in hearing health status. For example, children and young people who first receive services at older ages could have had chronic middle ear conditions for a longer time and therefore had more irreversible damage to their hearing. On the other hand, those who first received outreach audiology services at younger ages (0–5) might be more likely to experience improvements to hearing health due to early intervention and treatment, or maturation.

Changes in hearing loss

The analyses in this section show changes in hearing loss status for children and young people who received at least 3 hearing health outreach audiology services between August 2007 and June 2016 (excluding those with missing or not tested hearing loss status). Hearing loss status was measured at the first service, second last service and last service. To be included in this study, children and young people could receive 3 services at any time but the minimum interval between services was 3 months. This is to allow sufficient time to see the changes between services.

Figure 3.7 presents results of a cohort study, in which each child or young person was followed up individually and their hearing loss status compared at the first service, second last service and last service. There were 1,739 people aged 0–15 included in this analysis: 828 (48%) aged 0–5, 704 (40%) aged 6–10 and 207 (12%) aged 11–15. There were similar patterns in changes in hearing loss status between the three age groups, but those who entered the services at younger ages (0–5) had slightly better outcomes. A higher proportion in the younger age groups had their hearing loss status improved (47% of those aged 0–5 and 44% of those aged 6–10) than the older age group (35% of those aged 11–15). A higher proportion of service recipients experienced deteriorated hearing loss in age group 11–15 (13%) compared with those in age groups 0–5 (7%) and 6–10 (9%). Similarly, the proportion who had their hearing loss fluctuate was higher among those aged 11–15 (25%) than in age groups 0–5 (18%) and 6–10 (19%) (Figure 3.7; Appendix Table F3.9).



Note: Data are reported only where consent was obtained.

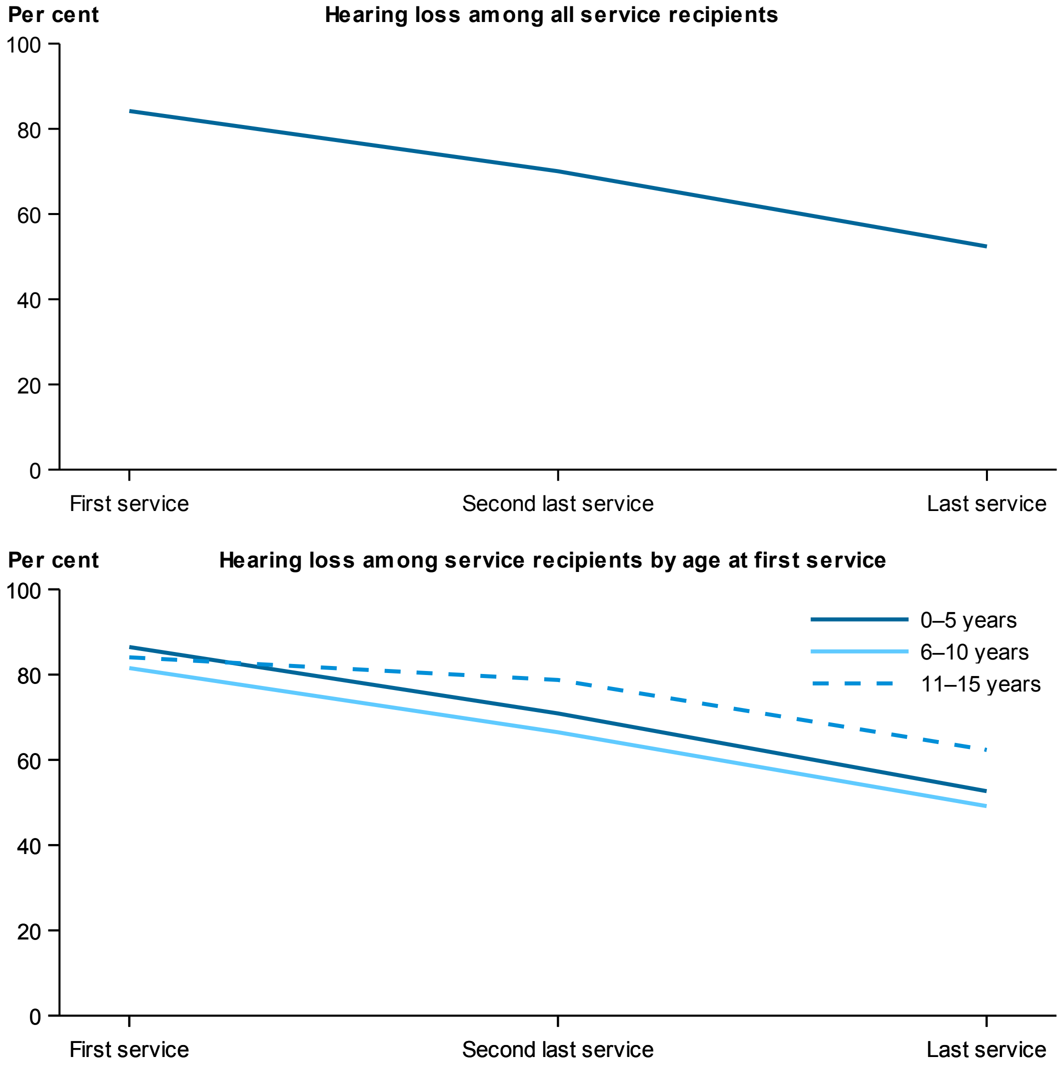
Source: Appendix Table F3.9.

Figure 3.7: Changes in hearing loss status among children and young people who received 3 or more audiology services (cohort study), by age at first service, August 2007 to June 2016

Figure 3.8 shows hearing loss status cross-sectionally by age groups among service recipients from August 2007 to June 2016. Similar to the findings from the cohort analysis above, the findings here suggest the effectiveness of early treatment at younger ages in improving hearing health outcomes. From a total of 1,739 children and young people aged 0–15 who received 3 or more services:

- 84% had hearing loss at their first outreach audiology service, which decreased to 70% at the second last service and 52% at the last service
- the proportions of children and young people with hearing loss were similar among age groups at the first service (ranging from 82% of those aged 6–10 to 87% of those aged 0–5) and there were improvements for all age groups over time. However, there was a bigger improvement for the younger age groups (aged 0–5 and 6–10 at first service) than for the age group 11–15. At the last service, a higher proportion of service recipients aged 11–15 had hearing loss (62%) compared with those in the younger age groups (53% of those aged 0–5 and 49% those aged 6–10) (Figure 3.8; Appendix Table F3.10).

It is not clear why children in younger age groups experienced greater improvement in hearing loss than those in older age groups. These improvements might be attributed to a couple of factors. Younger children may grow out of the conditions naturally as they age. As well, because the most common ear conditions in younger age groups are acute, early interventions may prevent them from developing into chronic conditions and more severe or permanent hearing damage.



Notes

1. Excludes children and young people with missing or not tested responses for hearing loss status.
2. Minimum interval between services: 3 months.
3. Data are reported for children and young people only where consent was obtained.

Source: Appendix Table F3.10.

Figure 3.8: Proportion of children and young people with hearing loss at first service, second last service and last service (cross-sectional analysis), August 2007 to June 2016

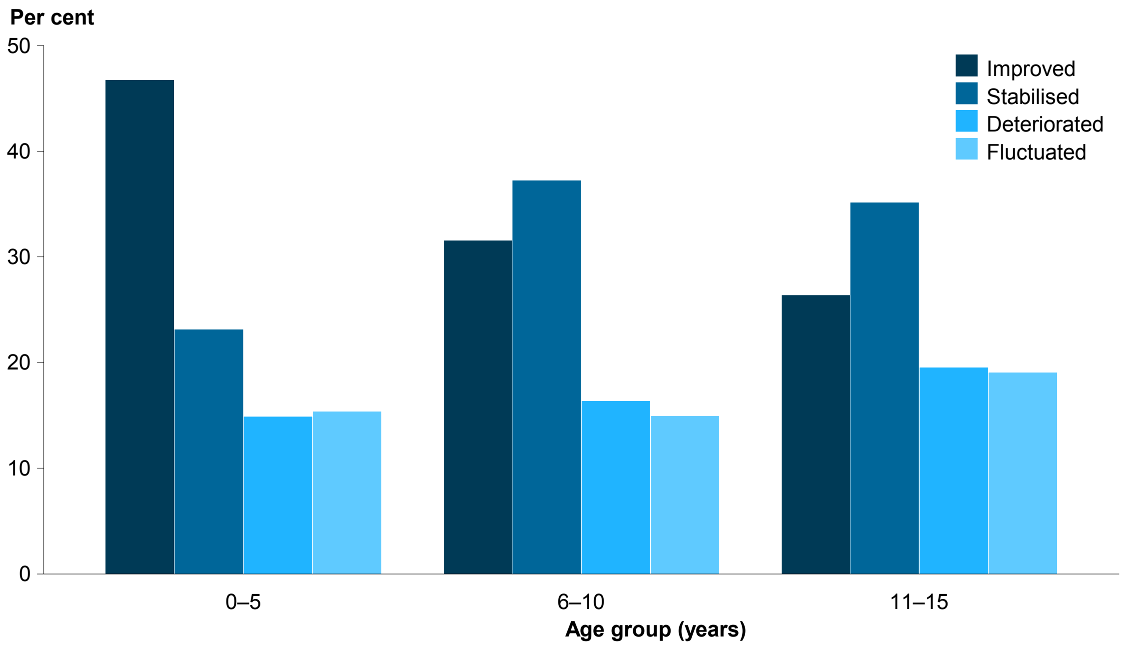
Changes in hearing impairment

The analyses in this section show changes in hearing impairment among 1,731 children and young people who received 3 or more outreach audiology services between August 2007 and June 2016 (excluding those with missing or not tested hearing impairment).

Figure 3.9 presents results of a cohort study in which each child was followed up individually, with their degree of hearing impairment between services over the period compared. Children who entered the services when they were younger had better outcomes in hearing impairment; this is consistent with the outcomes of the cohort analysis for hearing loss status.

Between August 2007 and June 2016:

- those who received their first audiology service at a younger age were more likely to have improvements to hearing impairment (47% of those aged 0–5) than those in older age groups (32% of those aged 6–10 and 26% of those aged 11–15)
- hearing impairment was slightly more likely to have deteriorated among those who entered the program at older ages (20% of those aged 11–15) compared with younger ages (15% of those aged 0–5 and 16% of those aged 6–10)
- the proportion of service recipients with stable hearing impairment was similar between those aged 6–10 and 11–15 (at 37% and 35%, respectively) and higher than that for those aged 0–5 (23%) (Figure 3.9; Appendix Table F3.11).



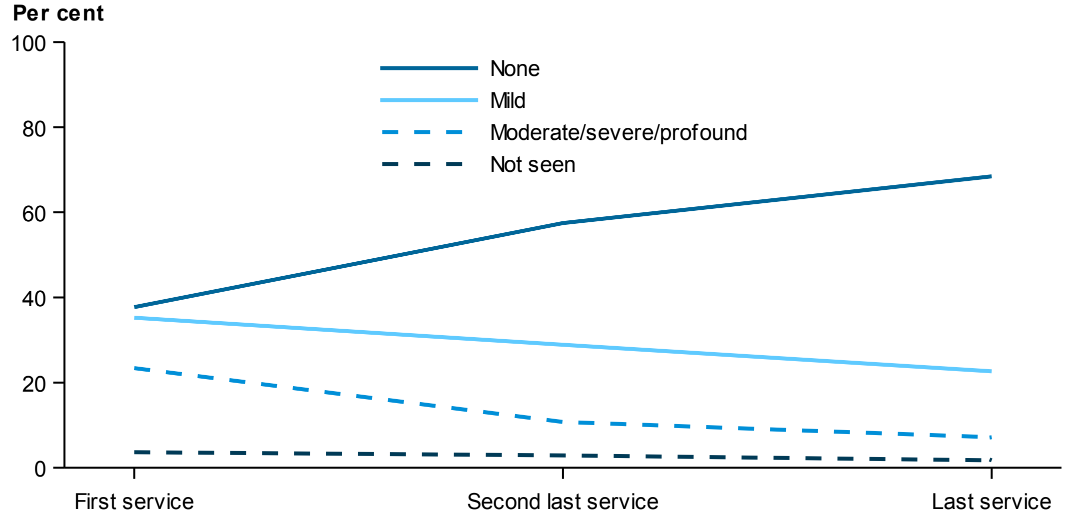
Note: Data are reported only where consent was obtained.

Source: Appendix Table F3.11.

Figure 3.9: Changes in hearing impairment among children and young people who received 3 or more audiology services (cohort study), by age at first service, August 2007 to June 2016

Figure 3.10 shows cross-sectional changes in hearing impairment among children and young people who received 3 or more outreach audiology services between August 2007 and June 2016. There were improvements to hearing impairment among the 1,731 children and young people aged 0–15 at their first service, with an increase in the proportion with no hearing impairment (from 38% at first service to 69% at the last service), and a decrease in the proportion with hearing impairment between first and last services:

- from 35% to 23% for mild hearing impairment
- from 23% to 7% for moderate, severe or profound hearing impairment (Figure 3.10; Appendix Table F3.12).



Notes

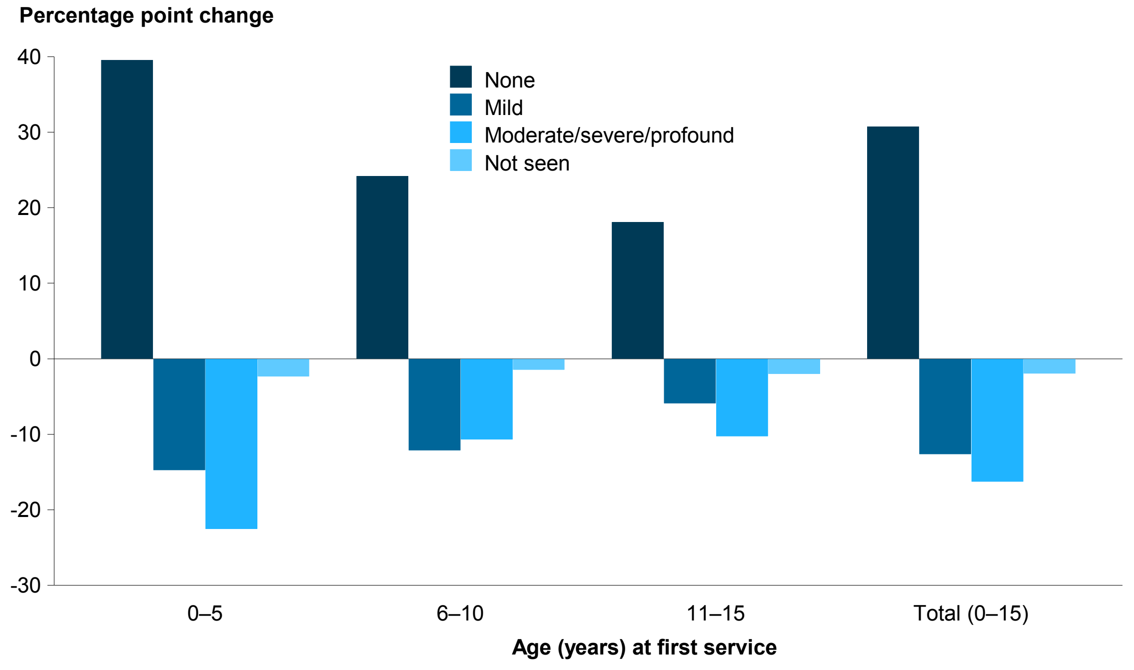
1. Excludes those with missing or not tested responses for hearing impairment status.
2. Minimum interval between services: 3 months.
3. Data are reported for children and young people only where consent was obtained.

Source: Appendix Table F3.12.

Figure 3.10: Degree of hearing impairment at first hearing health service, second last service and last service (cross-sectional analysis), August 2007 to June 2016

These patterns were observed for all age groups (0–5, 6–10 and 11–15); however, the improvements to hearing impairment were bigger among younger service recipients. Figure 3.11 shows the percentage point change between first and last services by age group and degree of hearing impairment:

- The biggest changes were observed for the youngest age group (0–5), for which there was an increase of 40 percentage points in the proportion with no hearing impairment, compared with 24 percentage points for those aged 6–10, and 18 percentage points for those aged 11–15.
- There were bigger decreases in the proportion of service recipients who had a hearing impairment among the youngest age group compared with older age groups. At the first service, the proportion of service recipients with a hearing impairment was higher among the youngest age group (0–5) than the oldest age group (11–15). By the last service, the proportions of service recipients with a hearing impairment were generally similar between age groups (Figure 3.11; Appendix Table F3.12).



Notes

1. Percentage point change is the proportion with hearing loss at the last service minus the proportion with hearing loss at the first service.
2. Data are reported for children and young people only where consent was obtained.

Source: Derived from Appendix Table F3.12.

Figure 3.11: Changes in degrees of hearing impairment between first and last outreach audiology service, by age at first service (cross-sectional analysis), August 2007 to June 2016

It should be noted that there are data limitations in the analyses of changes in hearing impairment between services. In the outreach audiology data collection, 'degree of hearing impairment' is a categorical variable that classifies hearing impairment as mild, moderate, severe or profound (see Box 3.2). These categories are based on the quietest sounds that a person can hear, measured in dB HL. However, as the categories are based on a dB HL range (for example, 16–30 dB HL in soundproof conditions for mild hearing impairment), it is possible that a person did, in reality, experience functional improvement (or deterioration) to their hearing, but failed to meet the dB HL threshold for the next degree of hearing impairment. Therefore, although the analyses of hearing impairment can detect changes between the broad categories of hearing impairment, they are not able to detect changes to hearing impairment within categories.

Overall, the findings from both the cross-sectional and cohort analyses presented in this section—for both hearing loss and impairment—demonstrate that the biggest improvements to hearing health were observed for children who entered into the program aged 0–5. This is consistent with the findings of other studies demonstrating the effectiveness of early intervention in improving outcomes for children (Moeller 2000). Improvements to hearing health for this age group, in particular, are important because they are associated with large functional gains in learning and language acquisition throughout childhood.

It is not entirely clear why there are differences between age groups in the reduction of hearing impairment between the first and last services. It could be associated with differences in the types of otitis media among children and young people in different age groups. Those in younger age groups are more likely to have acute otitis media (AOM) and less likely to have permanent damage to their hearing, as they are more likely to have reversals in hearing loss and impairment. In contrast, those in older age groups are more likely to have chronic otitis media. Damage to the middle ear structures associated with chronic otitis media, such as tympanic membrane perforation, erosion of ossicles (middle ear bones), cohesion of ossicles or ossicular discontinuity, increase the risk of residual permanent hearing loss.

3.4 Demand for audiology services

Although 9,221 audiology outreach services were provided to 5,357 children and young people between July 2012 and June 2016 (Table 3.1), there is still a high demand for these services in remote communities in the Northern Territory. As at 30 June 2016, 3,090 children and young people were on the audiology referral list and were waiting to be seen (Table 3.9). It should be noted that these data, and those for teleotology audiology services in Table 3.10, are for both current and outstanding referrals. For example, the children and young people on the waiting list includes those who received services just before 30 June 2016 and need to be seen again for a follow-up appointment at some time in the future. These are current referrals that were not yet overdue. There were also outstanding referrals that were already overdue, where the time elapsed since the date of referral was longer than the recommended period.

Table 3.9 shows the number of people aged 20 and under who received audiology referrals and were on the waiting list in remote Northern Territory communities as at 30 June 2016 (for more details by Health Service Delivery Areas, see Appendix Table F3.13). Among the 3,090 children and young people who were on the referral waiting list:

- the majority (2,692 or 87%) held an outstanding referral
- 398 (13%) held a referral that was not yet overdue.

Table 3.9: Number and proportion of children and young people on the referral waiting list for outreach audiology services, by age group, as at 30 June 2016

	0–15 years		16–20 years		Total	
Types of referrals	**Number**	**%**	**Number**	**%**	**Number**	**%**
Current referrals[(a)]	377	13.9	21	5.5	398	12.9
Outstanding referrals[(b)]	2,332	86.1	360	94.5	2,692	87.1
Total referrals[(c)]	**2,709**	**100.0**	**381**	**100.0**	**3,090**	**100.0**

(a) Current referrals are those that were not overdue—that is, the time elapsed since the date of referral was not longer than the recommended period, as at 30 June 2016.

(b) Outstanding referrals are those that were overdue—that is, the time elapsed since the date of referral was longer than the recommended period, as at 30 June 2016.

(c) Total referrals are current referrals plus outstanding referrals.

Source: NT DoH, unpublished data.

Audiology services are also available to children and young people in the Northern Territory through teleotology outreach visits (see Chapter 4). Table 3.10 shows the number of children and young people on the referral waiting list for audiology services provided through teleotology outreach visits as at 30 June 2016 (for more details by Health Service Delivery Areas, see Appendix Table F3.14). Among the 1,841 children and young people who were on the waiting list:

- the majority (1,531 or 83%) held an outstanding referral
- 310 (17%) held a referral that was not yet overdue.

Table 3.10: Number and proportion of children and young people on the referral waiting list for teleotology audiology services, by age group, as at 30 June 2016

	0–15 years		16–20 years		Total	
Types of referrals	**Number**	**%**	**Number**	**%**	**Number**	**%**
Current referrals[(a)]	279	19.1	31	8.2	310	16.8
Outstanding referrals[(b)]	1,183	80.9	348	91.8	1,531	83.2
Total referrals[(c)]	**1,462**	**100.0**	**379**	**100.0**	**1,841**	**100.0**

(a) Current referrals are those that were not overdue—that is, the time elapsed since the date of referral was not longer than the recommended period, as at 30 June 2016.

(b) Outstanding referrals are those that were overdue—that is, the time elapsed since the date of referral was longer than the recommended period, as at 30 June 2016.

(c) Total referrals are current referrals plus outstanding referrals.

Source: NT DoH, unpublished data.

4 Ear, nose and throat teleotology services

Key findings

- In 2015–16, 1,011 ENT teleotology services were provided to 936 children and young people.
- Between July 2012 and June 2016, 3,799 ENT teleotology services were provided to 2,434 Indigenous children and young people in the Northern Territory.
- In 2015–16, of the 934 children and young people who received ENT teleotology services and for whom consent to share information was obtained, 667 (71%) were recommended for at least 1 type of action (treatment, surgery or further follow-up):
  - 11% of service recipients were recommended for at least 1 type of treatment
  - 21% were recommended for at least 1 type of surgery
  - 60% were recommended for at least 1 type of further follow-up.
- Between 2012–13 and 2015–16:
  - the proportion of children and young people recommended for at least 1 type of action decreased from 84% to 71%
  - the proportion recommended for some form of treatment decreased from 28% to 11% and the proportion recommended for further follow-up decreased from 69% to 60%.
- As at 30 June 2016, 2,462 children and young people were on the ENT teleotology service waiting list and 90% of them had an outstanding referral.

This chapter provides information about ENT specialist consultations provided remotely and electronically through a technology called 'teleotology'. It reports on the number of services provided, the number of children and young people who received services, and the type of treatments and further actions recommended. For data on ear conditions diagnosed among ENT teleotology service recipients, see Chapter 6.

The teleotology service model was developed to meet demand for ENT services in remote Northern Territory communities and, in particular, to ensure post-surgical follow-up assessment and evaluation of surgical interventions. The services are delivered by a team of ear and hearing health professionals, which usually includes a CNC ENT nurse, audiologist and ENT specialist. These services were provided under the auspices of the Department of ENT at the Royal Darwin Hospital, which provided the majority of these services and provided clinical oversight to service delivery, quality and data collection.

During an outreach visit from an audiologist and CNC ENT, the CNC ENT collects relevant case history information and uses a video-otoscope to take digital images of a child's eardrum, and the audiologist provides a hearing assessment. This information is stored electronically and provided to an ENT specialist located elsewhere. The recommendations from the ENT specialist are communicated back to primary health practitioners through the CNC ENT. This information is updated in patient information recall systems (Primary Care Information System, and Communicare). If surgery is deemed appropriate based on the teleotology assessment, the child is added to an elective surgery waiting list.

The availability of teleotology services means not only that many families do not need to travel to regional centres for services but also that the amount of face-to-face ENT outreach required is reduced. It has shown both cost and productivity benefits, enabling more children and young people across remote areas to access ENT services.

4.1 ENT teleotology services

ENT teleotology services provided

In 2015–16, 1,011 ENT teleotology services were provided to 936 children and young people, with an average of 1.1 services per child or young person for whom consent to share data with the AIHW was obtained (tables 4.1 and 4.2).

Overall, from July 2012 to June 2016, 3,799 ENT teleotology services were provided to 2,434 children and young people, with an average of 1.6 services per child or young person (tables 4.1 and 4.2). Consent to share information with the AIHW was provided for almost all people who received services.

A number of factors contribute to changes in the number of ENT teleotology services provided each year. These include, for example, the availability of children and their families during outreach visits, logistical issues experienced by outreach teams in accessing communities (for example, inclement weather and road closures), and access restrictions during community events such as ceremonies, deaths and major sports events.

Table 4.1: Number of ENT teleotology services and service recipients, by consent status, 2012–13 to 2015–16

	Services			Service recipients		
	Consent	Non-consent	Total	Consent[(a)]	Non-consent	Total[(a)]
				Number		
2012–13	820	4	824	723	4	727
2013–14	962	14	976	837	14	851
2014–15	982	6	988	902	6	908
2015–16	1,009	2	1,011	934	2	936
Cumulative total	**3,773**	**26**	**3,799**	**2,408**	**26**	**2,434**
				%		
2012–13	99.5	0.5	100.0	99.4	0.5	100.0
2013–14	98.6	1.4	100.0	98.4	1.4	100.0
2014–15	99.4	0.6	100.0	99.3	0.6	100.0
2015–16	99.8	0.2	100.0	99.8	0.2	100.0
Cumulative total	**99.3**	**0.7**	**100.0**	**98.9**	**0.7**	**100.0**

(a) The total number of service recipients from 2012–13 to 2015–16 combined does not sum to the rows because some children and young people received services in multiple financial years; these service recipients were counted only once in the total.

Note: Services include only those provided through the ENT program.

Source: AIHW analysis of Northern Territory ENT teleotology data collection (services provided on or before 30 June 2016).

Table 4.2: Average and maximum number of teleotology services received, and proportion of children and young people who received only 1 service, 2012–13 to 2015–16

	2012–13	2013–14	2014–15	2015–16	Cumulative total (2012–16)[a]
Average number of services per child/young person	1.1	1.1	1.1	1.1	1.6
Maximum number of services	3	4	3	1	6
% of children/young people who received only 1 service	**87.7**	**86.1**	**91.4**	**92.3**	**65.2**

(a) Cumulative total includes data on children and young people who received ENT teleotology services from 1 July 2012 to 30 June 2016. It does not equal the sum of the financial years. For example, the maximum number of services is that for 2012–16, not the sum of the maximum number of services from 2012–13 to 2015–16.

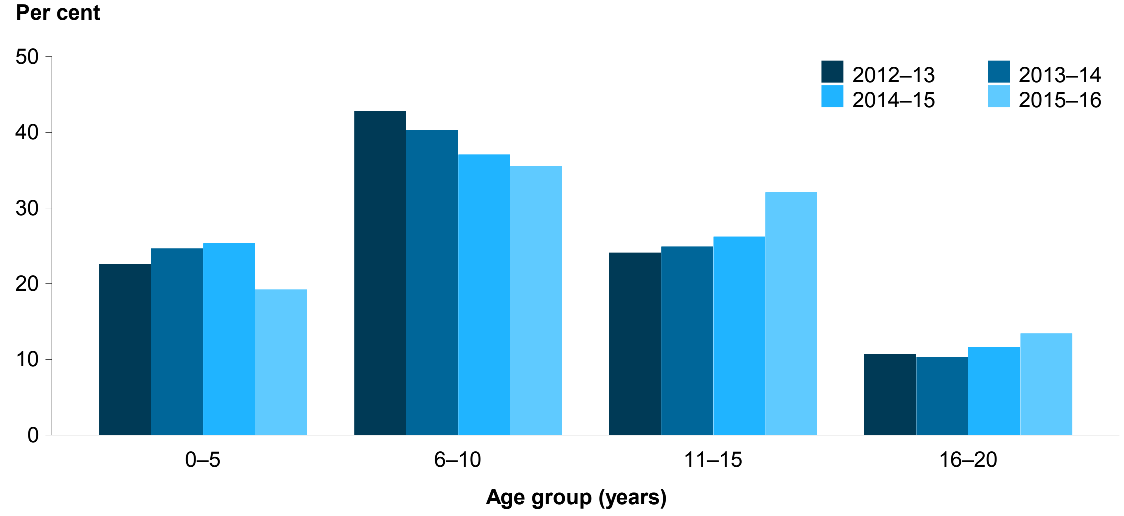
Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory ENT teleotology data collection (services provided on or before 30 June 2016).

ENT services are available to children and young people aged 21 and under, but analyses in this report include only ages 0–20 because none of the participants of the program were aged 21.

In 2015–16, among the 934 children and young people who received ENT teleotology services and for whom consent to share information was obtained:

- over one-third (35%) were aged 6–10, 32% were aged 11–15, 19% were aged 0–5 and 13% were aged 16–20. Between 2012–13 and 2015–16, the proportion of service recipients who received an ENT teleotology service decreased in the younger age groups (0–5 and 6–10) and increased in the older age groups (11–15 and 16–20) (Figure 4.1)
- similar proportions were male and female (49% and 51%, respectively) (Appendix Table F4.1).



Note: Data are reported only where consent was obtained.

Source: Appendix Table F4.1.

Figure 4.1: Children and young people who received an ENT teleotology service, by age, 2012–13 to 2015–16

Clinical management during ENT teleotology services

In 2015–16, among the 934 children and young people who received ENT teleotology services and for whom consent to share information was obtained, 667 (71%) were recommended for at least 1 further action. There are 3 types of actions that are recommended by ENT specialists: treatment, surgery, and further follow-up. The following sections provide more detailed information on each of these action types. As some children and young people were recommended for more than 1 type of action, the subtotal does not add up to the sum of the categories.

Medical treatment recommended

As part of ENT teleotology services, ENT specialists recommend treatment to be implemented by the child's primary health-care provider. In 2015–16, 104 (11%) children and young people were recommended for some form of treatment. The most common type of treatment was medication, recommended for 11% of children and young people, followed by aural toilet (4%) (Table 4.3). Aural toilet is the provision of a professional ear cleaning, including wax removal, micro suction and dry mopping.

Between 2012–13 and 2015–16, the proportion of children and young people recommended for some form of treatment decreased (from 28% to 11%).

Surgery recommended

In 2015–16, 199 (21%) children and young people were recommended for at least 1 type of surgery, most commonly myringoplasty (13%), followed by grommets (8%) and adenoidectomy (6%) (Table 4.3). (See Box 4.1 for explanations of surgery types.)

Between 2012–13 and 2015–16:

- the proportion of children and young people recommended for at least 1 type of surgery decreased (from 29% to 21%). Most notably, the proportion recommended for myringoplasty decreased (from 22% to 13%)
- the proportion recommended for grommets increased (from 1% to 8%) (Table 4.3).

Further follow-up recommended

The majority of children and young people who received an ENT teleotology service were recommended for further follow-up. In 2015–16:

- 559 (60%) children and young people were recommended for at least 1 type of follow-up
- 51% were recommended for an ENT review, 44% for an audiological assessment and less than 1% (in each case) for case management by primary health-care services and for referral to Australian Hearing (Table 4.3).

Between 2012–13 and 2015–16:

- the proportion of children and young people recommended for further follow-up decreased by 9 percentage points (from 69% to 60%)
- the proportion of service recipients recommended for an audiological assessment decreased by 19 percentage points (from 63% to 44%) (Table 4.3).

Table 4.3: Type of actions recommended at ENT teleotology services, 2012–13 to 2015–16

	%			
	2012–13	**2013–14**	**2014–15**	**2015–16**
Treatment recommended				
Medication	27.0	27.7	23.4	11.0
Aural toilet	10.0	11.9	10.1	4.1
Foreign body removed	0.4	1.0	0.2	0.1
Other treatment	0.1	1.3	0.1	0.0
Total who had at least 1 type of treatment recommended[(a)]	**28.1**	**30.0**	**24.2**	**11.1**
Number who had treatment recommended	203	251	218	104
Surgery recommended				
Myringoplasty	22.3	22.5	22.4	13.2
Grommets	1.4	1.6	5.3	7.6
Adenoidectomy	4.8	5.1	5.3	5.6
Examination under anaesthetic	1.0	1.4	1.1	0.5
Myringotomy	4.3	3.3	2.4	0.3
Other procedure	0.4	0.1	0.2	0.3
Removal of tubes	0.1	0.2	0.2	0.1
Exploration of middle ear/ mastoid	0.0	0.0	0.2	0.1
Total who had at least 1 surgery recommended[(a)]	**29.0**	**28.2**	**30.5**	**21.3**
Number who had surgery recommended	210	236	275	199
Further follow-up recommended				
ENT review	47.7	65.2	56.3	50.5
Audiological assessment	63.2	75.9	62.0	43.5
Case management by primary health-care services	1.4	2.3	1.7	0.5
Australian Hearing	1.5	2.5	2.1	0.3
Total who had at least 1 type of follow-up recommended[(a)]	**69.2**	**80.5**	**69.6**	**59.9**
Number who had further follow-up recommended	500	674	628	559
All actions recommended (treatment, surgery and further follow-up)				
Total who had at least 1 action recommended[(a)]	**84.1**	**89.4**	**82.2**	**71.4**
Number who had at least one action recommended	608	748	741	667
Total service recipients	**100.0**	**100.0**	**100.0**	**100.0**

(a) This is a multiple-response item. The subtotal does not add up to the sum of the categories because service recipients may be recommended for more than 1 type of action.

Notes

1. Data are reported only where consent was obtained.
2. Services include only those provided through the ENT program.

Source: AIHW analysis of ENT teleotology data collection (services provided on or before 30 June 2016).

Box 4.1: Common types of surgery to manage ear disease

- *Adenoidectomy:* the surgical removal of adenoids.
- *Examination under anaesthetic:* the examination of a child's ear(s) while under anaesthetic.
- *Grommet:* a tiny tube that is surgically placed across the eardrum to re-establish ventilation to the middle ear. It is also called a 'ventilation tube', a 'pressure equalisation tube' or a 'tympanostomy tube'.
- *Myringoplasty:* the repair of a perforation of the tympanic membrane (ear drum).
- *Myringotomy:* a procedure in which a tiny incision is created in the eardrum to relieve pressure caused by excessive build-up of fluid, or to remove fluid from the middle ear.

4.2 Demand for teleotology services

Although 3,799 ENT teleotology services have been provided to Indigenous children and young people in remote communities in the Northern Territory (Table 4.1), there are still substantial unmet needs for ENT services in this area.

Table 4.4 shows the number of people aged 20 and under on the ENT teleotology referral waiting list in remote communities of the Northern Territory as at 30 June 2016 (for more details by Health Service Delivery Areas, see Appendix Table F4.2). These data are for both current and outstanding (or overdue) referrals.

It should be noted that the data presented here are for teleotology referrals to *ENT specialists*, whereas data presented in Table 3.10 (see Chapter 3) are for teleotology referrals to *audiologists*. As at 30 June 2016, among the 2,462 children and young people who received ENT teleotology referrals:

- the majority (90%) held an outstanding referral
- 238 (10%) held a referral that was not yet overdue (Table 4.4).

Table 4.4: Number of children and young people on referral waiting list for teleotology services, by age group, as at 30 June 2016

	0–15 years		16–20 years		Total	
Health Service Delivery Area	**Number**	**%**	**Number**	**%**	**Number**	**%**
Current referrals[(a)]	212	10.8	26	5.2	238	9.7
Outstanding referrals[(b)]	1,751	89.2	473	94.8	2,224	90.3
Total referrals[(c)]	**1,963**	**100.0**	**499**	**100.0**	**2,462**	**100.0**

(a) Current referrals are those that were not overdue—that is, the time elapsed since the date of referral was not longer than the recommended period, as at 30 June 2016.

(b) Outstanding referrals are those that were overdue—that is, the time elapsed since the date of referral was longer than the recommended period, as at 30 June 2016.

(c) Total referrals are current referrals plus outstanding referrals.

Source: NT DoH, unpublished data.

5 Clinical Nurse Specialist services

Key findings

- In 2015–16, CNSs conducted 1,211 visits to 1,125 Indigenous children in the Northern Territory. From July 2012 to June 2016, CNSs conducted 3,087 visits to 2,614 children.
- In 2015–16:
  - the most common type of service provided was ear health education, provided at 80% of the 1,044 visits where consent to share information was obtained
  - an interpreter was present at 21% of CNS visits
  - the most common types of service providers contacted by CNSs were health providers at 19% of CNS visits and education providers (19%)
  - 62% of the 958 children who received CNS services and for whom consent to share information was obtained were diagnosed with at least 1 ear condition at their first visit, which was significantly lower than the proportion in 2012–13 (97%). The condition most often diagnosed was OME (28% of children)
  - among the 692 children who received both CNS and audiology services, 58% had some form of hearing loss (mostly bilateral) and 43% had some form of hearing impairment.

This chapter provides information about CNS services funded by the Australian Government, including the number of children visited by CNSs, the types of services provided, contacts made by CNSs with other service providers, and the ear and hearing health of children who received these services.

The CNS services were developed in response to the challenges encountered in preventing ear disease and in implementing clinical care for otitis media in the Northern Territory. These services provide continuity of care for children who have an identified risk of chronic otitis media and hearing loss. Based on a case management approach, the CNS oversees the treatment of children with a prioritised need for care by linking primary health-care services with specialist resources. These services are available to Indigenous children who have been identified as a hearing health priority, including:

- **Category 1 (HP1)**: infants aged under 12 months with recurrent AOM or CSOM. Infants who have failed Newborn Hearing Screening
- **Category 2 (HP2)**: children aged 1–2 with perforation of the eardrum, recurrent AOM or persistent bilateral otitis media with effusion (OME)
- **Category 3 (HP3)**: children aged 3–5 with perforation of the ear drum, recurrent AOM, persistent bilateral OME or moderate to profound hearing impairment
- **Category 4 (HP4):** children aged 6–10 with moderate, severe or profound hearing impairment. When interpreting the data analysed in this chapter, note that if children attended multiple visits, their demographic characteristics, priority listing and hearing health status were based on information at the first visit. Since admission into the program and the care pathway are based on priority categorisation, it is appropriate to present the information based on the status of children on entry into the program.

In addition, CNS staff assisted with hearing health service planning and skills development within primary health facilities and other community organisations to reduce the number of children with deteriorating ear conditions.

The CNS program is formerly known as the Child Hearing Health Coordinator, or CHHC. The CHHC ran from July 2012 to June 2015; the name changed to CNS from July 2015. Although there were no substantial changes to the program, a new version of the data collection form was used at CNS visits. Some changes in the wording on the new form were made to more accurately reflect what CNSs do, but this does not indicate changes in their responsibilities. The CHHC data collection form and CNS data collection form can be found in Appendix B.

5.1 Children and visits

In 2015–16, CNSs conducted 1,211 visits to 1,125 children (Table 5.1). Among the 85% of children (958) for whom consent was obtained, an average of 1.1 services per child was received (Table 5.1). From July 2012 to June 2016, CNSs conducted 3,087 visits to 2,614 children, with an average of 1.3 services per child among those for whom consent was obtained (tables 5.1 and 5.2).

Table 5.1: Number of Indigenous children in the CNS program and number of services, by consent status, 2012–13 to 2015–16

	Services			Children		
	Consent	Non-consent	Total	Consent[(a)]	Non-consent	Total[(a)]
				Number		
2012–13	201	310	511	194	310	504
2013–14	308	389	697	286	389	675
2014–15	531	137	668	485	137	622
2015–16	1,044	167	1,211	958	167	1,125
Cumulative total	**2,084**	**1,003**	**3,087**	**1,611**	**1,003**	**2,614**
				%		
2012–13	39.3	60.7	100.0	38.5	61.5	100.0
2013–14	44.2	55.8	100.0	42.4	57.6	100.0
2014–15	79.5	20.5	100.0	78.0	22.0	100.0
2015–16	86.2	13.8	100.0	85.2	14.8	100.0
Cumulative total	**67.5**	**32.5**	**100.0**	**61.6**	**38.4**	**100.0**

(a) The total number of children in the period 2012–13 to 2015–16 combined does not sum to the rows because some children received services in multiple financial years; these children were counted only once in the total.

Source: AIHW analysis of CNS data collection (services provided on or before 30 June 2016).

A number of factors contribute to changes in the number of CNS visits provided each year—for example, the availability of children and their families, logistical issues experienced by teams with accessing communities (for example, inclement weather and road closures) and the recruitment of CNSs. The number of CNS visits provided between 2012–13 and 2015–16 increased substantially, from 511 to 1,211 CNS visits. This can largely be explained by the recruitment of more CNSs to provide services in 2015–16.

Table 5.2: Average and maximum number of CNS services received, and proportion of children who received 1 service, 2012–13 to 2015–16

	2012–13	2013–14	2014–15	2015–16	Cumulative total (2012–16)
Average number of services per child	1.0	1.1	1.1	1.1	1.3
Maximum number of services	3	2	3	3	6
% of children who received 1 service	**96.9**	**92.3**	**91.3**	**91.6**	**77.8**

Note: Data are only reported for children where consent was obtained.

Source: AIHW analysis of CNS data collection (services provided on or before 30 June 2016).

Rates of non-consent for sharing information were high compared with those for other hearing health services included in this report. From July 2012 to June 2016, consent was not provided for 38% of the 2,614 children who received visits (Table 5.1). This should be taken into account when interpreting the analyses presented in this chapter, as the data do not fully represent all children who received CNS services. Non-consent rates have improved though, decreasing from 62% of children in 2012–13 to 15% in 2015–16. The hearing health team in the NT DoH developed and implemented a training program to help improve consent rates, which could explain why non-consent rates decreased markedly in recent years.

Among the 958 children for whom consent to share information with the AIHW was received, slightly more males than females received CNS services in 2015–16 (52% and 48%, respectively).

In terms of hearing health priority category, in 2015–16, category 4 (HP4) was the most common (39%), followed closely by category 3 (HP3) (37%). Between 2012–13 and 2015–16, the proportion of CNS service recipients in category HP4 increased from 15% to 39%, while there were decreases in the proportions in category 3 (HP3) (from 45% to 37%) and category 2 (HP2) (from 30% to 20%) (Figure 5.1; Appendix Table F5.1).

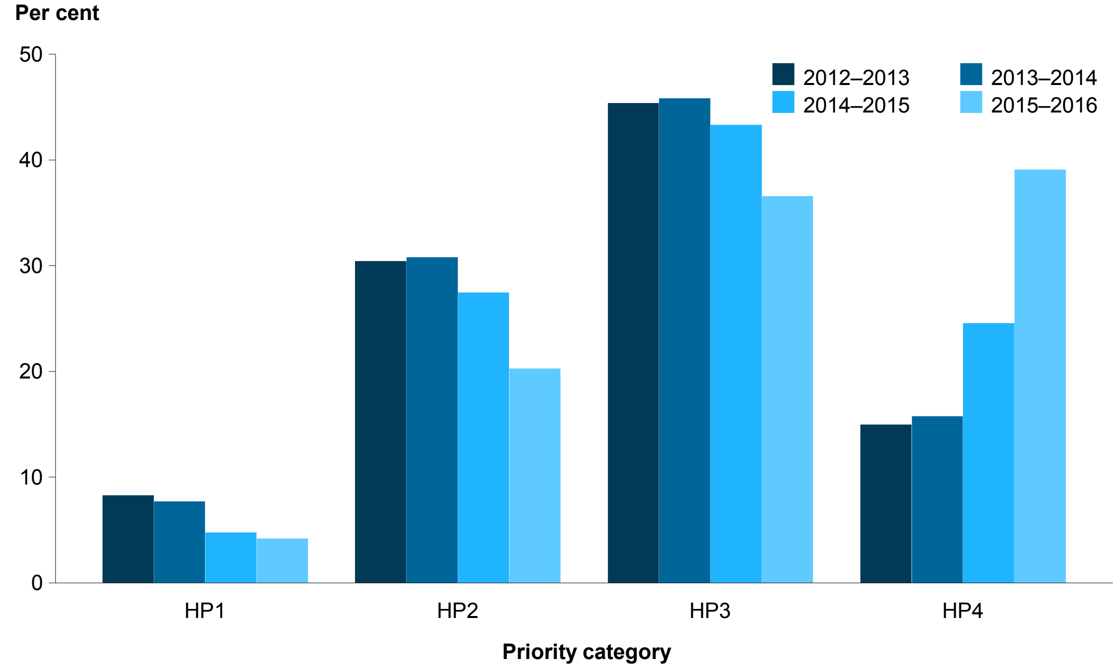
5.2 Types of services provided

A range of services have been provided by CNSs over the course of the program.

Appendix tables F5.2 and F5.3 contain data from 2012–13 to 2015–16 for services provided and contacted at CNS visits; however, this section reports only the data for 2015–16, as the data are not directly comparable between years due to changes in the data collection forms used.

In 2015–16, a total of 1,044 CNS visits were provided to 958 children for whom consent to share information with the AIHW was obtained. As shown in Figure 5.2, the services most commonly provided by CNSs were:

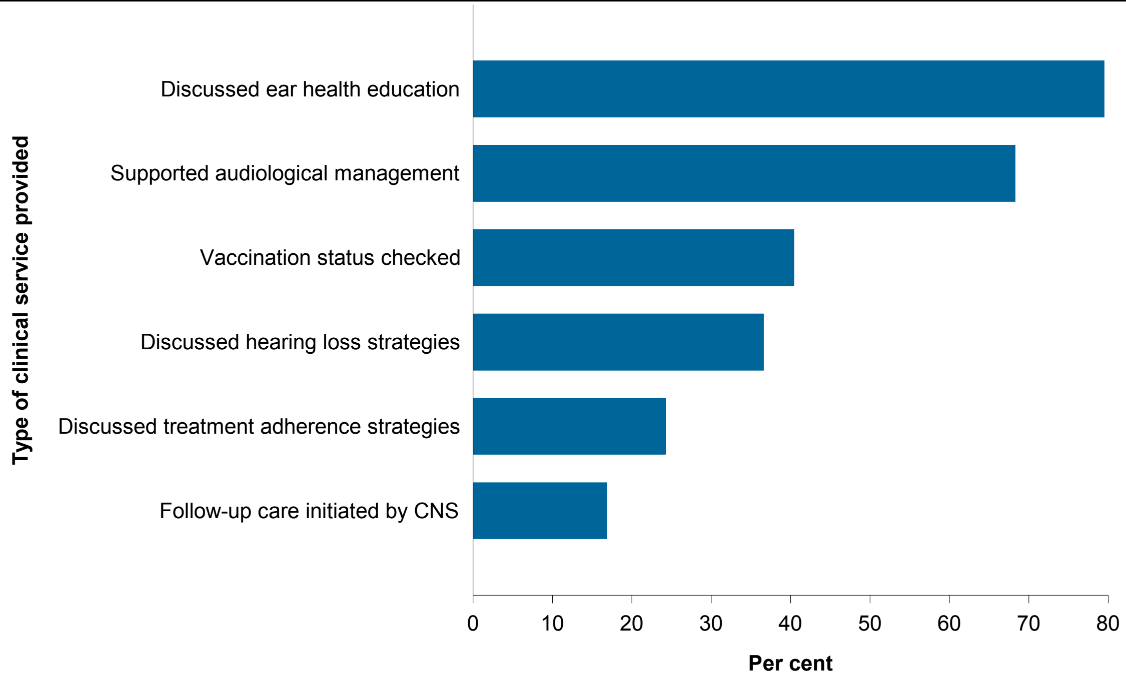
- discussion of ear health education (at 80% of visits)
- support for audiological management (68%)
- vaccination status check (40%).



Note: Data are reported only where consent was obtained.

Source: Appendix Table F5.1.

Figure 5.1: Proportion of children who received CNS services by priority listing, 2012–13 to 2015–16



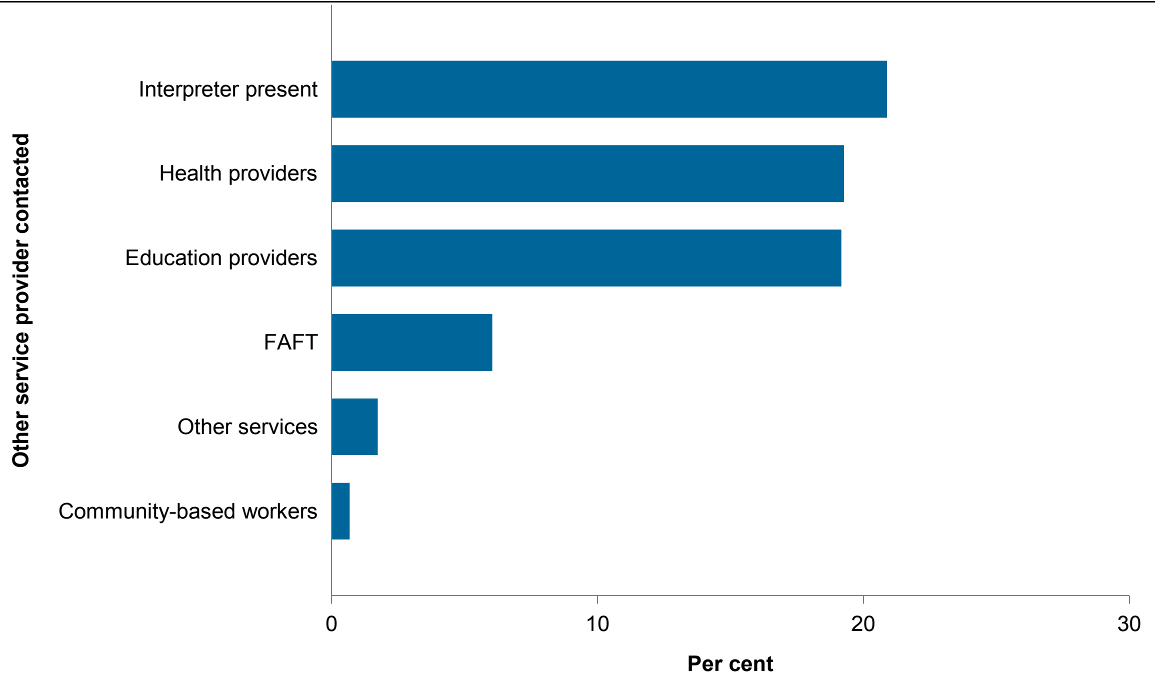
Note: Data are reported only where consent was obtained.

Source: Appendix Table F5.2.

Figure 5.2: Type of clinical services provided at CNS visits, 2015–16

CNSs also assisted children and their families by contacting other service providers. In 2015–16, as shown in Figure 5.3, contact was made with the following service providers at CNS visits: health providers (19% of the 1,044 visits), education providers (19%), Families as First Teachers (FaFT program (6%) and other services (2%).

As well, interpreters were present at 21% of CNS visits in 2015–16 (Appendix Table F5.3).



Notes

1. Data are reported only where consent was obtained.
2. 'Interpreter present' refers to the presence of an interpreter during CNS visits.

Source: Appendix Table F5.3.

Figure 5.3: Proportion of visits at which CNS made contact with other service providers, by service provider type, and proportion of CNS visits where an interpreter was present, 2015–16

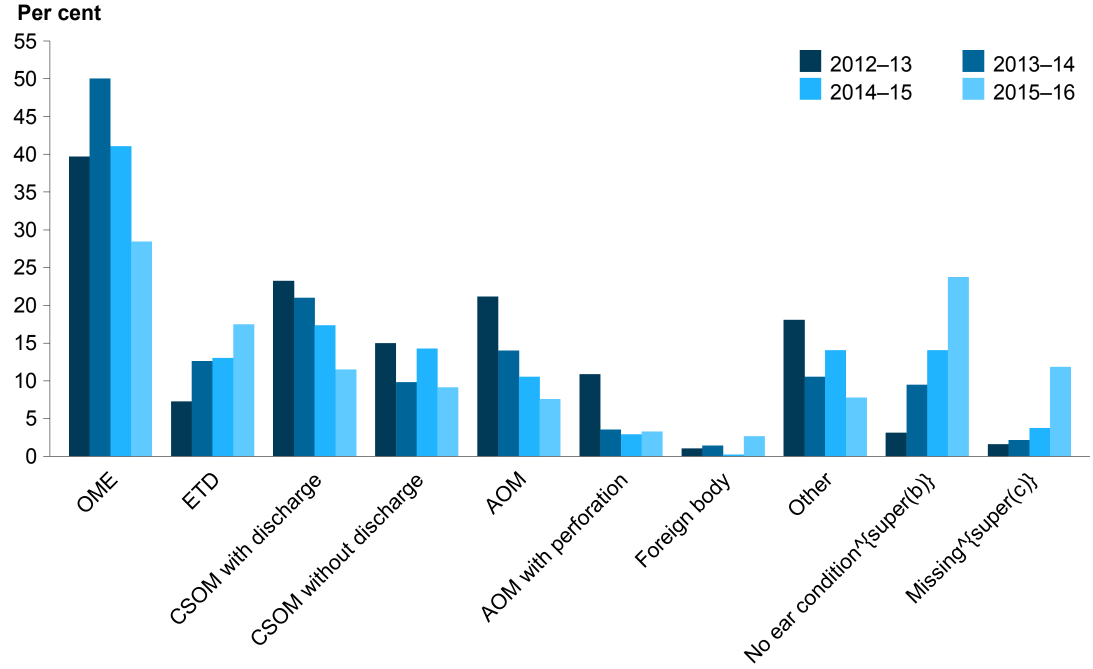
5.3 Ear health of service recipients

Ear conditions

In 2015–16, of the 958 children who received a CNS visit and for whom consent to share information was obtained:

- 62% were diagnosed with at least 1 ear condition at their first service
- the most commonly diagnosed conditions were OME (28% of children), Eustachian tube dysfunction (ETD) (17%) and CSOM) with discharge (12%).

Between 2012–13 and 2015–16, the proportion of children with at least 1 type of ear condition decreased from 97% to 62%. There were decreases in the proportions for a number of ear conditions, most notably OME (40% to 28%) (Figure 5.4; Appendix Table F5.4).



Note: Data are reported only where consent was obtained.

Source: Appendix Table F5.4.

Figure 5.4: Type of ear conditions among children who received CNS services, 2012–13 to 2015–16

A small proportion of children were not diagnosed with an ear condition at their latest CNS visit. This might be because they recovered from ear conditions before their appointment. As well, some children could require ongoing management even if they do not currently have an ear condition because they have a history of recurrent ear conditions.

Hearing loss and impairment

Data on CNS services do not include information about hearing loss and impairment. The hearing health status of children can be determined only by linking data for children who received CNS services as well as outreach audiology services. In the following analyses, the hearing health status of children who received CNS services was based on data from the child's last audiology service.

In 2015–16, of the 958 children who received a CNS visit and for whom consent was obtained, 677 (71%) also received an audiology service. Of these children, 58% had some form of hearing loss—45% had bilateral hearing loss and 13% had unilateral hearing loss.

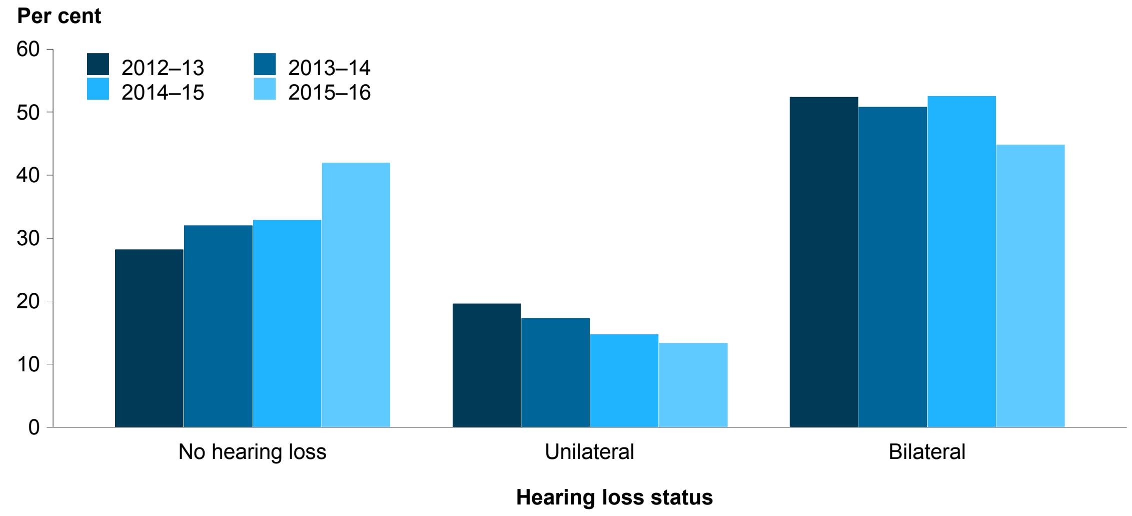
The proportion of children with hearing loss decreased from 72% to 58% between 2012–13 and 2015–16 (Figure 5.5; Appendix Table F5.5).

In terms of hearing impairment, of the 692 children who received both CNS and audiology services and were tested for hearing loss:

- in 2015–16, 43% had some form of hearing impairment—27% mild and 16% moderate, severe or profound
- the proportion of with a hearing impairment decreased between 2012–13 and 2015–16, from 50% to 43%

- the proportion with mild hearing impairment decreased from 31% to 27%
- the proportion with moderate, severe or profound impairment decreased from 19% to 16% (Figure 5.6; Appendix Table F5.6).

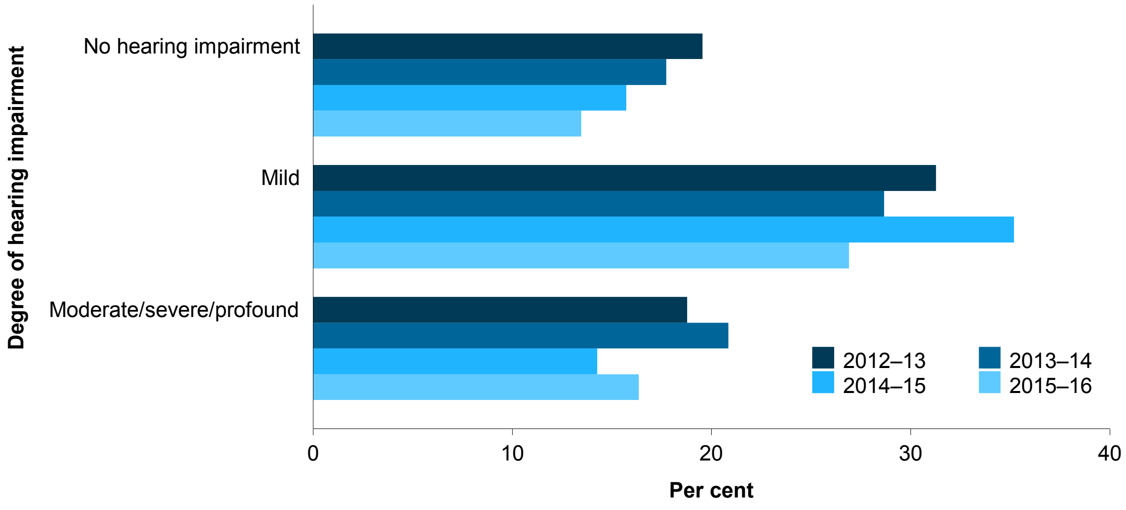
Hearing impairment among children who received both CNS and audiology services tended to be more common and more severe than among children who received only audiology services (see Chapter 3). This is expected, given the fact that children who were in the CNS program had more severe ear conditions than those in other programs.



Note: Data are reported only where consent was obtained.

Source: Appendix Table F5.5.

Figure 5.5: Hearing loss status among children in the CNS and audiology programs, 2012–13 to 2015–16



Note: Data are reported only where consent was obtained.

Source: Appendix Table F5.6.

Figure 5.6: Degree of hearing impairment, children in the CNS and audiology programs, 2012–13 to 2015–16

6 Ear conditions

Key findings

- In 2015–16:
  - of the 2,010 Indigenous children and young people in the Northern Territory who received an audiology or ENT service, 66% (or 1,330) were diagnosed with at least 1 type of ear condition, most commonly OME (23%, or 453) and ETD (16%, or 324)
  - the prevalence of ear conditions was higher among younger service recipients, and ranged from 78% of those aged 3–5 to 50% of those aged 16–20
  - of the 1,330 children and young people diagnosed with at least 1 ear condition, 66% experienced hearing loss. Rates of hearing loss were highest among children and young people with CSOM with discharge (87%), OME (78%) and CSOM without discharge (77%)
  - among children and young people with at least 1 ear condition, 43% had a hearing impairment.
- From July 2012 to June 2016, among the 2,121 children and young people who received 2 or more ENT or audiology services, there was a decrease of 7 percentage points in the proportion diagnosed with at least 1 middle ear condition between the first and last service (from 82% to 75%).
- From August 2007 to June 2016, among the 2,197 children and young people who received at least 3 ENT or audiology services, there was a 29 percentage point decrease in the proportion who had at least 1 type of otitis media (from 78% at the first service to 49% at the last service).

This chapter presents information about ear conditions diagnosed in children and young people who received hearing health services, compiled using ENT teleotology and audiology data collections. These two data collections were combined so that a larger number of service recipients could be included in the analyses undertaken, particularly for those of children and young people who received multiple services (Section 7.3).

It should be noted that if children and young people received 2 or more audiology and/or ENT teleotology services, the diagnosis made in the most recent service was used for analysis; if children and young people received 2 services on the same day (that is, one ENT service and one audiology service), the ENT diagnosis was used. Box 6.1 describes the main types of ear conditions analysed in this report. This chapter also contains information about the hearing health of these children and young people, and changes in rates of ear conditions over time.

6.1 Types of ear conditions diagnosed

In 2015–16, of the 2,010 children and young people aged 20 and under who received an audiology or ENT service:

- 1,330 (66%) were diagnosed with at least 1 type of ear condition at their latest service
- the most common type of ear condition was OME (23%, or 453), followed by ETD (16%, or 324) and foreign body (16%) (Figure 6.1; Appendix Table F6.1).

Between 2012–13 and 2015–16:

- the proportion of children and young people diagnosed with at least 1 ear condition fluctuated but remained at 66%
- there were slight increases in the proportion diagnosed with OME (22% to 23%), ETD (15% to 16%) and CSOM without discharge (12% to 13%), (Figure 6.1; Appendix Table F6.2).

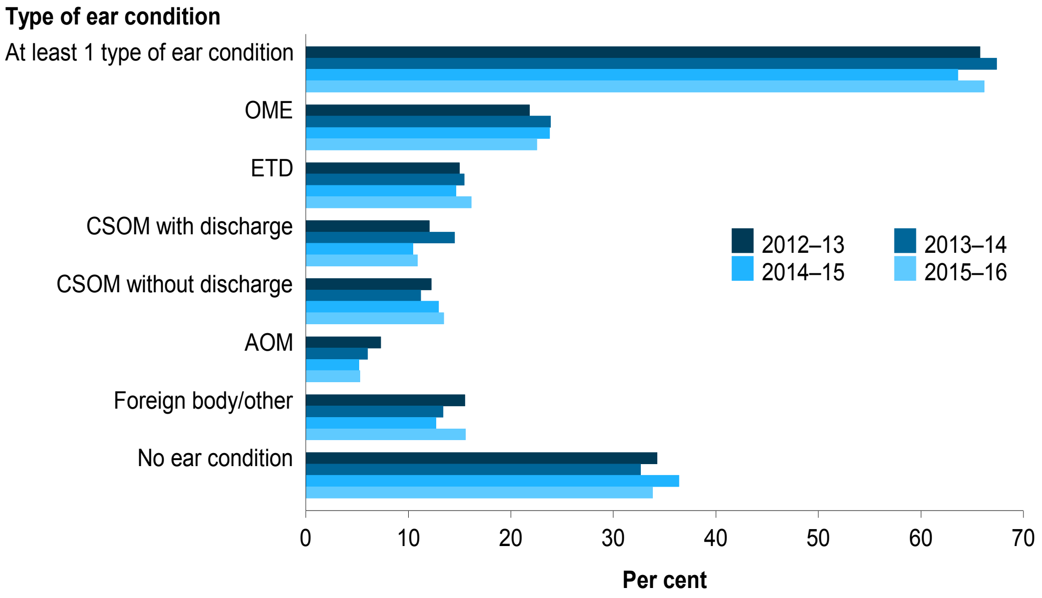
In 2015–16, 11% of children and young people who received audiology or ENT services were diagnosed with CSOM with discharge (Appendix Table F6.1). The World Health Organization defines a prevalence of CSOM with discharge of 4% as a massive public health problem needing urgent action (WHO 2004); the prevalence among children and young people in the Northern Territory who received these services was 3 times this rate. It should be noted, however, that those who participated in these programs do not constitute a random sample, so the data are not representative of the whole population of Indigenous children and young people in the Northern Territory.

The reason for the increasing proportion of children and young people with middle ear conditions is not clear, but may be associated with the following factors:

- targeted services to younger children
- auditing by CNSs to improve primary health management and appropriate referrals, which means more children with ear diseases were referred into the program
- skills development in primary health for otoscopy (ear examination) and correct diagnosis in ear diseases, which might lead to the increase in diagnosed ear diseases
- knowledge and support of primary health for otitis media management according to guidelines, which might lead to more appropriate referrals
- increased awareness of the importance of hearing health and partnership with services.

Box 6.1: Ear conditions

- *Otitis media:* all forms of inflammation and infection of the middle ear. Active inflammation or infection is nearly always associated with a middle ear effusion (fluid in the middle ear space). Types of otitis media include:
  - *acute otitis media (AOM):* the presence of fluid behind the eardrum plus at least one of the following: bulging eardrum, red eardrum, recent discharge of pus, fever, ear pain or irritability for less than 6 weeks
  - *chronic suppurative otitis media (CSOM) with discharge:* a persistent suppurative discharge from the middle ear through a tympanic membrane perforation for more than 6 weeks
  - *chronic suppurative otitis media (CSOM) without discharge:* the presence of a perforation (hole) in the eardrum without evidence of discharge or fluid behind the eardrum. It is also known as inactive CSOM or dry perforation
  - *otitis media with effusion (OME):* the presence of an intact eardrum and middle ear fluid without symptoms or signs of acute infection. OME may be episodic or persistent
- *Eustachian tube dysfunction (ETD):* negative middle ear pressure associated with compromised equalisation, impeding middle ear function and sometimes causing middle ear fluid accumulation.



Note: Data are reported only where consent was obtained.

Source: Appendix Table F6.2.

Figure 6.1: Type of ear condition, children and young people who received an audiology or ENT service, 2012–13 to 2015–16

Age and sex

Ear conditions varied by age (Figure 6.2; Appendix Table F6.3), but were generally similar by sex (Appendix Table F6.1).

The prevalence of most ear conditions was highest among younger service recipients. In 2015–16, about three-quarters of children aged 0–2 and 3–5 had at least 1 type of ear condition (72% and 78%, respectively) compared with 68% or less of those aged 6–10, 11–15 and 16–20 (68%, 56% and 50%, respectively) (Figure 6.2). This reflects the natural profile of ear disease, where children typically grow out of the condition (AIHW 2014c).

The most common types of ear conditions differed slightly among age groups. Table 6.1 summarises the top five ear conditions diagnosed by age group in 2015–16. It shows that OME tended to be more commonly diagnosed among younger age groups, being the top middle ear condition among those aged 0–2, 3–5 and 6–10. For older age groups (11–15 and 16–20), the most commonly diagnosed ear conditions were CSOM without discharge, and foreign body and other conditions. Additionally, AOM was in the top five ear conditions for those in younger age groups (0–2 and 3–5), but not for older age groups.

Table 6.1: Top five most common ear conditions diagnosed among children and young people who received an audiology or ENT service(a)(b), by age(c), 2015–16

	Most common type of ear disease diagnosed(d)				
Age group (years)	**1st**	**2nd**	**3rd**	**4th**	**5th**
0–2	OME (34%)	AOM (20%)	ETD (15%)(e)	CSOM with discharge (11%)(e)	Foreign body/other (8%)
3–5	OME (34%)	ETD (24%)	CSOM with discharge (16%)	CSOM without discharge (11%)	AOM (8%)
6–10	OME (23%)	ETD (19%)	Foreign body/other (18%)	CSOM without discharge (14%)	CSOM with discharge (10%)
11–15	Foreign body/other (21%)	CSOM without discharge (16%)	OME(e) (12%)	ETD (10%)	CSOM with discharge(e) (9%)
16–20	Foreign body/other(e) (22%)	CSOM without discharge(e) (20%)	OME (8%)	CSOM with discharge (7%)	ETD (4%)

(a) Compiled using linked ENT teleotology and audiology data collections based on the hospital registration number (HRN). Uses ear condition diagnosed at most recent ENT service or, if only an audiology service was received, the most recent audiology service. If the most recent ENT and audiology service was on the same date, diagnosis of ear condition at ENT consultation was used.

(b) Excludes children with an unknown or invalid HRN.

(c) Age at most recent service.

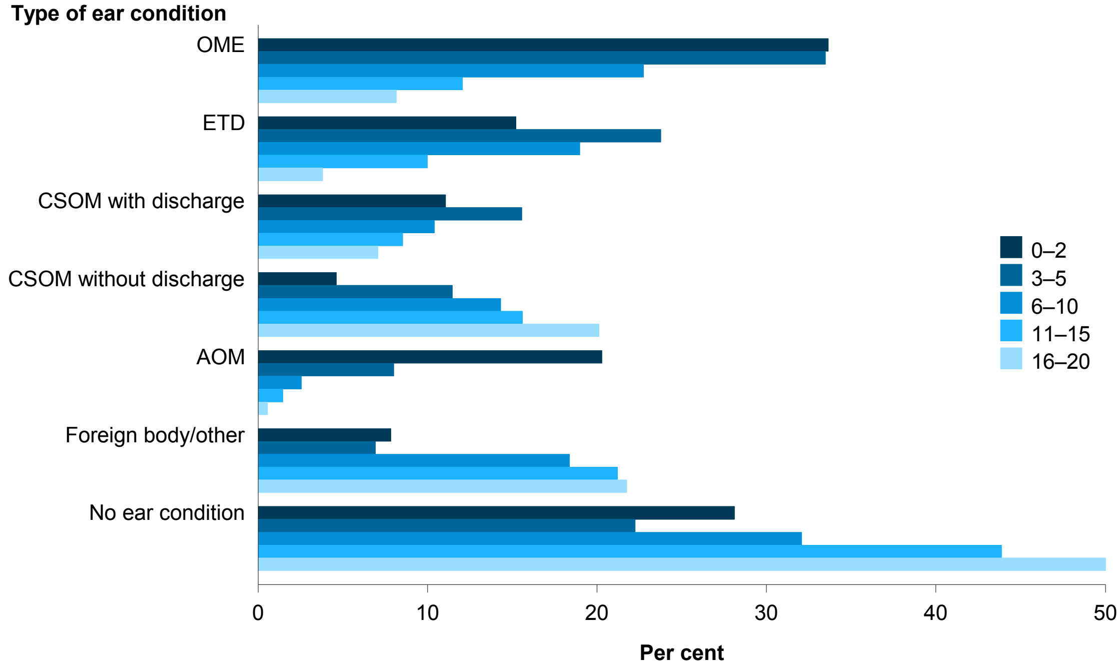
(d) Proportions calculated with the denominator as the total number of children and young people who received an audiology or ENT service in the relevant age group.

(e) For age group 0–2, ETD and CSOM with discharge were the equal third most common condition diagnosed; for age group 11–15, OME and CSOM with discharge were the equal fourth most common condition diagnosed; for age group 16–20, CSOM without discharge and foreign body and other conditions were the equal first most common condition diagnosed.

Figure 6.2 shows that, consistent with Table 6.1 above, there were clear shifts in the presence of various types of ear conditions diagnosed by age group:

- The proportion of service recipients with OME, ETD, CSOM with discharge and AOM generally decreased with age.
- The proportion of service recipients with CSOM without discharge, and foreign body or other conditions generally increased with age.
- The proportion of service recipients with no ear conditions generally increased with age.

In 2015–16, the proportion of males and females diagnosed with at least 1 type of ear condition was similar (around 66%) and the prevalence of different types of ear conditions was generally similar between sexes. The exceptions were for ETD, which was diagnosed for more males (169 or 17% of males) than females (155 or 15% of females), and foreign body and other conditions which were diagnosed for more females (175 or 17%) than males (138 or 14%) (Appendix Table F6.1).



Note: Data are reported only where consent was obtained.

Source: Appendix Table F6.3.

Figure 6.2: Type of ear conditions among children and young people who received an audiology or ENT service, by age, 2015–16

6.2 Hearing status of children and young people with ear conditions

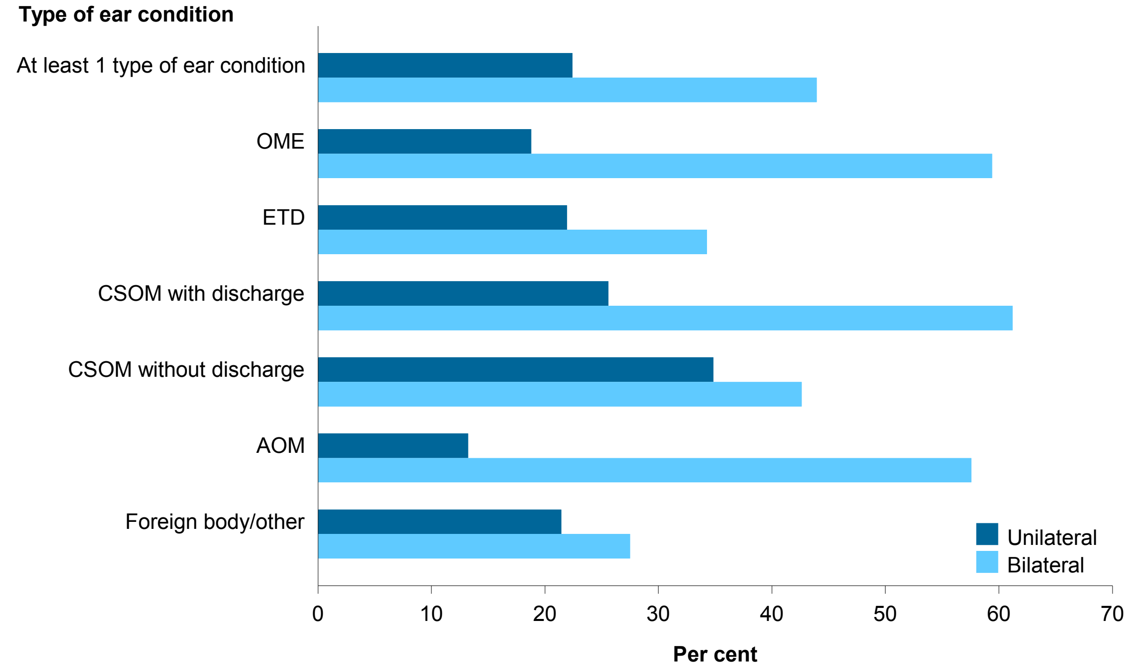
In 2015–16, of the 1,330 children and young people diagnosed with at least 1 ear condition:

- two-thirds (66%) experienced hearing loss: 44% had bilateral hearing loss and 22% had unilateral hearing loss
- 26% had no hearing loss, and hearing loss status was missing for 8% (Appendix Table F6.4).

As shown in Figure 6.3, hearing loss status varied by the type of ear condition diagnosed. In 2015–16, rates of hearing loss were highest among children and young people with:

- CSOM with discharge: 87% of them have hearing loss (61% bilateral and 26% unilateral)
- OME: 78% of them have hearing loss (59% bilateral and 19% unilateral)
- CSOM without discharge: 77% of them have hearing loss (42% bilateral and 35% unilateral) (Appendix Table F6.4).

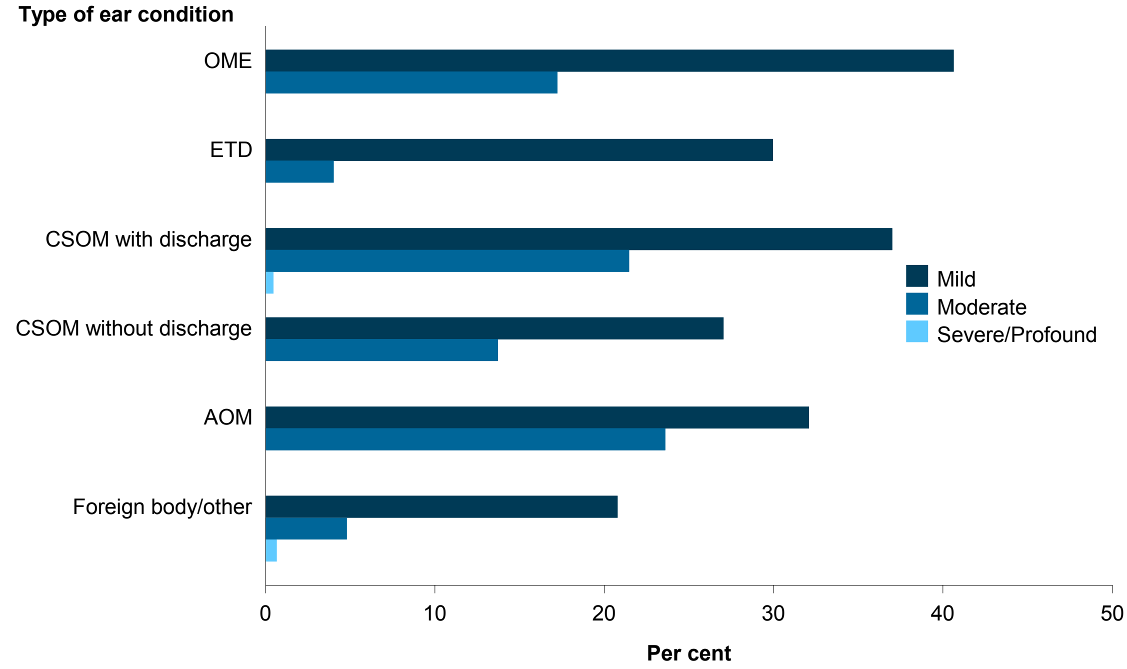
From 2012–13 to 2015–16, the proportion of children and young people with a middle ear condition who had hearing loss increased from 59% to 66%, while the proportion with no hearing loss increased from 19% to 26% (Appendix Table F6.5). The increase in the proportion of children and young people with a middle ear condition who had hearing loss was not accompanied by a decrease in the proportion who had no hearing loss. This might be partially attributed to the improvement in the completeness of data, where there was a decrease in the proportion of children and young people whose information was missing, from 22% to 8% between 2012–13 and 2015–16.



Note: Data are reported only where consent was obtained.

Source: Appendix Table F6.4.

Figure 6.3: Hearing loss status by ear condition, 2015–16



Note: Data are reported only where consent was obtained.

Source: Appendix Table F6.6.

Figure 6.4: Degree of hearing impairment by ear condition, 2015–16

Degrees of hearing impairment also differed between ear conditions diagnosed. In 2015–16:

- among the 1,330 children and young people with at least 1 ear condition, 43% had a hearing impairment, 30% had mild impairment and 13% moderate impairment (Figure 6.4)
- hearing impairment was most common among children and young people diagnosed with CSOM with discharge (59%), OME (58%) and AOM (56%). The degree of hearing impairment also tended to be more severe in children and young people with these conditions, with moderate hearing impairment found in about 17% or more of children and young people with OME (17%), CSOM with discharge (22%) or AOM (24%)
- 49% of the children and young people with at least 1 type of ear condition were found to have no hearing impairment (Appendix Table F6.6).

Between 2012–13 and 2015–16, among children and young people diagnosed with an ear condition at their most recent service, the proportion with a hearing impairment increased slightly from 42% to 43% (Appendix Table F6.7).

6.3 Changes in ear conditions

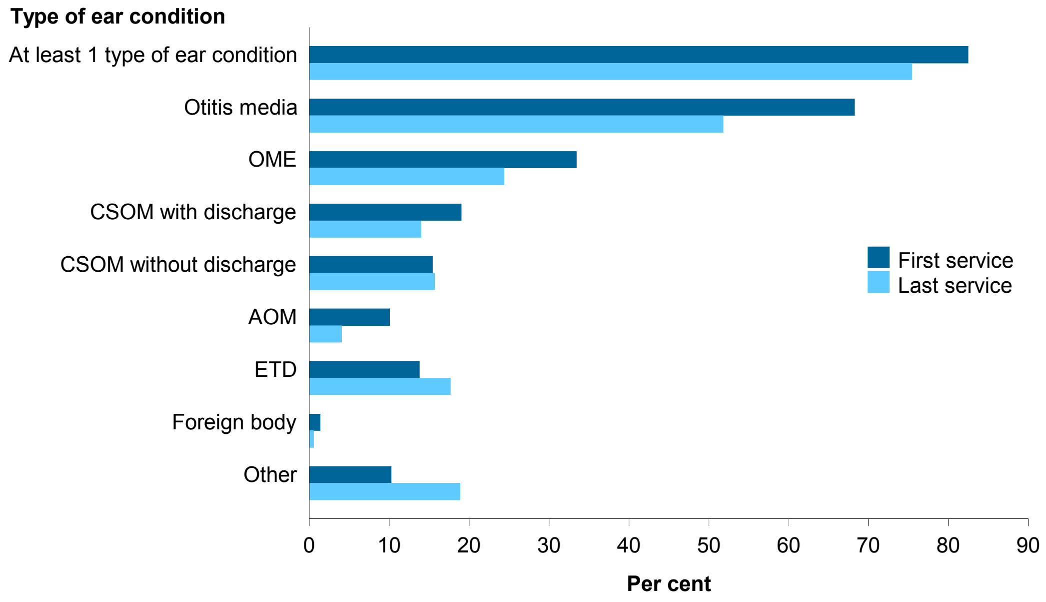
The following sections analyse changes in ear conditions over time among children and young people who received multiple audiology or ENT teleotology services. The analyses of children and young people who received at least 2 services is for 4 financial years (July 2012 to June 2016), while analyses of those who received at least 3 services are for a longer period (August 2007 to June 2016). As different periods are analysed, the data presented are not directly comparable between the results for children and young people who received at least 2 services and for those who received at least 3 services.

Children and young people who received at least 2 services between July 2012 and June 2016

This section assesses whether the prevalence of ear conditions improved between the first and last service for children and young people who were on the treatment pathway (that is, who received 2 or more ENT or audiology services between July 2012 and June 2016). To measure change over time and observe the outcomes of treatment, this analysis includes only children and young people with a minimum time interval of 3 months between the first and last service.

Figure 6.5 shows that out of 2,121 children and young people who received 2 or more audiology or ENT services between July 2012 and June 2016, the proportion diagnosed with at least 1 ear condition decreased by 7 percentage points (from 82% to 75%) between the first and last service. There was some variation in the extent of change over time between different types of ear conditions. Between first and last services:

- there was a decrease of 16 percentage points (from 68% to 52%) in the proportion of children and young people diagnosed with otitis media (which includes OME, CSOM with discharge, CSOM without discharge and AOM):
  - there were decreases in the proportions of children and young people diagnosed with OME (from 33% to 24%), CSOM with discharge (from 19% to 14%) and AOM (10% to 4%)
- the proportion of those diagnosed with ETD increased from 14% to 18%
- there was little change in rates for CSOM without discharge (from 15% to 16%) and foreign body (about 1%)
- the proportion with no ear conditions increased from 25% to 32% (Figure 6.5; Appendix Table F6.8).



Notes

1. Otitis media includes OME, CSOM with discharge, CSOM without discharge and AOM.
2. 'Other' includes grommets, reduced ear drum movement or retracted ear drum, or other ear conditions.
3. Data are reported only where consent was obtained.

Source: Appendix Table F6.8.

Figure 6.5: Change in prevalence of ear conditions between first and last hearing health service, July 2012 to June 2016

Children and young people who received at least 3 services between August 2007 and June 2016

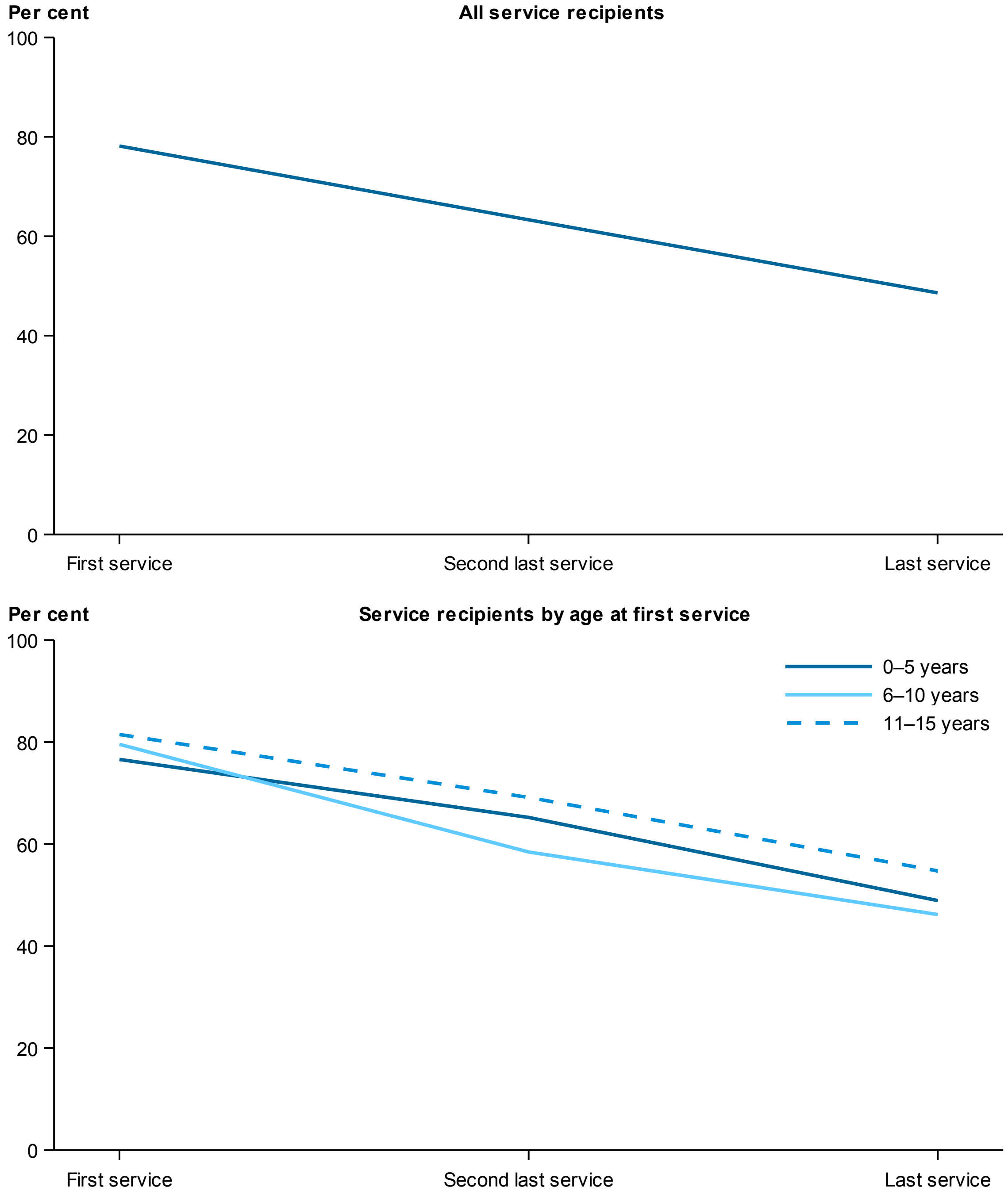
Figure 6.6 shows changes in the proportion of children and young people aged under 16 with some form of otitis media (that is, AOM, CSOM with discharge, OME or CSOM without discharge) among those who received at least 3 ENT or audiology services between August 2007 and June 2016. These conditions were chosen for analysis as they were the most common among service recipients.

The cross-sectional analysis shows that among the 2,197 children and young people analysed, 78% had at least 1 type of otitis media at their first service. This decreased to 63% at the second last service, and 49% at the last service—an overall decrease of 29 percentage points between the first and last service.

The age groups 0–5, 6–10 and 11–15 (based on age at first service) were also analysed in this way because the profiles of younger and older age groups often differ in terms of hearing conditions, treatment pathways and outcomes in hearing health status. The proportions of service recipients with otitis media decreased between first and last services for all groups, but at different rates:

- The change was biggest among those aged 6–10, with a decrease of 34 percentage points, (from 80% to 46%).
- For those aged 0–5 and 11–15, there were decreases of 28 and 27 percentage points, respectively. At all services analysed (first, second last and last services), the proportion with otitis media was consistently higher among those aged 11–15 than for those aged 0–5 (Figure 6.6; Appendix Table F6.9).

The patterns observed by age group may be partly explained by the effects of both medical intervention and natural development (whereby people typically grow out of ear conditions with age). As shown in Figure 6.6, at the first service, those aged 6–10 at their first service had a higher rate of otitis media than those aged 0–5. By the second last and last services, those aged 6–10 had a lower rate of otitis media than those aged 0–5. For both age groups, it is likely that medical intervention helped to decrease rates of otitis media, but the bigger decrease in those aged 6–10 may be partially due to natural development, with children in this group more likely to be naturally growing out of ear conditions than those in the younger group.



Notes

1. Includes children and young people who received 3 or more audiology and/or ENT services between July 2012 and June 2016. Excludes children and young people with missing or not tested responses for hearing loss status.
2. Minimum time between services: 3 months. Median time interval between the first and second last service: 25 months. Median time interval between the second last and last service: 12 months.
3. Data are reported only where consent was obtained.

Source: Appendix Table F6.9.

Figure 6.6: Proportion of children and young people with otitis media (OME, CSOM with discharge, AOM or CSOM without discharge) at first hearing health outreach service, second last service and last service (among those who received 3 or more services), August 2007 to June 2016

6.4 Disease progression of chronic otitis media

This section examines the progress of children and young people with chronic otitis media (that is, CSOM with discharge and CSOM without discharge). Between August 2007 and June 2016, there were 2,539 children and young people who received audiology or ENT services with a diagnosis of CSOM with discharge (1,654) or CSOM without discharge (1,864) (service recipients might have been diagnosed with both conditions at different services during the period analysed). Among these children and young people, 41% (674 of 1,654) of CSOM with discharge and 44% (818 of 1,864) of CSOM without discharge received another service at least 3 months after their initial diagnosis. These are the data analysed in this section.

Figure 6.7 shows that, among the 674 children and young people who were diagnosed with CSOM with discharge at an initial ENT or audiology service:

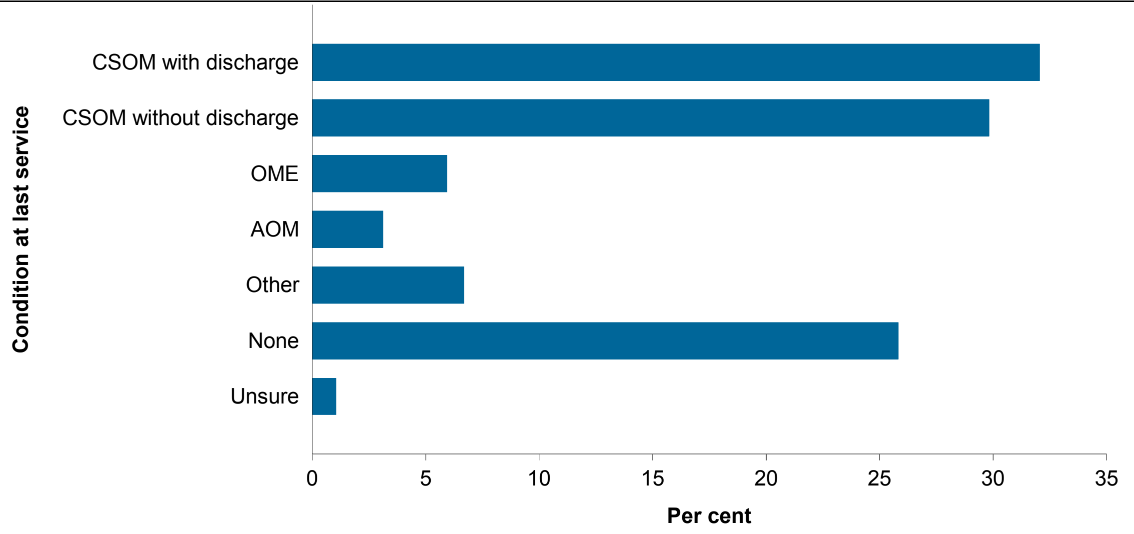
- most still had an ear condition at their latest service—32% still had CSOM with discharge, while 30% developed CSOM without discharge, 6% OME, 3% AOM and 7% other conditions (Figure 6.7a; Appendix Table F6.10)
- over one-quarter (26%) had no ear conditions at their latest service.

Among the 818 children and young people who were diagnosed with CSOM without discharge at an initial ENT or audiology service:

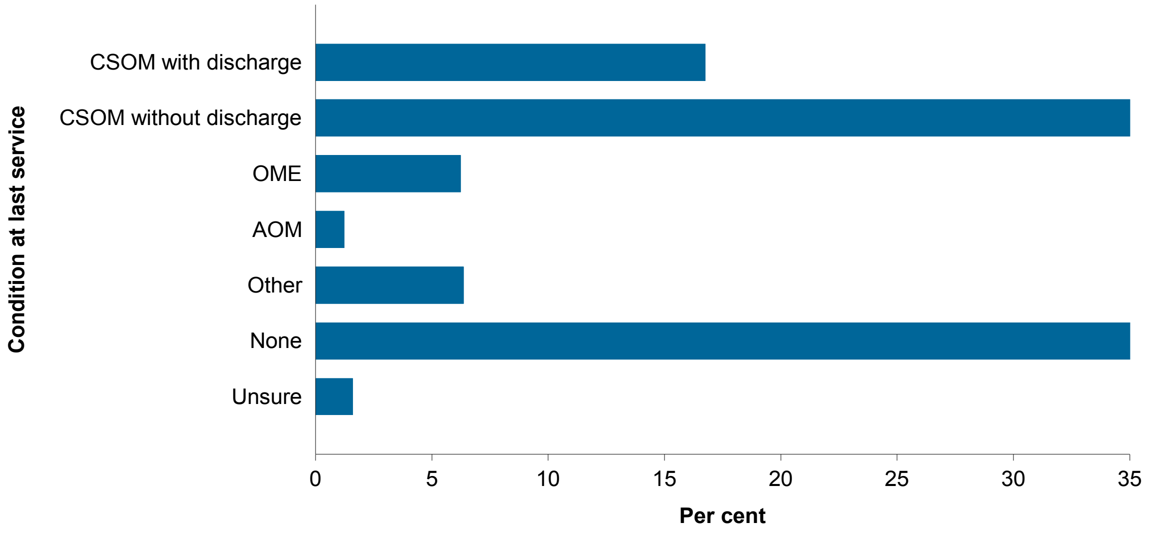
- over one-third (35%) still had CSOM without discharge at their latest check, while 17% developed CSOM with discharge, 6% OME, 1% AOM and 6% other conditions (Figure 6.7b; Appendix Table F6.10)
- over one-third (35%) had no ear conditions at their latest service.

Although there were some improvements in both groups analysed, overall, the results generally suggest poor progress in children and young people diagnosed with CSOM with discharge or CSOM without discharge at an initial service, with the majority still experiencing the same condition or developing another type of ear disease over their course of treatment.

Caution should be exercised when interpreting the information above, as the progress of children and young people with chronic otitis media who have not returned for Northern Territory hearing health outreach services is not known—for example, children and young people may have accessed services at a hospital or urban facility, had surgery intervention, or be candidates for surgery.



(a) Ear conditions at last service among children and young people with CSOM with discharge at initial service



(b) Ear conditions at last service among children and young people with CSOM without discharge (dry perforation) at initial service

Notes

1. 'Initial service' refers to the initial service at which a child or young person was diagnosed with CSOM with discharge or CSOM without discharge, which is not necessarily the service recipient's first audiology or ENT service.
2. Minimum time between initial and last services: 3 months. Median time interval: 40 months. Maximum time interval: 96 months.
3. Data are reported only where consent was obtained.

Source: Appendix Table F6.10.

Figure 6.7: Progress of children and young people with ear conditions between the initial and last service, August 2007 to June 2016

7 Special analyses: young people who exited the hearing health programs

Key findings

- At 30 June 2016, 130 young people aged 21 and over exited the hearing health programs. This included 128 in the outreach audiology program, and 80 in the ENT teleotology program, with some young people attending both programs.
- Among the 76 young people who received 2 or more audiology and/or ENT teleotology services, otitis media was present in three-quarters (76%, or 58) of young people at their first service. This proportion decreased to 47% (or 36) at the last service.
- Among the 73 young people who received 2 or more outreach audiology services only, 22 (30%) experienced improvement in hearing impairment (that is, moved to a less severe degree of hearing impairment).
- Among young people who exited the program, further action was recommended at their last service for:
  - half (50%) of the 128 audiology service recipients, most commonly ongoing monitoring by NT Hearing Services (37%)
  - 69% of the 80 ENT teleotology service recipients. Types of further action recommended included further follow-up (53%), surgery (34%) and treatment (24%).

This chapter presents findings from analyses of young people aged 21 and over at the end of the reporting period (30 June 2016). As these young people were no longer eligible to receive services under the NTRAI and HEBHBL programs after June 2016, they were determined to have exited the hearing health programs. By analysing service recipients on exiting the hearing health programs, it can be established how long they participated in the programs, whether ear and hearing health improved while in the programs, and whether further actions for continued care and monitoring were still being recommended at their last service.

This chapter includes data from ENT teleotology and outreach audiology services, with the data analysed separately where appropriate, and combined where possible. The service recipients included in the following analyses are those who were aged 21 or over at 30 June 2016, and received at least 1 service from July 2012 to June 2016.

7.1 Number of services received

Overall, there were 130 young people aged 21 and over at 30 June 2016 who received an outreach audiology service, ENT teleotology service, or both. The majority of these service recipients received 2 or more services from August 2007 to June 2016 (76 young people, or 59%), with a median interval between the first and last services of 55 months (4.6 years) (Table 7.1).

There were 128 young people aged 21 and over who exited the outreach audiology program at 30 June 2016. Among these service recipients, over half (73 young people, or 57%) received 2 or more services from August 2007 to June 2016, with a median interval between the first and last services of 55 months (about 4.6 years) (Table 7.1).

There were 80 young people aged 21 who exited the ENT teleotology program at 30 June 2016. Among these service recipients, over half (46 young people, or 58%) received 2 or more services from August 2007 to June 2016, with a median interval between the first and last services of 38 months (about 3.2 years) (Table 7.1).

Table 7.1: Number of services received among young people aged 21 and over and who had left the hearing health programs[(a)] at 30 June 2016[(b)]

	Number of services received		
	1	2 or more	Total service recipients
Audiology services			
Number of young people	55	73	**128**
Per cent	43.0	57.0	**100.0**
Median interval between first and last services (months)	. .	55	. .
ENT teleotology services			
Number of young people	34	46	**80**
Per cent	42.5	57.5	**100.0**
Median interval between first and last services (months)	. .	38	. .
Audiology and/or ENT services			
Number of young people	54	76	**130**
Per cent	41.5	58.5	**100.0**
Median interval between first and last services (months)	. .	55	. .

(a) Includes outreach audiology services and ENT teleotology services.

(b) Service recipients were determined to have left the programs at age 21 and over, as they were no longer eligible for the programs at this age.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

7.2 Changes in ear and hearing health for young people who exited hearing health programs

Among the 128 outreach audiology service recipients who exited the program, 73 received 2 or more services. Of these, 22 (30%) experienced improvement in hearing impairment (that is, moved to a less severe degree of hearing impairment) between their first and last service, and 13 (18%) experienced a deterioration in hearing impairment (that is, a movement to a more severe degree of hearing impairment) (Table 7.2). There was no change in hearing impairment for almost half (48%) of these service recipients. Some of them may not have had hearing impairment at their first check, or changes in hearing category are too small to be identified by available data.

Table 7.2: Change in degree of hearing impairment between first and last audiology services among young people aged 21 and over and who had left hearing health programs at 30 June 2016(a)(b)(c)

Change in hearing impairment	Number	%
Improved(c)	22	30.1
No change	35	47.9
Deteriorated(d)	13	17.8
Missing	3	4.1
Total service recipients	**73**	**100.0**

(a) Service recipients were determined to have left the program at age 21 and over, as they were no longer eligible for the program at this age.

(b) Includes Indigenous young people who had 2 or more audiology services (with the first service between August 2007 and June 2016, and the last service between July 2012 and June 2016) and had some degree of hearing impairment at their first service. Excludes service recipients with missing or not tested responses for hearing impairment.

(c) Defined as a movement to a less severe hearing impairment category; for example, from moderate to mild.

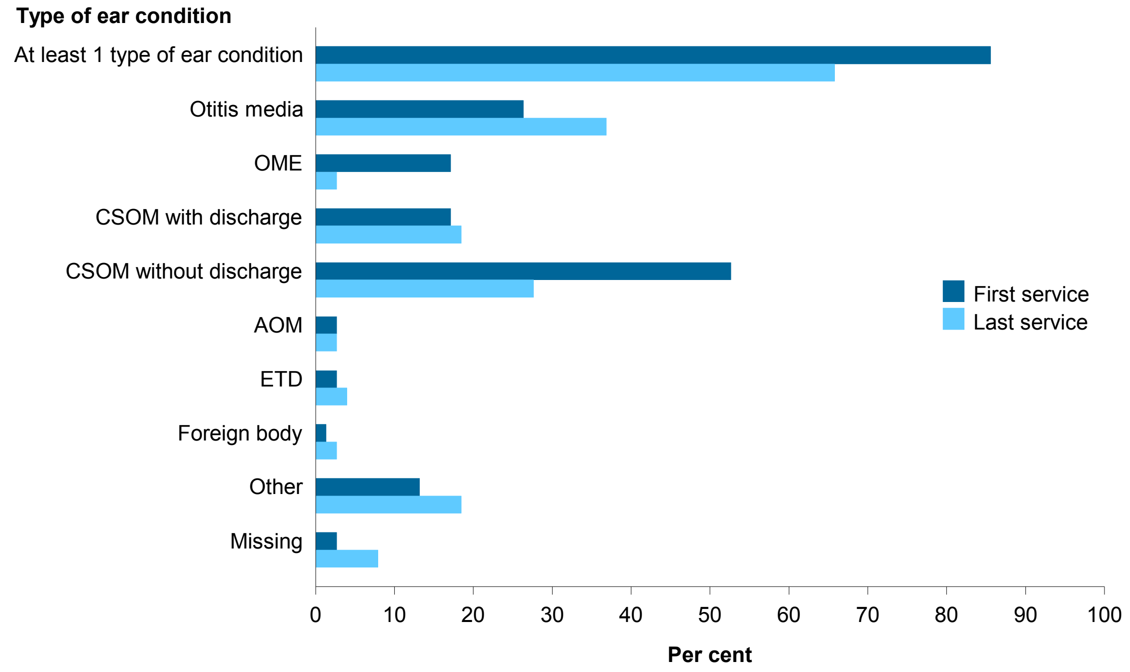
(d) Defined as a movement to a more severe hearing impairment category; for example, from mild to moderate.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

In terms of changes in ear conditions, among the 130 young people who received outreach audiology and/or ENT teleotology services who exited the program, 76 received 2 or more services. Of these, 86% had at least 1 ear condition at their first service. This decreased by 20 percentage points to 66% at the last service (Table 7.3).

Otitis media was present in 58 of the 76 young people (76%) at their first service (which includes OME, CSOM with discharge, CSOM without discharge and AOM). This proportion decreased by 29 percentage points to 47% at the last service. The most common type of otitis media was CSOM without discharge, with 53% of service recipients having this condition at the first service. This reduced by 25 percentage points to 28% at the last service. There was also a notable decrease in the proportion of service recipients diagnosed with OME, decreasing from 17% to 3% between first and last services. The proportion of service recipients with no ear condition more than doubled, from 12% at the first service to 26% at the last service (Figure 7.1; Appendix Table 7.3).



Notes

1. Data are reported only where consent was obtained.
2. Otitis media includes OME, CSOM with discharge, CSOM without discharge and AOM.
3. For the contents of ‘Other’, see Table 7.3.

Source: Table 7.3.

Figure 7.1: Prevalence of ear conditions at first and last hearing health (ENT or audiology) service among young people aged 21 and over and who had left the hearing health programs at 30 June 2016

Table 7.3: Change in prevalence of ear conditions between first and last hearing health (ENT or audiology) service[(a)(b)(c)] among young people aged 21 and over and who had left the hearing health programs at 30 June 2016[(d)]

	First service		Last service		
Type of ear condition	**Number**	**% (x)**	**Number**	**% (y)**	**Percentage point difference (y–x)**
At least 1 type of ear condition	65	85.5	50	65.8	–19.7
Otitis media[(e)]	20	26.3	28	36.8	10.5
OME	13	17.1	2	2.6	–14.5
CSOM with discharge	13	17.1	14	18.4	1.3
CSOM without discharge	40	52.6	21	27.6	–25.0
AOM	2	2.6	2	2.6	—
ETD	2	2.6	3	3.9	1.3
Foreign body	1	1.3	2	2.6	1.3
Other[(f)]	10	13.2	14	18.4	5.3
No ear condition[(g)]	9	11.8	20	26.3	14.5
Missing[(h)]	2	2.6	6	7.9	5.3
Total service recipients[(i)]	**76**	**100.0**	**76**	**100.0**	. .

(a) Minimum interval between first and last services: 3 months. Median interval: 55 months.

(b) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses ear condition diagnosed at ENT service or, if only audiology service was received, audiology service. If ENT and audiology service were on the same date, diagnosis of ear condition at ENT consultation was used. Excludes service recipients with missing response for middle ear condition.

(c) Includes those who received 2 or more audiology or ENT teleotology services, with the first service between August 2007 and June 2016, and the last service between July 2012 and June 2016.

(d) Service recipients were determined to have left the programs at age 21 and over, as they were no longer eligible for the programs at this age.

(e) Otitis media includes OME, CSOM with discharge, CSOM without discharge and AOM.

(f) 'Other' includes grommets, reduced ear drum movement or retracted ear drum, or other ear condition.

(g) Where no ear condition was reported for both right and left ears.

(h) 'Missing' includes not stated and unsure.

(i) The sum of the columns may be greater than 100% as service recipients may have more than 1 ear condition.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

7.3 Further actions and recommendations for young people who exited hearing health programs

For audiology services, of the 128 young people who exited the program, half (50%) required at least 1 further type of action at their last service. The most common type of action required was ongoing monitoring by Northern Territory Hearing Services (37%), followed by case management by an ENT specialist (24%) (Table 7.4).

Table 7.4: Type of further actions required among young people aged 21 and over and who had left the outreach audiology program at 30 June 2016(a)

Type of further action required	Number	%
At least one further action required(b)	64	50.0
Ongoing monitoring by NT Hearing Services	47	36.7
Case management by ENT	31	24.2
Case management by Primary Health Centre	11	8.6
Referral to Australian Hearing	9	7.0
No action required	64	50.0
Total service recipients	**128**	**100.0**

(a) Service recipients were determined to have left the program at age 21 and over, as they were no longer eligible for the program at this age.

(b) Service recipients can have multiple further actions required; therefore, the sum of the subcategories can be more than 100%.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

For ENT teleotology services, of the 80 young people who exited the program, 69% were recommended for at least 1 type of action at their last service. As shown in Table 7.5:

- further follow-up was recommended for over half (53%) of service recipients, most commonly audiological assessment (44%) and ENT review (30%)
- one-third (34%) of service recipients were recommended for surgery, with all 27 of these recommended for myringoplasty
- almost one-quarter (24%) of service recipients were recommended for at least 1 type of treatment, with all 19 of these recommended for medication.

As service recipients are no longer part of the program at age 21 and over, it is unknown whether the recommendations for further actions and follow-up given at their last services were fulfilled. It is possible, after their last service, that they go on to receive mainstream or other services at which further actions and follow-up care are undertaken.

Table 7.5: Type of actions recommended among young people aged 21 and over and who had left the ENT teleotology program at 30 June 2016[a][b]

	Number	%
Treatment recommended		
Medication	19	23.8
Aural toilet	9	11.3
Foreign body removed	1	1.3
Total who had at least 1 type of treatment recommended(c)	**19**	**23.8**
Surgery recommended		
Myringoplasty	27	33.8
Examination under anaesthetic	1	1.3
Exploration of middle ear/ mastoid	1	1.3
Total who had at least 1 surgery recommended(c)	**27**	**33.8**
Further follow-up recommended		
Audiological assessment	35	43.8
ENT review	24	30.0
Australian Hearing	2	2.5
Total who had at least 1 type of follow-up recommended(c)	**42**	**52.5**
All actions recommended (treatment, surgery and further follow-up)		
Total who had at least 1 action recommended(c)	55	68.8
Total service recipients	**80**	**100.0**

(a) Total includes all young people who received ENT services between 1 July 2012 and 30 June 2016. It does not equal the sum of services for the financial years, as data are based on the latest service in the period analysed, and young people may have received services in multiple financial years.

(b) Service recipients were determined to have left the program at age 21 and over, as they were no longer eligible for the program at this age.

(c) This is a multiple-response item. The subtotal does not add up to the sum of the categories because service recipients may be recommended for more than 1 type of action.

Notes

1. Data are reported only where consent was obtained.
2. Services include only those provided through the ENT program.

Source: AIHW analysis of ENT teleotology data collection (services provided on or before 30 June 2016).

Appendix A: Data item summary for hearing health data collections

Northern Territory outreach audiology data collection

The Northern Territory outreach audiology data collection includes:

- information about the child (HRN, date of birth and sex)
- information about the service (community where service was provided and date of service)
- outcomes from the audiology check, including hearing loss status, hearing loss type, degree of hearing impairment (see Box 3.2 in Chapter 3 for definitions), and middle ear conditions diagnosed
- further action(s) recommended.

Northern Territory ENT teleotology data collection

The Northern Territory ENT teleotology data collection includes:

- information about the child or young person (HRN, date of birth and sex)
- information about the service (community where the service was provided and date of service)
- middle ear diagnosis
- actions recommended and follow-up required
- type of surgery recommended.

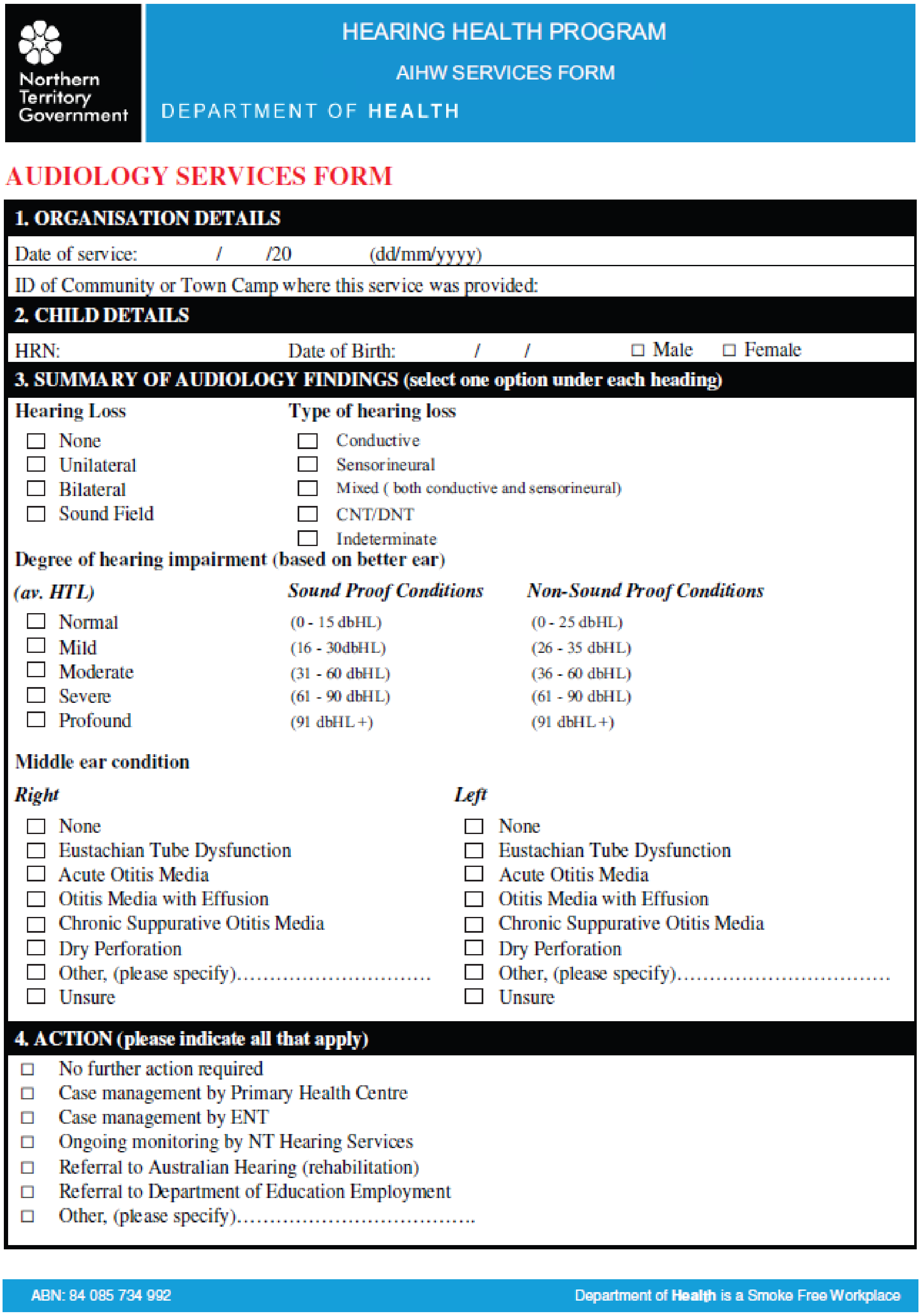
Northern Territory Clinical Nurse Specialist data collection

The Northern Territory Clinical Nurse Specialist data collection includes:

- information about the child (HRN, date of birth and sex)
- information about the service (community where the service was provided and date of service)
- hearing health priority category
- ear health of children, including diagnosis of middle ear condition
- clinical service activities provided to children
- contacts made with other service providers.

Appendix B: Data collection forms and information collected

Outreach audiology data collection form



Northern Territory Government

HEARING HEALTH PROGRAM

AIHW SERVICES FORM

DEPARTMENT OF HEALTH

AUDIOLOGY SERVICES FORM

1. ORGANISATION DETAILS

Date of service: / /20 (dd/mm/yyyy)

ID of Community or Town Camp where this service was provided:

2. CHILD DETAILS

HRN: Date of Birth: / / ☐ Male ☐ Female

3. SUMMARY OF AUDIOLOGY FINDINGS (select one option under each heading)

Hearing Loss

- ☐ None
- ☐ Unilateral
- ☐ Bilateral
- ☐ Sound Field

Type of hearing loss

- ☐ Conductive
- ☐ Sensorineural
- ☐ Mixed (both conductive and sensorineural)
- ☐ CNT/DNT
- ☐ Indeterminate

Degree of hearing impairment (based on better ear)

(av. HTL)	*Sound Proof Conditions*	*Non-Sound Proof Conditions*
☐ Normal	(0 - 15 dbHL)	(0 - 25 dbHL)
☐ Mild	(16 - 30dbHL)	(26 - 35 dbHL)
☐ Moderate	(31 - 60 dbHL)	(36 - 60 dbHL)
☐ Severe	(61 - 90 dbHL)	(61 - 90 dbHL)
☐ Profound	(91 dbHL +)	(91 dbHL +)

Middle ear condition

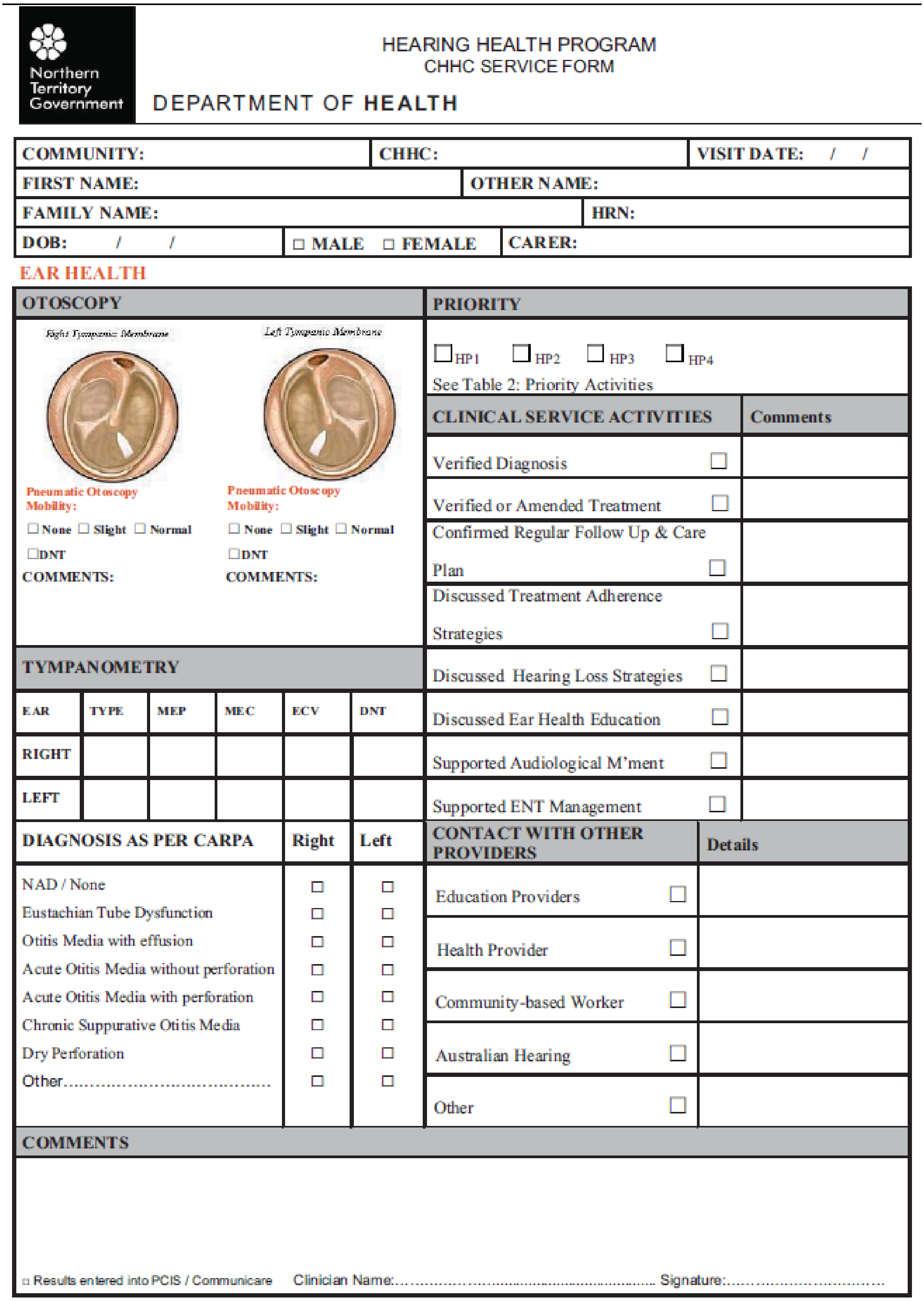
Right	*Left*
☐ None	☐ None
☐ Eustachian Tube Dysfunction	☐ Eustachian Tube Dysfunction
☐ Acute Otitis Media	☐ Acute Otitis Media
☐ Otitis Media with Effusion	☐ Otitis Media with Effusion
☐ Chronic Suppurative Otitis Media	☐ Chronic Suppurative Otitis Media
☐ Dry Perforation	☐ Dry Perforation
☐ Other, (please specify).............................	☐ Other, (please specify)................................
☐ Unsure	☐ Unsure

4. ACTION (please indicate all that apply)

- ☐ No further action required
- ☐ Case management by Primary Health Centre
- ☐ Case management by ENT
- ☐ Ongoing monitoring by NT Hearing Services
- ☐ Referral to Australian Hearing (rehabilitation)
- ☐ Referral to Department of Education Employment
- ☐ Other, (please specify)..................................

ABN: 84 085 734 992 Department of Health is a Smoke Free Workplace

CHHC audiology data collection form—used from October 2012 to June 2015



Northern Territory Government

HEARING HEALTH PROGRAM
CHHC SERVICE FORM

DEPARTMENT OF HEALTH

COMMUNITY: **CHHC:** **VISIT DATE:** / /
FIRST NAME: **OTHER NAME:**
FAMILY NAME: **HRN:**
DOB: / / ☐ **MALE** ☐ **FEMALE** **CARER:**

EAR HEALTH

OTOSCOPY

Right Tympanic Membrane	*Left Tympanic Membrane*
Pneumatic Otoscopy Mobility:	**Pneumatic Otoscopy Mobility:**
☐ **None** ☐ **Slight** ☐ **Normal**	☐ **None** ☐ **Slight** ☐ **Normal**
☐**DNT**	☐**DNT**
COMMENTS:	**COMMENTS:**

PRIORITY

☐ HP1 ☐ HP2 ☐ HP3 ☐ HP4
See Table 2: Priority Activities

CLINICAL SERVICE ACTIVITIES		**Comments**
Verified Diagnosis	☐	
Verified or Amended Treatment	☐	
Confirmed Regular Follow Up & Care Plan	☐	
Discussed Treatment Adherence Strategies	☐	
Discussed Hearing Loss Strategies	☐	
Discussed Ear Health Education	☐	
Supported Audiological M'ment	☐	
Supported ENT Management	☐	

TYMPANOMETRY

EAR	**TYPE**	**MEP**	**MEC**	**ECV**	**DNT**
RIGHT					
LEFT					

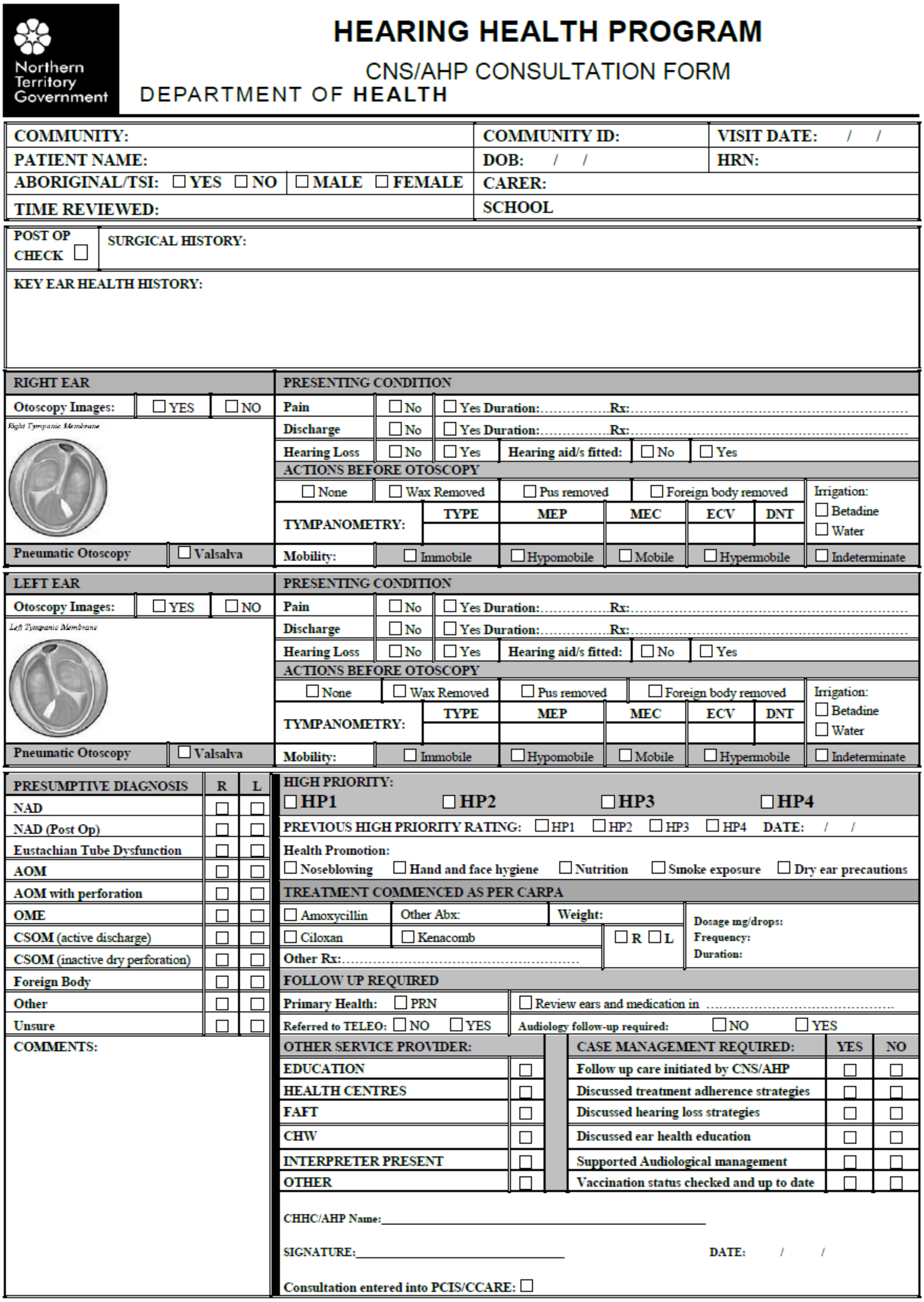
DIAGNOSIS AS PER CARPA	**Right**	**Left**
NAD / None	☐	☐
Eustachian Tube Dysfunction	☐	☐
Otitis Media with effusion	☐	☐
Acute Otitis Media without perforation	☐	☐
Acute Otitis Media with perforation	☐	☐
Chronic Suppurative Otitis Media	☐	☐
Dry Perforation	☐	☐
Other…………………………………	☐	☐

CONTACT WITH OTHER PROVIDERS		**Details**
Education Providers	☐	
Health Provider	☐	
Community-based Worker	☐	
Australian Hearing	☐	
Other	☐	

COMMENTS

☐ Results entered into PCIS / Communicare Clinician Name:………………………………………………… Signature:……………………………

CNS data collection form—used from July 2015 to the present (June 2016)



Northern Territory Government

HEARING HEALTH PROGRAM

CNS/AHP CONSULTATION FORM

DEPARTMENT OF **HEALTH**

COMMUNITY:	**COMMUNITY ID:**	**VISIT DATE:** / /
PATIENT NAME:	**DOB:** / /	**HRN:**
ABORIGINAL/TSI: ☐ **YES** ☐ **NO** ☐ **MALE** ☐ **FEMALE**	**CARER:**	
TIME REVIEWED:	**SCHOOL**	

POST OP CHECK ☐

SURGICAL HISTORY:

KEY EAR HEALTH HISTORY:

RIGHT EAR		
Otoscopy Images:	☐ YES	☐ NO
Right Tympanic Membrane		
Pneumatic Otoscopy	☐ **Valsalva**	

PRESENTING CONDITION						
Pain	☐ No	☐ Yes **Duration:**.............. **Rx:**........................				
Discharge	☐ No	☐ Yes **Duration:**.............. **Rx:**........................				
Hearing Loss	☐ No	☐ Yes	**Hearing aid/s fitted:**	☐ No	☐ Yes	
ACTIONS BEFORE OTOSCOPY						
☐ None	☐ Wax Removed	☐ Pus removed	☐ Foreign body removed			Irrigation: ☐ Betadine ☐ Water
TYMPANOMETRY:	**TYPE**	**MEP**	**MEC**	**ECV**	**DNT**	
Mobility:	☐ Immobile	☐ Hypomobile	☐ Mobile	☐ Hypermobile	☐ Indeterminate	

LEFT EAR		
Otoscopy Images:	☐ YES	☐ NO
Left Tympanic Membrane		
Pneumatic Otoscopy	☐ **Valsalva**	

PRESENTING CONDITION						
Pain	☐ No	☐ Yes **Duration:**.............. **Rx:**........................				
Discharge	☐ No	☐ Yes **Duration:**.............. **Rx:**........................				
Hearing Loss	☐ No	☐ Yes	**Hearing aid/s fitted:**	☐ No	☐ Yes	
ACTIONS BEFORE OTOSCOPY						
☐ None	☐ Wax Removed	☐ Pus removed	☐ Foreign body removed			Irrigation: ☐ Betadine ☐ Water
TYMPANOMETRY:	**TYPE**	**MEP**	**MEC**	**ECV**	**DNT**	
Mobility:	☐ Immobile	☐ Hypomobile	☐ Mobile	☐ Hypermobile	☐ Indeterminate	

PRESUMPTIVE DIAGNOSIS	**R**	**L**
NAD	☐	☐
NAD (Post Op)	☐	☐
Eustachian Tube Dysfunction	☐	☐
AOM	☐	☐
AOM with perforation	☐	☐
OME	☐	☐
CSOM (active discharge)	☐	☐
CSOM (inactive dry perforation)	☐	☐
Foreign Body	☐	☐
Other	☐	☐
Unsure	☐	☐

COMMENTS:

HIGH PRIORITY:

☐ **HP1** ☐ **HP2** ☐ **HP3** ☐ **HP4**

PREVIOUS HIGH PRIORITY RATING: ☐ HP1 ☐ HP2 ☐ HP3 ☐ HP4 **DATE:** / /

Health Promotion:

☐ **Noseblowing** ☐ **Hand and face hygiene** ☐ **Nutrition** ☐ **Smoke exposure** ☐ **Dry ear precautions**

TREATMENT COMMENCED AS PER CARPA

☐ Amoxycillin	Other Abx:	**Weight:**	**Dosage mg/drops:** **Frequency:** **Duration:**
☐ Ciloxan	☐ Kenacomb	☐ **R** ☐ **L**	
Other Rx:..			

FOLLOW UP REQUIRED

Primary Health: ☐ PRN	☐ Review ears and medication in ....
Referred to TELEO: ☐ NO ☐ YES	**Audiology follow-up required:** ☐ NO ☐ YES

OTHER SERVICE PROVIDER:	
EDUCATION	☐
HEALTH CENTRES	☐
FAFT	☐
CHW	☐
INTERPRETER PRESENT	☐
OTHER	☐

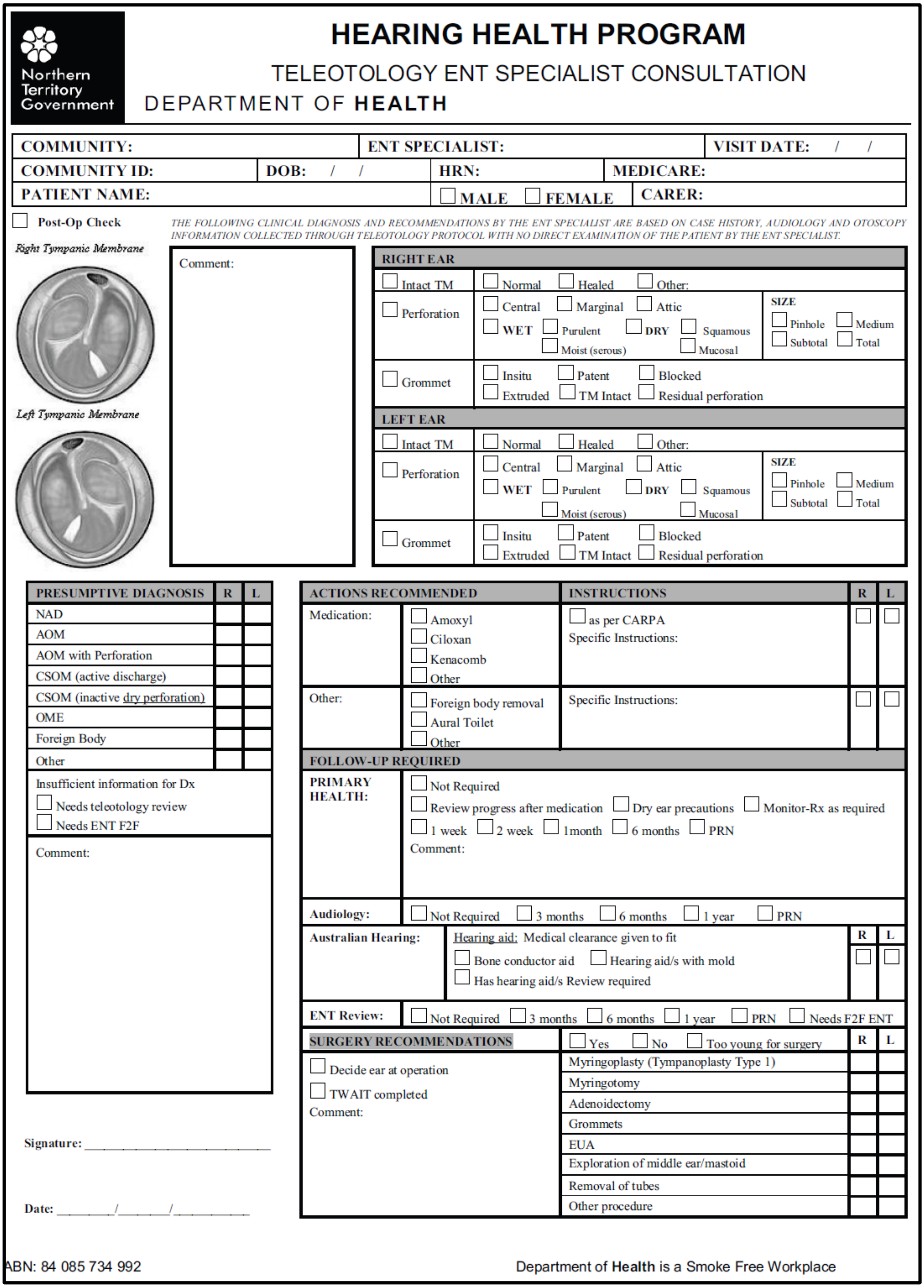
CASE MANAGEMENT REQUIRED:	**YES**	**NO**
Follow up care initiated by CNS/AHP	☐	☐
Discussed treatment adherence strategies	☐	☐
Discussed hearing loss strategies	☐	☐
Discussed ear health education	☐	☐
Supported Audiological management	☐	☐
Vaccination status checked and up to date	☐	☐

CHHC/AHP Name:____

SIGNATURE:____________________________ **DATE:** / /

Consultation entered into PCIS/CCARE: ☐

ENT teleotology data collection form



Northern Territory Government

HEARING HEALTH PROGRAM

TELEOTOLOGY ENT SPECIALIST CONSULTATION

DEPARTMENT OF **HEALTH**

COMMUNITY:	**ENT SPECIALIST:**	**VISIT DATE:** / /	
COMMUNITY ID:	**DOB:** / /	**HRN:**	**MEDICARE:**
PATIENT NAME:	☐ **MALE** ☐ **FEMALE**	**CARER:**	

☐ **Post-Op Check**

THE FOLLOWING CLINICAL DIAGNOSIS AND RECOMMENDATIONS BY THE ENT SPECIALIST ARE BASED ON CASE HISTORY, AUDIOLOGY AND OTOSCOPY INFORMATION COLLECTED THROUGH TELEOTOLOGY PROTOCOL WITH NO DIRECT EXAMINATION OF THE PATIENT BY THE ENT SPECIALIST.

Right Tympanic Membrane

Left Tympanic Membrane

Comment:

RIGHT EAR		
☐ Intact TM	☐ Normal ☐ Healed ☐ Other:	
☐ Perforation	☐ Central ☐ Marginal ☐ Attic ☐ **WET** ☐ Purulent ☐ **DRY** ☐ Squamous ☐ Moist (serous) ☐ Mucosal	**SIZE** ☐ Pinhole ☐ Medium ☐ Subtotal ☐ Total
☐ Grommet	☐ Insitu ☐ Patent ☐ Blocked ☐ Extruded ☐ TM Intact ☐ Residual perforation	

LEFT EAR		
☐ Intact TM	☐ Normal ☐ Healed ☐ Other:	
☐ Perforation	☐ Central ☐ Marginal ☐ Attic ☐ **WET** ☐ Purulent ☐ **DRY** ☐ Squamous ☐ Moist (serous) ☐ Mucosal	**SIZE** ☐ Pinhole ☐ Medium ☐ Subtotal ☐ Total
☐ Grommet	☐ Insitu ☐ Patent ☐ Blocked ☐ Extruded ☐ TM Intact ☐ Residual perforation	

PRESUMPTIVE DIAGNOSIS	**R**	**L**
NAD		
AOM		
AOM with Perforation		
CSOM (active discharge)		
CSOM (inactive dry perforation)		
OME		
Foreign Body		
Other		
Insufficient information for Dx ☐ Needs teleotology review ☐ Needs ENT F2F		

Comment:

ACTIONS RECOMMENDED		**INSTRUCTIONS**	**R**	**L**
Medication:	☐ Amoxyl ☐ Ciloxan ☐ Kenacomb ☐ Other	☐ as per CARPA Specific Instructions:	☐	☐
Other:	☐ Foreign body removal ☐ Aural Toilet ☐ Other	Specific Instructions:	☐	☐

FOLLOW-UP REQUIRED

PRIMARY HEALTH:	☐ Not Required ☐ Review progress after medication ☐ Dry ear precautions ☐ Monitor-Rx as required ☐ 1 week ☐ 2 week ☐ 1month ☐ 6 months ☐ PRN Comment:		
Audiology:	☐ Not Required ☐ 3 months ☐ 6 months ☐ 1 year ☐ PRN		
Australian Hearing:	Hearing aid: Medical clearance given to fit ☐ Bone conductor aid ☐ Hearing aid/s with mold ☐ Has hearing aid/s Review required	**R** ☐	**L** ☐
ENT Review:	☐ Not Required ☐ 3 months ☐ 6 months ☐ 1 year ☐ PRN ☐ Needs F2F ENT		

SURGERY RECOMMENDATIONS	☐ Yes ☐ No ☐ Too young for surgery	**R**	**L**
☐ Decide ear at operation ☐ TWAIT completed Comment:	Myringoplasty (Tympanoplasty Type 1)		
	Myringotomy		
	Adenoidectomy		
	Grommets		
	EUA		
	Exploration of middle ear/mastoid		
	Removal of tubes		
	Other procedure		

Signature: ____________________________

Date: ________/_______/__________

ABN: 84 085 734 992

Department of **Health** is a Smoke Free Workplace

Appendix C: Data quality statements

Northern Territory outreach audiology data collection

Summary of key issues

- This data collection included over 5,000 children and young people who were aged under 21 and received Northern Territory outreach audiology services. They account for about 17% of the Northern Territory's Indigenous population of this age group; however, they are not a random sample of Indigenous children in the Northern Territory. Although outreach audiology services are available to all Indigenous children and young people aged under 21, not all eligible children access these services.
- The data are collected as part of the hearing health programs. Health professionals who provide the programs' services document the results of audiology assessment on standard data collection forms. These forms are then forwarded to the AIHW.
- About 7% of service participants who were able to complete audiology assessments, their hearing loss status were missing in the data. The extent of missing data should be taken into account when using and interpreting hearing health data. Where possible, published tables show the percentage of missing data.

Description

The Northern Territory outreach audiology data collection contains data from outreach audiology services provided in the Northern Territory, funded by two Australian Government programs: the SFNT (which was replaced by the NTRAI on 1 July 2015) and the HEBHBL.

The SFNT began in July 2012 and continues to provide funding through the NTRAI from 2015–16 to 2021–22. The hearing health component of this agreement replaced, and expanded, services implemented under the NTER CHCI(CtG) in the Northern Territory National Partnership Agreement. The funding was mainly used to provide outreach audiology services to children aged under 16.

The HEBHBL was used to support outreach audiology services for people aged 16–20 who are not eligible under the SFNT/NTRAI. As well, the HEBHBL funded additional audiology services to children aged 0–15. Although all Indigenous children and young people aged 0–21 in the Northern Territory are eligible to receive these services, the AIHW currently has data for people aged up to 20 only. In the Northern Territory, the Healthy Ears services have mainly been delivered by outreach service teams to children and young people in remote areas because there are insufficient local services to meet the high demand in these areas.

Institutional environment

This section provides information about the origin of the data collection and the arrangements under which the collection is governed and administered.

The AIHW is a major national agency set up by the Australian Government under the *Australian Institute of Health and Welfare Act* 1987 (Cwlth) to provide reliable, regular and relevant information and statistics on Australia's health and welfare. It is an independent corporate Commonwealth entity established in 1987, governed by a management Board, and accountable to the Australian Parliament through the Health portfolio.

The AIHW aims to improve the health and wellbeing of Australians through better health and welfare information and statistics. It collects and reports information on a wide range of topics and issues, ranging from health and welfare expenditure, hospitals, disease and injury, and mental health, to ageing, homelessness, disability and child protection.

The Institute also plays a role in developing and maintaining national metadata standards. This work contributes to improving the quality and consistency of national health and welfare statistics. The Institute works closely with governments and non-government organisations to achieve greater adherence to these standards in administrative data collections to promote national consistency and comparability of data and reporting.

One of the main functions of the AIHW is to work with the states and territories to improve the quality of administrative data and, where possible, to compile national data sets based on data from each jurisdiction, to analyse these data sets and disseminate information and statistics.

Compliance with The Australian Health and Welfare Act, and the *Privacy Act* 1988 (Cwlth), ensures that the data collections managed by the AIHW are kept securely and under the strictest conditions with respect to privacy and confidentiality.

For further information see the AIHW website <www.aihw.gov.au>.

The AIHW is responsible for undertaking the data management, analysis and reporting of information collected from the Northern Territory outreach ear and hearing health services funded by the Department of Health.

Data collection forms are completed by clinical service providers and forwarded to the AIHW via the NT DoH. The NT DoH is responsible for delivering health and family services related to the ministerial responsibilities of Health and Senior Territorians. For further information see the NT DoH website <www.health.nt.gov.au>.

Timeliness

This section specifies the timeliness of the supply of data for this collection, in terms of the time taken for the AIHW to receive and process data from service providers, as well as the time taken for the AIHW to publish data from the end of a reporting period.

The first report on the SFNT audiology data collection was published in January 2014, with a reference period of July 2012 to June 2013. The scope of this report was only the SFNT program (that is, children and young people aged under 16). The scope of subsequent reports was extended to contain both the SFNT and HEBHBL programs (children and young people aged 0–21). The second annual report, published in February 2015, has a reference period of July 2012 to June 2014. The third annual report, published in November 2015, has a reference period of July 2012 to June 2015. The latest report was published in March 2017, with a reference period of July 2012 to June 2016. It is expected that future reports will be published on an annual basis.

Due to the nature of the collection process, there is a lag between the date when the service was provided and the date of data receipt by the AIHW. This means that at any point in time, there may be services provided that have not yet been captured in the data collection.

However, the extent to which the number of services and children and young people who received services is under-reported is minimal. From July 2012 to June 2016, the median lag between services being provided and records being received by the AIHW was 2 weeks for outreach audiology services.

Accessibility

This section outlines the capacity of data users to identify the availability of relevant information, and then to access it in a convenient and suitable manner.

Reports are published on the AIHW website. They can be downloaded free of charge.

Permission to obtain unpublished data must be sought from the NT DoH and the Department of Health via the AIHW. In addition, approvals from relevant ethics committees of the Northern Territory could be required.

Interpretability

This section includes information on the availability of information to help provide insight into the data, to assist with interpretation and usability.

To help stakeholders interpret information about the outreach hearing health programs, reports contain basic information about the programs, relevant definitions, and information about the data contained in the analyses presented. This includes providing information about caveats or aspects that readers should be aware of when interpreting the data.

A copy of the National Partnership Agreement on the SFNT/NTRAI is available on the website of the Standing Council on Federal Financial Relations <http://www.federalfinancialrelations.gov.au>.

Relevance

This section includes information about how well the data meet the agreed purpose of the data collection in terms of concepts measured and the population represented.

The Northern Territory outreach audiology data collection captures data on children and young people who receive outreach audiology services funded through the SFNT/NTRAI and HEBHBL programs. The data include information on the amount of services provided, demographic information of service recipients, and the ear health status of service recipients; the data also allowed children's ear health status to be compared over the time period. These services are more commonly accessed by children and young people in remote areas and the services targeted at children and young people most in need. In 2013, the NT DoH implemented the use of priority listing categories, so children and young people with poorer ear and hearing health are more likely to receive outreach audiology services.

Accuracy

This section provides information about the degree to which the data correctly describe the phenomena they were designed to measure.

Although outreach audiology services are available to all Indigenous children and young people aged 21 and under the SFNT/NTRAI and HEBHBL programs, not all eligible children and young people access these services. Therefore, it is important to note that children and young people who receive outreach audiology services are not a random sample of Indigenous children in the Northern Territory. Furthermore, outreach audiology data cannot be generalised beyond the programs contained in the data collection; neither can they be used to determine the prevalence of health conditions among all Indigenous children and young people in the Northern Territory.

Services are targeted at children and young people in most need. In January 2013, the NT DoH implemented the use of priority listing categories, so children and young people with poorer ear and hearing health are more likely to receive outreach audiology services.

Hearing loss status was missing from the data for about 7% of service participants where they were able to complete audiology assessments. The extent of missing data should be taken into account when using and interpreting hearing health data. Where possible, published tables show the percentage of missing data.

To obtain unit record data for the AIHW audiology collection, the service recipient's parent or guardian must give consent for the data to be used in this way; if this consent is not given, the information cannot be presented by demographic characteristics or referral type, only in aggregated form. The proportion of non-consent data varies over time; however, in general, it is about 1% for children who received outreach audiology services.

In order to protect privacy, personal information is not provided to the AIHW (for example, the child's name). Children can be counted only by using an HRN. A very small percentage of children could not be counted accurately due to missing or incorrect HRNs.

Coherence

This section provides information about the internal consistency of a statistical collection, product or release, as well as its comparability with other sources of information, within a broad analytical framework and over time.

The scope of the first annual report on SFNT hearing health services to Indigenous children and young people in the Northern Territory—published by the AIHW in January 2014 (for 2012–13)—contained services provided under the SFNT (that is, for children aged under 16). Following this, two annual reports were published by the AIHW in 2015 (in February and November, with data to June 2014 and June 2015, respectively); the current report was published in March 2017 (with data to June 2016). These reports were wider in scope than the first annual report, containing data from SFNT services as well as from services provided under the HEBHBL to children and young people aged 0–20. Due to differences in the scope of the programs, analyses from the first annual report containing only SFNT program data (for children aged under 16) should not be compared with analyses in subsequent annual reports (for children and young people aged 0–20).

As well, SFNT outreach audiology services were developed and extended from the outreach audiology services originally funded through the CHCI(CtG), which ran from August 2007 to June 2012. However, data from the CHCI(CtG) should not be compared with data from the SFNT/NTRAI program. The CHCI(CtG) services were provided to Indigenous children in Prescribed Areas of the Northern Territory, and targeted at children who had a referral from their initial Child Health Check. The outreach audiology services provided through the SFNT/NTRAI are available to all Indigenous children in the Northern Territory aged under 16. The final report from the CHCI(CtG) program, *Northern Territory Emergency Response Child Health Check Initiative—follow-up services for oral and ear health: final report 2007–2012* (AIHW 2012) is available from the AIHW website.

Northern Territory ENT teleotology data collection

Summary of key issues

- This data collection included over 2,400 children and young people who were aged under 21 and received ENT teleotology services. They account for about 11% of the Northern Territory population of this age group; however, they are not a random sample of Indigenous children and young people in the Northern Territory. Although these services are available to all Indigenous people aged 0–20 in the Northern Territory, not all eligible people access these services. As well, these services are more commonly accessed by those in remote areas. Therefore, results of analyses cannot be generalised to all Indigenous children and young people in the Northern Territory.
- The methods of assessment used at ENT teleotology services differ from those for face-to-face consultations. Results of tests and subsequent diagnoses from teleotology services may be affected by the method of service delivery.

Description

ENT teleotology services are funded through the HEBHBL. They were previously funded through the CHCI(CtG); this funding arrangement ended in December 2010.

All Indigenous children and young people in the Northern Territory aged 21 and under are eligible for ENT teleotology services. Although, all Indigenous children and young people aged 0–21 in Northern Territory are eligible (under national program provisions) to receive these services, the AIHW currently has data only for people aged up to 20. The data collection includes demographic information of service recipients, middle ear conditions diagnosed (if any), actions recommended, whether follow-up is required, and the type of surgery recommended (if any). Services are most commonly accessed by children and young people in remote areas, where the high demand for ENT face-to-face consultations is difficult to meet due to a lack of resources.

Institutional environment

This section provides information about the origin of the data collection and the arrangements under which the collection is governed and administered.

The AIHW is a major national agency set up by the Australian Government under the *Australian Institute of Health and Welfare Act* 1987 (Cwlth) to provide reliable, regular and relevant information and statistics on Australia's health and welfare. It is an independent corporate Commonwealth entity established in 1987, governed by a management Board, and accountable to the Australian Parliament through the Health portfolio.

The AIHW aims to improve the health and wellbeing of Australians through better health and welfare information and statistics. It collects and reports information on a wide range of topics and issues, ranging from health and welfare expenditure, hospitals, disease and injury, and mental health, to ageing, homelessness, disability and child protection.

The Institute also plays a role in developing and maintaining national metadata standards. This work contributes to improving the quality and consistency of national health and welfare statistics. The Institute works closely with governments and non-government organisations to achieve greater adherence to these standards in administrative data collections to promote national consistency and comparability of data and reporting.

One of the main functions of the AIHW is to work with the states and territories to improve the quality of administrative data and, where possible, to compile national data sets based on data from each jurisdiction, to analyse these data sets and disseminate information and statistics.

The Australian Institute of Health and Welfare Act, in conjunction with compliance to the *Privacy Act 1988* (Cwlth), ensures that the data collections managed by the AIHW are kept securely and under the strictest conditions with respect to privacy and confidentiality.

For further information see the AIHW website <www.aihw.gov.au>.

The AIHW is responsible for undertaking the data management, analysis and reporting of information collected from the Northern Territory outreach ear and hearing health services funded by the Department of Health.

Data collection forms are completed by clinical service providers and forwarded to the AIHW via the NT DoH. The NT DoH is responsible for delivering health and family services related to the ministerial responsibilities of Health and Senior Territorians. For further information see the NT DoH website <www.health.nt.gov.au>.

Timeliness

This section specifies the timeliness of the supply of data for this collection, in terms of the time taken for the AIHW to receive and process data from service providers, as well as the time taken for the AIHW to publish data from the end of a reporting period.

The first AIHW report containing ENT service data was published in 2011, with a reference period of July 2009 to May 2011. It covered ENT services funded by the CHCI(CtG) as well as by the Project Agreement on Improving Ear Health Services for Indigenous Australian Children. A report was also published in 2012, with a reference period of July 2009 to December 2010, which covered ENT services funded by the CHCI(CtG) only. The first annual report, which includes ENT data from services funded by the HEBHBL from July 2012 to June 2014, was published in February 2015. The second annual report containing ENT data from services funded by the HEBHBL was published in November 2015; it covers data from July 2012 to June 2015. The latest report was published in March 2017, covering data from July 2012 to June 2016. It is expected that future reports will be published on an annual basis.

Due to the nature of the collection process, there is a lag between the date when the service was provided and the date of data receipt by the AIHW. This means that at any point in time, there could be services provided that have not yet been captured in the ENT teleotology data collection. From July 2012 to June 2016, the median lag between ENT teleotology services being provided and records being entered into AIHW’s database was about 10 weeks.

Accessibility

This section outlines the capacity of data users to identify the availability of relevant information, and then to access it in a convenient and suitable manner.

Hearing health reports containing ENT teleotology data are published on the AIHW website. They can be downloaded free of charge.

Permission to obtain unpublished data must be sought from the NT DoH and the Department of Health via the AIHW. As well, approvals from relevant ethics committees of the Northern Territory could be required.

Interpretability

This section includes information on the availability of information to help provide insight into the data, to assist with interpretation and usability.

To help stakeholders interpret information about the ENT teleotology services, the AIHW's hearing health reports contain basic information about ENT teleotology services, relevant definitions, and information about the data contained in the analyses presented. This includes providing information about caveats or aspects that readers should be aware of when interpreting the data.

Relevance

This section includes information about how well the data meet the agreed purpose of the data collection in terms of concepts measured and the population represented.

The ENT teleotology collection captures data on children and young people who receive ENT teleotology services funded through the HEBHBL. The data include information on the amount of services provided, demographic information of service recipients and the ear health status of service recipients; the data also allowed children's ear health status to be compared over the time period. These services are more commonly accessed by children and young people in remote areas and the services targeted at children and young people most in need. In 2013, the NT DoH implemented the use of priority listing categories, so children and young people with poorer ear and hearing health are more likely to receive ENT teleotology services.

Accuracy

This section provides information about the degree to which the data correctly describe the phenomena they were designed to measure.

This data collection included over 2,400 children and young people who were aged under 21 and received ENT teleotology services. They account for about 11% of the Northern Territory population of this age group, however, they are not a random sample of Indigenous children and young people in the Northern Territory. Although these services are available to all Indigenous people aged 0–20 in the Northern Territory, not all eligible people access them. As well, these services are more commonly accessed by those in remote areas. Therefore, results of analyses cannot be generalised to all Indigenous children and young people in the Northern Territory.

The methods of assessment used in ENT teleotology services differ from those used for face-to-face consultations. Therefore, the results of tests and subsequent diagnoses from teleotology services may be affected by the method of service delivery.

To obtain unit record data for the Northern Territory ENT teleotology data collection, the service recipient's parent or guardian must give consent to share the information in this form. If they do not give consent, their information cannot be presented by demographic characteristics or referral type, only in aggregated form. The proportion of non-consented data varies over time; however, in general, it is around 1% for children and young people who received ENT teleotology services.

In order to protect privacy, personal information is not provided to the AIHW (for example, the child's name). Children can be counted only by using an HRN. A very small percentage of children could not be counted accurately due to missing or incorrect HRNs.

Coherence

This section provides information about the internal consistency of a statistical collection, product or release, as well as its comparability with other sources of information, within a broad analytical framework and over time.

ENT teleotology services were originally funded through the CHCI(CtG), which ran from August 2007 to June 2012. Data from the CHCI(CtG) should not be compared with data from July 2012 onwards. The CHCI(CtG) services were provided to Indigenous children and young people aged under 16 in Prescribed Areas of the Northern Territory and targeted at children and young people who had a referral from their initial NTER Child Health Check. The ENT services provided through the HEBHBL are available to all Indigenous children and young people in the Northern Territory aged 0–21.

In 2013, priority listing was implemented, so those in most need of ENT services are more likely to receive them before other children and young people. The final report from the CHCI(CtG), *Northern Territory Emergency Response Child Health Check Initiative—follow-up services for oral and ear health: final report 2007–2012* (AIHW 2012) is available on the AIHW website.

Northern Territory Clinical Nurse Specialist data collection

Summary of key issues

- The data collection includes over 2,600 children who were aged under 21 and received CNS services—formerly known as CHHC services—which is accounted for about 11% of the Northern Territory population of this age group. However, they are not a random sample of Indigenous children in the Northern Territory. The CNS program is available only to Indigenous children who have a referral from a health professional.
- The data were collected as part of the outreach hearing health programs. Health professionals who provide the services document the results on standard data collection forms, which are then forwarded to the AIHW.
- Rates of non-consent were high over the course of the CHHC/CNS program between July 2012 and June 2016 (33% of services and 38% of children). However, there have been improvements to non-consent rates over time, decreasing from 62% of children in 2012–13 to 58% in 2013–14, then to 22% in 2014–15, and to 15% in 2015–16. This should be taken into account when interpreting CHHC/CNS program analyses.

Description

The CHHC/CNS data collection contains data from CHHC/CNS services provided in the Northern Territory, funded by the Australian Government through the SFNT (which was replaced by the NTRAI on 1 July 2015).

The SFNT began in July 2012 and continues to provide funding through the NTRAI, from 2015–16 to 2021–22. The hearing health component of this agreement replaced, and expanded, services implemented under the NTER CHCI(CtG) in the Northern Territory National Partnership Agreement. The funding was mainly used to provide CHHC/CNS services to children and young people aged under 16.

Institutional environment

This section provides information about the origin of the data collection and the arrangements under which the collection is governed and administered.

The AIHW is a major national agency set up by the Australian Government under the *Australian Institute of Health and Welfare Act* 1987 (Cwlth) to provide reliable, regular and relevant information and statistics on Australia's health and welfare. It is an independent corporate Commonwealth entity established in 1987, governed by a management Board, and accountable to the Australian Parliament through the Health portfolio.

The AIHW aims to improve the health and wellbeing of Australians through better health and welfare information and statistics. It collects and reports information on a wide range of topics and issues, ranging from health and welfare expenditure, hospitals, disease and injury, and mental health, to ageing, homelessness, disability and child protection.

The Institute also plays a role in developing and maintaining national metadata standards. This work contributes to improving the quality and consistency of national health and welfare statistics. The Institute works closely with governments and non-government organisations to achieve greater adherence to these standards in administrative data collections to promote national consistency and comparability of data and reporting.

One of the main functions of the AIHW is to work with the states and territories to improve the quality of administrative data and, where possible, to compile national data sets based on data from each jurisdiction, to analyse these data sets and disseminate information and statistics.

The Australian Institute of Health and Welfare Act, in conjunction with compliance to the *Privacy Act 1988* (Cwlth), ensures that the data collections managed by the AIHW are kept securely and under the strictest conditions with respect to privacy and confidentiality.

For further information see the AIHW website <www.aihw.gov.au>.

The AIHW is responsible for undertaking the data management, analysis and reporting of information collected from the Northern Territory outreach ear and hearing health services funded by the Department of Health.

Data collection forms are completed by clinical service providers and forwarded to the AIHW via the NT DoH. The NT DoH is responsible for delivering health and family services related to the ministerial responsibilities of Health and Senior Territorians. For further information see the NT DoH website <www.health.nt.gov.au>.

Timeliness

This section specifies the timeliness of the supply of data for this collection, in terms of the time taken for the AIHW to receive and process data from service providers, as well as the time taken for the AIHW to publish data from the end of a reporting period.

The first annual report on the SFNT audiology data collection was published in January 2014, with a reference period of July 2012 to June 2013. The scope of this report was only the SFNT program (that is, children and young people aged under 16). The scope of subsequent reports was extended to contain both the SFNT program and the HEBHBL (children and young people aged 0–21). The second annual report, published in February 2015, has a reference period of July 2012 to June 2014. The third annual report, published in November 2015, has a reference period of July 2012 to June 2015. It is expected that future reports will be published on an annual basis.

Due to the nature of the collection process, there is a lag between the date when the service was provided and the date of data receipt by the AIHW. This means that at any point in time, there may be services provided that have not yet been captured in the data collection. However, the extent to which the number of services and children who received services is under-reported is minimal. From July 2012 to June 2016, the median lag between services being provided and records being entered into AIHW's database was just over 7 weeks for CHHC/CNS services.

Accessibility

This section outlines the capacity of data users to identify the availability of relevant information, and then to access it in a convenient and suitable manner.

Reports are published on the AIHW website. They can be downloaded free of charge.

Permission to obtain unpublished data must be sought from the NT DoH and the Department of Health via the AIHW. As well, approvals from relevant ethics committees of the Northern Territory could be required.

Interpretability

This section includes information on the availability of information to help provide insight into the data, to assist with interpretation and usability.

To help stakeholders interpret information about the outreach hearing health programs, reports contain basic information about the programs, relevant definitions, and information about the data contained in the analyses presented. This includes providing information about caveats or aspects that readers should be aware of when interpreting the data.

A copy of the National Partnership Agreement on the SFNT/NTRAI is available on the website of the Standing Council on Federal Financial Relations <http://www.federalfinancialrelations.gov.au>.

Relevance

This section includes information about how well the data meet the agreed purpose of the data collection in terms of concepts measured and the population represented.

This data collection captures data on children and young people who receive outreach CHHC/CNS services, which are more commonly accessed by children and young people in remote areas. The children who participated in the CHHC/CNS program are referred to this program if they have an identified middle ear condition or hearing impairment. The services are targeted at children and young people most in need through a priority listing categories schedule.

The CHHC/CNS collection includes information on the amount of services provided, demographic information of service recipients and ear health status of service recipients; the data also allowed children's ear health status to be compared over the time period.

Accuracy

This section provides information about the degree to which the data correctly describe the phenomena they were designed to measure.

Health providers use standard forms to record information from the CHHC/CNS services. The forms were developed by the NT DoH in consultation with the Department of Health and the AIHW.

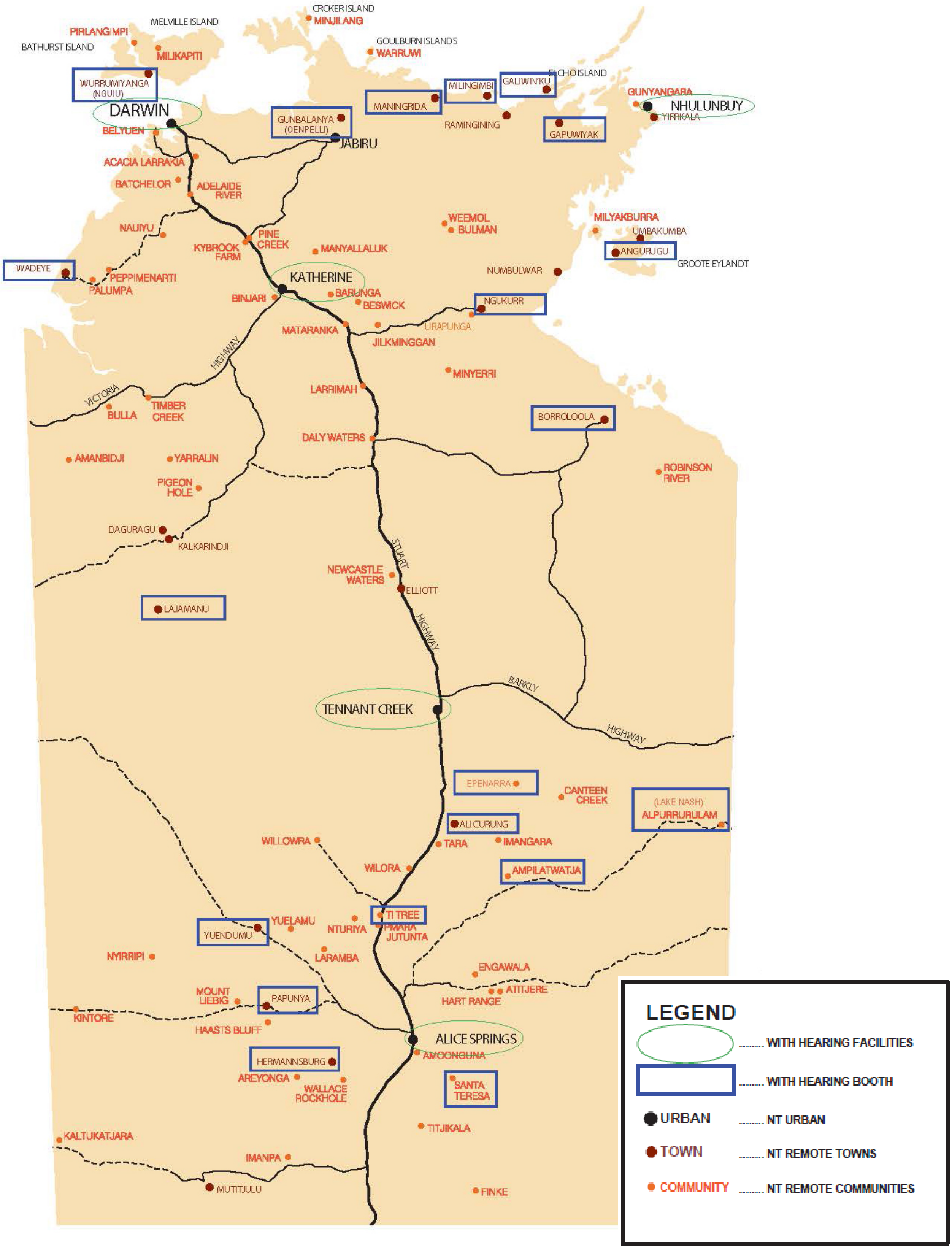
To obtain unit record data for the AIHW's CHHC/CNS collection, the child's parent or guardian must give consent to share information in this form. If they do not give consent, their child's information cannot be presented by demographic characteristics or referral type, only in aggregated form. Rates of non-consent were high over the course of the CHHC program between July 2012 and June 2016 (33% of services and 38% of children). This should be taken into account when interpreting CHHC program analyses, as the findings may not accurately represent all children who received CHHC/CNS services. However, there have been improvements to non-consent rates over time, decreasing from 62% of children in 2012–13 to 58% in 2013–14, then to 22% in 2014–15, and to 15% in 2015-16.

Coherence

This section provides information about the internal consistency of a statistical collection, product or release, as well as its comparability with other sources of information, within a broad analytical framework and over time.

Following its publication of *Stronger Futures in the Northern Territory: hearing health services 2012–13* (AIHW 2014c) in January 2014, the AIHW received additional data on CHHC services provided in 2012–13—in particular, information about a high number of services for which consent to share data with the AIHW was not obtained. Hence, the total number of CHHC services and service recipients reported for 2012–13 is much higher in the updated reports published in February 2015 and November 2015 than in the report *Stronger Futures in the Northern Territory: hearing health services 2012–13* (AIHW 2014c). Due to differences in the CHHC/CNS data analysed, comparisons should not be made between these reports on CHHC/CNS services and service recipients. It should be noted that there have been improvements to non-consent rates over time, decreasing from 62% of children in 2012–13 to 58% in 2013–14, then to 22% in 2014–15, and to 15% in 2015–16.

Appendix D: Hearing facility locations in the Northern Territory



Appendix E: Comparison of hearing impairment standards

Table E1: Comparison of standards for classifying degree of hearing impairment between the NT DoH and the World Health Organization

Degree of hearing impairment	NT DoH standard (for services analysed in this report) (dB HL)	World Health Organization standard (dB HL)
Mild	16–30	26–40
Moderate	31–60	41–60
Severe	61–90	61–80
Profound	**91+**	**81+**

Note: dB HL refers to the quietest sounds that people can hear with their better ear in soundproof conditions.

Appendix F: Additional tables

Table F3.1: Children and young people who received outreach audiology services, by age and sex, 2012–13 to 2015–16

	2012–13[a]		2013–14		2014–15		2015–16		Cumulative total[b]	
	Number	%	Number	%	Number	%	Number	%	Number	%
Age (years)										
<1	26	1.6	28	1.6	30	1.2	26	1.3	61	1.2
1–2	203	12.3	186	10.6	246	10.2	183	9.3	436	8.2
3–5	421	25.6	449	25.7	560	23.3	462	23.4	1,166	22.0
6–10	595	36.1	592	33.9	857	35.7	654	33.1	1,844	34.8
11–15	288	17.5	354	20.3	519	21.6	472	23.9	1,273	24.0
16–20	113	6.9	138	7.9	189	7.9	178	9.0	515	9.7
Total	**1,646**	**100.0**	**1,747**	**100.0**	**2,401**	**100.0**	**1,976**	**100.0**	**5,296**	**100.0**
Sex										
Male	818	49.7	863	49.4	1,209	50.4	973	49.2	2,670	50.4
Female	828	50.3	884	50.6	1,192	49.6	1,003	50.8	2,626	49.6
Total	**1,646**	**100.0**	**1,747**	**100.0**	**2,401**	**100.0**	**1,976**	**100.0**	**5,296**	**100.0**

(a) Some numbers are slightly different from those in previous publications due to data cleaning.

(b) Total includes all children and young people who received audiology services from 1 July 2012 to 30 June 2016. It does not equal the sum of services for the financial years, as data are based on the latest service in the period analysed, and children/young people may have received services in multiple financial years. It also includes services where the record was missing date of birth.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.2: Children and young people who received outreach audiology services and had hearing loss[(a)(b)], by age, 2012–13 to 2015–16[(c)]

Age group (years)	2012–13	2013–14	2014–15	2015–16
		Number		
<1	12	9	7	8
1–2	88	88	107	95
3–5	233	259	309	273
6–10	308	344	378	331
11–15	144	174	221	180
16–20	67	86	88	77
Total(d)	**852**	**960**	**1,110**	**965**
		%(e)		
<1	46.2	32.1	23.3	30.8
1–2	43.3	47.3	43.5	51.9
3–5	55.3	57.7	55.2	59.1
6–10	51.8	58.1	44.1	50.6
11–15	50.0	49.2	42.6	38.1
16–20	59.3	62.3	46.6	43.3
Total(d)	**51.8**	**55.0**	**46.2**	**48.8**

(a) If a child/young person received multiple audiology services, information is from the latest service.

(b) Hearing status is based on the child or young person's better ear. Therefore, degree of hearing loss is reported only for those who may have bilateral hearing loss.

(c) Some numbers are slightly different from those in previous publications due to data cleaning.

(d) Total including missing date of birth.

(e) Proportion is calculated with the denominator as the total number of service recipients in the relevant age group and financial year.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.3: Type of hearing loss[(a)], children and young people who received outreach audiology services, 2012–13 to 2015–16

	2012–13	2013–14	2014–15	2015–16
		Number		
Service recipients with hearing loss	852	960	1,110	965
Conductive	658	645	792	548
Sensorineural	18	24	21	19
Mixed	28	22	10	25
Type of hearing loss missing/not tested	148	269	287	373
No hearing loss	588	618	1,063	869
Hearing loss missing(b)/not tested(c)	206	169	228	142
Total	**1,646**	**1,747**	**2,401**	**1,976**
		%		
Service recipients with hearing loss	51.8	55.0	46.2	48.8
Conductive	40.0	36.9	33.0	27.7
Sensorineural	1.1	1.4	0.9	1.0
Mixed	1.7	1.3	0.4	1.3
Type of hearing loss missing/not tested	9.0	15.4	12.0	18.9
No hearing loss	35.7	35.4	44.3	44.0
Hearing loss missing(b)/not tested(c)	12.5	9.7	9.5	7.2
Total	**100.0**	**100.0**	**100.0**	**100.0**

(a) If a child or young person received multiple audiology services, information is from the latest service.

(b) 'Missing' includes not stated, unsure and invalid responses.

(c) Some children and young people may not be tested because they may find it difficult to cooperate with the procedure.

Note: Data are reported for children and young people only where consent was obtained.

Source: AIHW analysis of Northern Territory hearing health outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.4: Degree of hearing impairment[(a)], children and young people who received outreach audiology services, 2012–13 to 2015–16

	2012–13		2013–14		2014–15		2015–16	
Degree of hearing impairment	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Service recipients with hearing impairment	602	36.6	629	36.0	741	30.9	630	31.9
Mild	374	22.7	408	23.4	491	20.4	425	21.5
Moderate	156	9.5	167	9.6	197	8.2	183	9.3
Severe/profound	7	0.4	7	0.4	4	0.2	3	0.2
Degree unknown	65	3.9	47	2.7	49	2.0	19	1.0
No hearing impairment	849	51.6	951	54.4	1,436	59.8	1,204	60.9
Missing(b)/not tested(c)	195	11.8	167	9.6	224	9.3	142	7.2
Total	**1,646**	**100.0**	**1,747**	**100.0**	**2,401**	**100.0**	**1,976**	**100.0**

(a) Hearing impairment is based on the child or young person's better ear. Therefore, degree of hearing impairment is reported only for those children and young people who may have bilateral hearing loss. If a child or young person received multiple audiology services, information is from the latest service.

(b) 'Missing' includes not stated, unsure and invalid responses.

(c) Children and young people may not be tested if they find it difficult to cooperate with the procedure.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.5: Age group by degree of hearing impairment[(a)(b)], children and young people who received outreach audiology services, 2015–16

				Hearing impairment							
		No hearing impairment		Mild		Moderate/severe/ profound		Degree not tested		Missing/ not tested[(c)]	
Age group (years)	**Number of children received audiology service**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
<1	26	5	19.2	4	15.4	3	11.5	n.p.	n.p.	13	50.0
1–2	183	28	15.3	38	20.8	49	26.8	n.p.	n.p.	62	33.9
3–5	462	200	43.3	149	32.3	57	12.3	n.p.	n.p.	51	11.0
6–10	654	449	68.7	150	22.9	46	7.0	n.p.	n.p.	8	1.2
11–15	472	375	79.4	68	14.4	18	3.8	n.p.	n.p.	6	1.3
16–20	178	147	82.6	16	9.0	12	6.7	n.p.	n.p.	2	1.1
Total[(d)]	**1,976**	**1,204**	**60.9**	**425**	**21.5**	**186**	**9.4**	**19**	**1.0**	**142**	**7.2**

(a) If a child or young person received multiple audiology services, information is from latest service.

(b) Hearing impairment is based on the child's better ear. Therefore, degree of hearing impairment is only reported or those who may have bilateral hearing loss.

(c) Missing includes not stated, unsure and invalid responses.

(d) Total including missing date of birth.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.6: Age group by degree of hearing impairment[(a)(b)] among children and young people who received outreach audiology services, 2012–13 to 2015–16[(c)] (%)

Age group (years)	2012–13	2013–14	2014–15	2015–16
		No hearing impairment		
<1	15.4	7.1	3.3	19.2
1–2	12.8	10.8	13.0	15.3
3–5	40.9	47.4	45.2	43.3
6–10	64.4	62.0	70.9	68.7
11–15	68.8	74.6	76.1	79.4
16–20	58.4	61.6	77.8	82.6
Total[(d)]	**51.6**	**54.4**	**59.8**	**60.9**
		Mild hearing impairment		
<1	11.5	14.3	10.0	15.4
1–2	17.2	17.7	22.0	20.8
3–5	27.3	29.0	27.1	32.3
6–10	23.7	25.3	20.3	22.9
11–15	18.1	19.2	15.4	14.4
16–20	24.8	16.7	14.8	9.0
Total[(d)]	**22.7**	**23.4**	**20.4**	**21.5**
		Moderate/severe/profound hearing impairment		
<1	23.1	7.1	6.7	11.5
1–2	20.7	21.5	18.3	26.8
3–5	13.1	10.2	11.8	12.3
6–10	5.5	8.8	6.0	7.0
11–15	6.6	3.4	5.2	3.8
16–20	7.1	15.9	5.3	6.7
Total[(d)]	**9.9**	**10.0**	**8.4**	**9.4**
		Hearing impairment not tested		
<1	11.5	14.3	6.7	3.8
1–2	5.4	5.9	2.4	3.3
3–5	2.9	2.7	3.8	1.1
6–10	3.5	1.5	1.3	0.2
11–15	3.1	1.4	1.2	1.1
16–20	8.0	4.3	1.6	0.6
Total[(d)]	**3.9**	**2.7**	**2.0**	**1.0**

(a) If a child/young person received multiple audiology services, information is from the latest service.

(b) Hearing status is based on the child or young person's better ear. Therefore, degree of hearing loss is reported only for those who may have bilateral hearing loss.

(c) Proportion is calculated with the denominator as the total number of service recipients in the relevant age group and financial year.

(d) Total includes those with a missing date of birth.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.7: Hearing loss status by type of actions required, children and young people who received outreach audiology services, 2015–16

	No hearing loss		Hearing loss		Missing[a]		Total	
Type of further action required	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
At least one further action required[a]	240	27.6	930	96.4	136	95.8	1,306	66.1
Ongoing monitoring by Northern Territory Hearing Services	215	24.7	875	90.7	131	92.3	1,221	61.8
Case management by Primary Health Centre	31	3.6	224	23.2	43	30.3	298	15.1
Case management by ENT	15	1.7	175	18.1	13	9.2	203	10.3
Referral to Department of Education and Training	9	1.0	213	22.1	3	2.1	225	11.4
Referral to Australian Hearing	8	0.9	214	22.2	5	3.5	227	11.5
Other	27	3.1	82	8.5	11	7.7	120	6.1
No action required	629	72.4	35	3.6	6	4.2	670	33.9
Total service recipients	**869**	**100.0**	**965**	**100.0**	**142**	**100.0**	**1,976**	**100.0**

(a) ‘Missing’ includes not tested, not stated, unsure and invalid responses.

(b) Service recipients can have multiple further actions required and, therefore, the sum of these categories totals more than 100%.

Notes

1. Data are reported only where consent was obtained.
2. If a child or young person received multiple audiology services, information is from the latest service.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.8: Type of actions required among children and young people who received outreach audiology services, by hearing loss status, 2012–13 to 2015–16 (%)

	2012–13	2013–14	2014–15	2015–16
	Service recipients with no hearing loss			
At least one further action required[(a)]	28.9	24.8	18.9	27.6
Ongoing monitoring by NT Hearing Services	23.5	20.4	16.6	24.7
Case management by Primary Health Centre	6.3	6.0	2.8	3.6
Case management by ENT	7.8	4.7	2.7	1.7
Referral to Department of Education and Training	0.2	0.3	0.2	1.0
Referral to Australian Hearing	0.0	0.2	0.1	0.9
Other	0.7	0.5	0.8	3.1
No action required	71.1	75.2	81.1	72.4
Total service recipients	**100.0**	**100.0**	**100.0**	**100.0**
	Service recipients with hearing loss			
At least one further action required[(a)]	97.1	94.0	96.5	96.4
Ongoing monitoring by NT Hearing Services	85.1	78.3	87.2	90.7
Case management by Primary Health Centre	32.9	22.3	23.8	23.2
Case management by ENT	49.2	25.3	23.8	18.1
Referral to Department of Education and Training	8.0	8.0	15.5	22.1
Referral to Australian Hearing	13.0	13.0	25.4	22.2
Other	3.3	1.5	3.4	8.5
No action required	2.5	5.4	3.5	3.6
Total service recipients	**100.0**	**100.0**	**100.0**	**100.0**

(a) Service recipients can have multiple further actions required, therefore the sum of the sub-categories can be more than 100%.

Notes

1. Data are reported only where consent was obtained.
2. If a child or young person received multiple audiology services, information is from the latest service.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.9: Change in hearing loss status, children and young people who received at least 3 outreach audiology services[a][b], cohort study, August 2007 to June 2016

Age group (years)	Change in hearing loss status				
	Improved[c]	**Stabilised[d]**	**Fluctuated[e]**	**Deteriorated[f]**	**Total**
			Number		
0–5	388	233	150	57	828
6–10	311	193	135	65	704
11–15	73	55	52	27	207
Total	**772**	**481**	**337**	**149**	**1,739**
			%		
0–5	46.9	28.1	18.1	6.9	100.0
6–10	44.2	27.4	19.2	9.2	100.0
11–15	35.3	26.6	25.1	13.0	100.0
Total	**44.4**	**27.7**	**19.4**	**8.6**	**100.0**

(a) Median interval between first and second last service: 28 months. Median interval between second last and last service: 13 months. Minimum interval between services: 3 months.

(b) Excludes service recipients with missing or not tested hearing loss status.

(c) Hearing loss status was classified as ‘improved’ if a child or young person’s hearing loss status improved between services included for analysis in this study (first and second services and/or second and third services); if there was an improvement between only 2 services, there was no change in hearing loss status between the other 2 services. Improved hearing loss status was defined as a change between audiology services in the following scenarios: (1) from bilateral hearing loss to unilateral hearing loss/no hearing loss; (2) from unilateral hearing loss to no hearing loss.

(d) Hearing loss status was classified as ‘stabilised’ if a child or young person’s hearing loss status was the same in all 3 audiology services included for analysis in this study.

(e) Hearing loss status was classified as ‘fluctuated’ if a child or young person’s hearing loss status differed between services included for analysis in this study without a clear pattern in either improvement or deterioration (that is, if hearing loss status improved between first and second services and deteriorated between second and third services, or vice versa).

(f) Hearing loss status was classified as ‘deteriorated’ if a child or young person’s hearing loss status deteriorated between services included for analysis in this study (first and second services and/or second and third services); if there was a deterioration between only 2 services, there was no change in hearing loss status between the other 2 services. Deteriorated hearing loss status was defined as a change between audiology services in the following scenarios: (1) from no hearing loss to unilateral hearing loss/ bilateral hearing loss; (2) from unilateral hearing loss to bilateral hearing loss.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.10: Proportion of children and young people with hearing loss at first outreach audiology service, second last service and last service (among those who received 3 or more services), by age, August 2007 to June 2016

		First service		Second last service		Last service	
Age group (years)	**Total service recipients**	**Number**	**%**	**Number**	**%**	**Number**	**%**
0–5	828	716	86.5	587	70.9	436	52.7
6–10	704	574	81.5	468	66.5	346	49.1
11–15	207	174	84.1	163	78.7	129	62.3
Total	**1,739**	**1,464**	**84.2**	**1,218**	**70.0**	**911**	**52.4**

Notes

1. Median interval between the first and second last service: 28 months. Median interval between second last and last service: 13 months. Minimum interval: 3 months.
2. Includes Indigenous children and young people who received 3 or more outreach audiology services. Excludes children and young people with missing or not tested responses for hearing status.
3. Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.11: Change in hearing impairment status, children and young people who received at least 3 outreach audiology services[(a)(b)], cohort study, August 2007 to June 2016

	Change in hearing impairment status				
Age (years)	**Improved[(c)]**	**Stabilised[(d)]**	**Fluctuated[(e)]**	**Deteriorated[(f)]**	**Total**
			Number		
0–5	384	190	126	122	822
6–10	222	262	105	115	704
11–15	54	72	39	40	205
Total	**660**	**524**	**270**	**277**	**1,731**
			%		
0–5	46.7	23.1	15.3	14.8	100.0
6–10	31.5	37.2	14.9	16.3	100.0
11–15	26.3	35.1	19.0	19.5	100.0
Total	**38.1**	**30.3**	**15.6**	**16.0**	**100.0**

(a) Median interval between the first and second last service: 27 months. Median interval between the second last and last service: 13 months. Minimum interval between services: 3 months.

(b) Excludes service recipients with missing or not tested hearing impairment.

(c) Hearing impairment status was classified as ‘improved’ if a child or young person’s hearing impairment status improved between services included for analysis in this study (first and second services and/or second and third services); if there was an improvement between only 2 services, there was no change in hearing impairment status between the other 2 services. Improved hearing impairment status was defined as a movement between audiology services to a lower degree of hearing impairment (for example, from profound hearing impairment to severe, moderate or mild hearing impairment).

(d) Hearing impairment status was classified as ‘stabilised’ if a child or young person’s hearing impairment status was the same in all 3 audiology services included for analysis in this study.

(e) Hearing impairment status was classified as ‘fluctuated’ if a child or young person’s hearing impairment status differed between services included for analysis in this study without a clear pattern in either improvement or deterioration (that is, if hearing impairment status improved between the first and second services and deteriorated between the second and third services, or vice versa).

(f) Hearing impairment status was classified as ‘deteriorated’ if a child or young person’s hearing impairment status deteriorated between services included for analysis in this study (first and second services and/or second and third services); if there was a deterioration between only 2 services, there was no change in hearing impairment status between the other 2 services. Deteriorated hearing impairment status was defined as a movement between audiology services to a higher degree of hearing impairment (for example, from mild hearing impairment to moderate, severe or profound hearing impairment).

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.12: Proportion of children and young people with hearing impairment at first outreach audiology service, second last service and last service (among those who received 3 or more services), by age, August 2007 to June 2016

	First service		Second last service		Last service	
Hearing impairment	**Number**	**%**	**Number**	**%**	**Number**	**%**
Age 0–5						
None	217	26.4	421	51.2	542	65.9
Mild	324	39.4	271	33.0	203	24.7
Moderate/severe/profound	255	31.0	108	13.1	70	8.5
Not seen	26	3.2	22	2.7	7	0.9
Total	**822**	**100.0**	**822**	**100.0**	**822**	**100.0**
Age 6–10						
None	334	47.4	450	63.9	504	71.6
Mild	230	32.7	175	24.9	145	20.6
Moderate/severe/profound	112	15.9	58	8.2	37	5.3
Not seen	28	4.0	21	3.0	18	2.6
Total	**704**	**100.0**	**704**	**100.0**	**704**	**100.0**
Age 11–15						
None	102	49.8	124	60.5	139	67.8
Mild	56	27.3	54	26.3	44	21.5
Moderate/severe/profound	38	18.5	20	9.8	17	8.3
Not seen	9	4.4	7	3.4	5	2.4
Total	**205**	**100.0**	**205**	**100.0**	**205**	**100.0**
Total (age 0–15)						
None	653	37.7	995	57.5	1,185	68.5
Mild	610	35.2	500	28.9	392	22.6
Moderate/severe/profound	405	23.4	186	10.7	124	7.2
Not seen	63	3.6	50	2.9	30	1.7
Total	**1,731**	**100.0**	**1,731**	**100.0**	**1,731**	**100.0**

Notes

1. Median interval between the first and second last service: 27 months. Median interval between the second last and last service: 13 months. Minimum interval between services: 3 months.
2. Includes Indigenous children and young people who received 3 or more outreach audiology services, aged 0–20. Excludes those with missing or not tested responses for hearing status.
3. Data are reported only where consent was obtained.

Source: AIHW analysis of Northern Territory outreach audiology data collection (services provided on or before 30 June 2016).

Table F3.13: Number and proportion of children and young people on referral waiting list for outreach audiology services, by Health Service Delivery Area and age group, as at 30 June 2016

	0–15 years		16–20 years		Total	
Health Service Delivery Area	**Number**	**%**	**Number**	**%**	**Number**	**%**
Current referrals[(a)]						
Barkly	19	100.0	0	0.0	19	100.0
Central Australia	84	96.6	3	3.4	87	100.0
East Arnhem	92	94.9	5	5.1	97	100.0
West Arnhem	45	90.0	5	10.0	50	100.0
Katherine	70	93.3	5	6.7	75	100.0
Top End	67	95.7	3	4.3	70	100.0
Interstate	0	0.0	0	0.0	0	100.0
Unknown	0	0.0	0	0.0	0	100.0
Total	**377**	**94.7**	**21**	**5.3**	**398**	**100.0**
Outstanding referrals[(b)]						
Barkly	207	88.1	28	11.9	235	100.0
Central Australia	568	86.6	88	13.4	656	100.0
East Arnhem	403	88.0	55	12.0	458	100.0
West Arnhem	247	93.9	16	6.1	263	100.0
Katherine	420	81.2	97	18.8	517	100.0
Top End	465	86.1	75	13.9	540	100.0
Interstate	22	95.7	1	4.3	23	100.0
Unknown	0	0.0	0	0.0	0	100.0
Total	**2,332**	**86.6**	**360**	**13.4**	**2,692**	**100.0**
Total referrals[(c)]						
Barkly	226	89.0	28	11.0	254	100.0
Central Australia	652	87.8	91	12.2	743	100.0
East Arnhem	495	89.2	60	10.8	555	100.0
West Arnhem	292	93.3	21	6.7	313	100.0
Katherine	490	82.8	102	17.2	592	100.0
Top End	532	87.2	78	12.8	610	100.0
Interstate	22	95.7	1	4.3	23	100.0
Unknown	0	0.0	0	0.0	0	100.0
Total	**2,709**	**87.7**	**381**	**12.3**	**3,090**	**100.0**

(a) Current referrals are those that were not overdue—that is, the time elapsed since the date of referral was not longer than the recommended period, as at 30 June 2016.

(b) Outstanding referrals are those that were overdue—that is, the time elapsed since the date of referral was longer than the recommended period, as at 30 June 2016.

(c) Total referrals are current referrals plus outstanding referrals.

Source: NT DoH, unpublished data.

Table F3.14: Number and proportion of children and young people on referral waiting list for teleotology audiology services, by Health Service Delivery Area and age group, as at 30 June 2016

	0–15 years		16–20 years		Total	
Health Service Delivery Area	**Number**	**%**	**Number**	**%**	**Number**	**%**
Current referrals[(a)]						
Barkly	24	92.3	2	7.7	26	100.0
Central Australia	49	92.5	4	7.5	53	100.0
East Arnhem	50	89.3	6	10.7	56	100.0
West Arnhem	18	81.8	4	18.2	22	100.0
Katherine	85	91.4	8	8.6	93	100.0
Top End	53	88.3	7	11.7	60	100.0
Interstate	0	0.0	0	0.0	0	100.0
Unknown	0	0.0	0	0.0	0	100.0
Total	**279**	**90.0**	**31**	**10.0**	**310**	**100.0**
Outstanding referrals[(b)]						
Barkly	91	70.0	39	30.0	130	100.0
Central Australia	308	72.1	119	27.9	427	100.0
East Arnhem	220	76.7	67	23.3	287	100.0
West Arnhem	85	84.2	16	15.8	101	100.0
Katherine	196	80.3	48	19.7	244	100.0
Top End	270	83.1	55	16.9	325	100.0
Interstate	13	76.5	4	23.5	17	100.0
Unknown	0	0.0	0	0.0	0	100.0
Total	**1,183**	**77.3**	**348**	**22.7**	**1,531**	**100.0**
Total referrals[(c)]						
Barkly	115	73.7	41	26.3	156	100.0
Central Australia	357	74.4	123	25.6	480	100.0
East Arnhem	270	78.7	73	21.3	343	100.0
West Arnhem	103	83.7	20	16.3	123	100.0
Katherine	281	83.4	56	16.6	337	100.0
Top End	323	83.9	62	16.1	385	100.0
Interstate	13	76.5	4	23.5	17	100.0
Unknown	0	0.0	0	0.0	0	100.0
Total	**1,462**	**79.4**	**379**	**20.6**	**1,841**	**100.0**

(a) Current referrals are those that were not overdue—that is, the time elapsed since the date of referral was not longer than the recommended period, as at 30 June 2016.

(b) Outstanding referrals are those that were overdue—that is, the time elapsed since the date of referral was longer than the recommended period, as at 30 June 2016.

(c) Total referrals are current referrals plus outstanding referrals.

Source: NT DoH, unpublished data.

Table F4.1: Children and young people who received ENT teleotology services, by age and sex, 2012–13 to 2015–16

Age (years)[b]	2012–13	2013–14	2014–15	2015–16	Cumulative total[a]
			Number		
0–5	163	206	228	179	498
6–10	309	337	334	331	884
11–15	174	208	236	299	707
16–20	77	86	104	125	319
Sex[c]					
Male	337	386	439	453	1,185
Female	386	451	463	480	1,222
Total	**723**	**837**	**902**	**934**	**2,408**
			%		
0–5	22.5	24.6	25.3	19.2	20.7
6–10	42.7	40.3	37.0	35.4	36.7
11–15	24.1	24.9	26.2	32.0	29.4
16–20	10.7	10.3	11.5	13.4	13.2
Sex[c]					
Male	46.6	46.1	48.7	48.5	49.2
Female	53.4	53.9	51.3	51.4	50.7
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Total includes all children and young people who received ENT services from 1 July 2012 to 30 June 2016. It does not equal the sum of services for the financial years, as data are based on the latest service in the period analysed, and children/young people may have received services in multiple financial years.

(b) Age is based on the latest ENT teleotology service received.

(c) Sex total includes sex missing

Notes

1. Data are reported only where consent was obtained.
2. Services include only those provided through the ENT program.

Source: AIHW analysis of Northern Territory ENT teleotology data collection (services provided on or before 30 June 2016).

Table F4.2: Number of children and young people on referral waiting list for teleotology services, by Health Service Delivery Area and age group, as at 30 June 2016

	0–15 years		16–20 years		Total	
Health Service Delivery Area	**Number**	**%**	**Number**	**%**	**Number**	**%**
Current referrals[(a)]						
Barkly	16	94.1	1	5.9	17	100.0
Central Australia	25	92.6	2	7.4	27	100.0
East Arnhem	44	84.6	8	15.4	52	100.0
West Arnhem	30	88.2	4	11.8	34	100.0
Katherine	77	89.5	9	10.5	86	100.0
Top End	20	90.9	2	9.1	22	100.0
Interstate	0	0.0	0	0.0	0	100.0
Unknown	0	0.0	0	0.0	0	100.0
Total	**212**	**89.1**	**26**	**10.9**	**238**	**100.0**
Outstanding referrals[(b)]						
Barkly	147	75.0	49	25.0	196	100.0
Central Australia	460	74.8	155	25.2	615	100.0
East Arnhem	301	77.0	90	23.0	391	100.0
West Arnhem	117	81.2	27	18.8	144	100.0
Katherine	278	81.5	63	18.5	341	100.0
Top End	430	83.5	85	16.5	515	100.0
Interstate	18	81.8	4	18.2	22	100.0
Unknown	0	0.0	0	0.0	0	100.0
Total	**1,751**	**78.7**	**473**	**21.3**	**2,224**	**100.0**
Total referrals[(c)]						
Barkly	163	76.5	50	23.5	213	100.0
Central Australia	485	75.5	157	24.5	642	100.0
East Arnhem	345	77.9	98	22.1	443	100.0
West Arnhem	147	82.6	31	17.4	178	100.0
Katherine	355	83.1	72	16.9	427	100.0
Top End	450	83.8	87	16.2	537	100.0
Interstate	18	81.8	4	18.2	22	100.0
Unknown	0	0.0	0	0.0	0	100.0
Total	**1,963**	**80.0**	**499**	**20.0**	**2,462**	**100.0**

(a) Current referrals are those that were not overdue—that is, the time elapsed since the date of referral was not longer than the recommended period, as at 30 June 2016.

(b) Outstanding referrals are those that were overdue—that is, the time elapsed since the date of referral was longer than the recommended period, as at 30 June 2016.

(c) Total referrals are current referrals plus outstanding referrals.

Source: NT DoH, unpublished data.

Table F5.1: Number of Indigenous children in the CNS program, by sex and hearing health priority category, 2012–13 to 2015–16

	2012–13[(a)]	2013–14	2014–15[(a)]	2015–16	Cumulative total[(b)]
			Number		
Sex					
Male	91	144	251	501	833
Female	103	142	234	457	778
Priority listing[(c)]					
HP1	16	22	23	40	100
HP2	59	88	132	194	401
HP3	88	131	210	350	601
HP4	29	45	119	374	507
Total	**194**	**286**	**485**	**958**	**1,611**
			%		
Sex					
Male	46.9	50.3	51.8	52.3	51.7
Female	53.1	49.7	48.2	47.7	48.3
Priority listing[(c)]					
HP1	8.2	7.7	4.7	4.2	6.2
HP2	30.4	30.8	27.4	20.3	24.9
HP3	45.4	45.8	43.3	36.5	37.3
HP4	14.9	15.7	24.5	39.0	31.5
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) Some numbers are slightly different from those in previous publications due to data cleaning.

(b) Total includes all children who received CNS services from 1 July 2012 to 30 June 2016. It does not equal the sum of services for the financial years, as data are based on the first service in the period analysed, and children may have received services in multiple financial years.

(c) Hearing health priority listing status at first visit. See Box 6.1 for definitions of categories.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of CNS data collection (services provided on or before 30 June 2016).

Table F5.2: Type of clinical services provided at CNS visits, 2012–13 to 2015–16

	2012–13		2013–14		2014–15[(a)]		2015–16	
Clinical services	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Discussed ear health education	193	96.0	302	98.1	503	94.7	830	79.5
Verified diagnosis[(b)]	171	85.1	282	91.6	371	69.9	. .	. .
Discussed hearing loss strategies	157	78.1	273	88.6	366	68.9	382	36.6
Supported audiological management	151	75.1	270	87.7	394	74.2	713	68.3
Confirmed regular follow-up and care plan[(b)]	157	78.1	226	73.4	301	56.7	. .	. .
Discussed treatment adherence strategies	111	55.2	174	56.5	257	48.4	253	24.2
Verified or amended treatment[(b)]	93	46.3	153	49.7	199	37.5	. .	. .
Supported ENT management[(b)]	66	32.8	131	42.5	150	28.2	. .	. .
Follow-up care initiated by CNS[(c)]	. .	. .	. .	. .	. .	. .	176	16.9
Vaccination status checked[(c)]	. .	. .	. .	. .	. .	. .	422	40.4
Total visits[(d)]	**201**	**100.0**	**308**	**100.0**	**531**	**100.0**	**1,044**	**100.0**

(a) Some numbers are slightly different from those in previous publications due to data cleaning.

(b) In 2015–16, the CNS data collection form changed to reflect a shift in the focus of the program; this type of clinical service was removed from the new version of the form, and therefore is not applicable for 2015–16.

(c) In 2015–16, the CNS data collection form changed to reflect a shift in the focus of the program; this type of clinical service was added to the new version of the form, and therefore is only applicable for 2015–16.

(d) Children can be provided with multiple services; therefore, the columns may sum to more than 100%.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of CNS data collection (services provided on or before 30 June 2016).

Table F5.3: Contact made with other service providers at CNS visits, and presence of interpreter at service, 2012–13 to 2015–16

	2012–13		2013–14		2014–15[(a)]		2015–16	
Service providers	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Health providers	103	51.2	203	65.9	338	63.7	201	19.3
Education providers	77	38.3	183	59.4	224	42.2	200	19.2
Australian Hearing[(b)]	20	10.0	62	20.1	58	10.9	. .	. .
Community-based workers	12	6.0	53	17.2	55	10.4	7	0.7
FaFT[(c)]	. .	. .	. .	. .	. .	0.2	63	6.0
Other services	3	1.5	4	1.3	14	2.6	18	1.7
Interpreter present[(c)(d)]	. .	. .	. .	. .	. .	. .	218	20.9
Total visits[(e)]	**201**	**100.0**	**308**	**100.0**	**531**	**100.0**	**1,044**	**100.0**

(a) Some numbers are slightly different from those in previous publications due to data cleaning.

(b) In 2015–16, the CNS data collection form changed to reflect a shift in the focus of the program; this type of service provider was removed from the new version of the form, and therefore is not applicable for 2015–16.

(c) In 2015–16, the CNS data collection form changed to reflect a shift in the focus of the program; this type of service provider was added to the new version of the form, and therefore is only applicable for 2015–16.

(d) 'Interpreter present' refers to the presence of an interpreter during CNS services.

(e) Multiple types of service providers can be contacted by CNS at visits; therefore, the total may not equal the sum of the column.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of CNS data collection (services provided on or before 30 June 2016).

Table F5.4: Type of ear condition, children in the CNS program who received CNS services, 2012–13 to 2015–16

	2012–13		2013–14		2014–15[(a)]		2015–16	
Type of ear condition[(b)]	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
At least 1 type of ear condition	188	96.9	259	90.6	413	85.3	592	61.8
OME	77	39.7	143	50.0	199	41.0	272	28.4
ETD	14	7.2	36	12.6	63	13.0	167	17.4
CSOM with discharge	45	23.2	60	21.0	84	17.3	110	11.5
CSOM without discharge	29	14.9	28	9.8	69	14.2	87	9.1
AOM	41	21.1	40	14.0	51	10.5	72	7.5
AOM with perforation	21	10.8	10	3.5	14	2.9	31	3.2
No ear condition[(c)]	6	3.1	27	9.4	68	14.0	231	24.1
Total children[(d)]	**194**	**100.0**	**286**	**100.0**	**485**	**100.0**	**958**	**100.0**

(a) Some numbers are slightly different from those in previous publications due to data cleaning.

(b) Ear condition at first visit.

(c) No ear condition reported for both ears.

(d) Children can be provided with multiple services; therefore, the columns may sum to more than 100%.

Note: Data are reported only for children where consent was obtained.

Source: AIHW analysis of CNS data collection (services provided on or before 30 June 2016).

Table F5.5: Hearing loss status[(a)], Indigenous children in the CNS and audiology programs[(b)], 2012–13 to 2015–16

	2012–13		2013–14		2014–15		2015–16	
Hearing loss status	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Hearing loss[(c)]	92	71.9	130	68.1	229	67.2	393	58.1
Unilateral	25	19.5	33	17.3	50	14.7	90	13.3
Bilateral	67	52.3	97	50.8	179	52.5	303	44.8
No hearing loss	36	28.1	61	31.9	112	32.8	284	41.9
Total children	**128**	**100.0**	**191**	**100.0**	**341**	**100.0**	**677**	**100.0**

(a) Based on hearing loss status at last audiology service.

(b) Children who received both CNS and outreach audiology services.

(c) Total children with unilateral and bilateral hearing loss.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of CNS data collection (services provided on or before 30 June 2016).

Table F5.6: Degree of hearing impairment[(a)], Indigenous children in the CNS and audiology programs[(b)], 2012–13 to 2015–16

	2012–13		2013–14		2014–15		2015–16	
Degree of hearing impairment	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
No hearing impairment	25	19.5	34	17.7	54	15.7	93	13.4
Hearing impairment	64	50.0	95	49.5	170	49.4	299	43.2
Mild	40	31.3	55	28.6	121	35.2	186	26.9
Moderate/severe/profound	24	18.8	40	20.8	49	14.2	113	16.3
Missing[(c)]	2	1.6	1	0.5	4	1.2	6	0.9
Total children with hearing loss	91	71.1	130	67.7	228	66.3	398	57.5
Children without hearing loss	37	28.9	62	32.3	116	33.7	294	42.5
Total children tested for hearing loss[(d)]	**128**	**100.0**	**192**	**100.0**	**344**	**100.0**	**692**	**100.0**

(a) Based on hearing status at last audiology service.

(b) Children who received both CNS and audiology services.

(c) 'Missing' includes not stated, unsure, invalid and not tested responses.

(d) Some children may not be tested because they may find it difficult to cooperate with the procedure.

Note: Data are reported only for children where consent was obtained.

Source: AIHW analysis of CNS data collection (services provided on or before 30 June 2016).

Table F6.1: Sex by type of ear condition[(a)] among children and young people[(b)] who received an audiology or ENT service, 2015–16

	Sex					
	Male		Female		Total	
Type of ear condition	**Number**	**%**	**Number**	**%**	**Number**	**%**
At least 1 type of ear condition	653	66.0	676	66.3	1,329	66.2
OME	221	22.3	232	22.7	453	22.5
ETD	169	17.1	155	15.2	324	16.1
CSOM with discharge	113	11.4	106	10.4	219	10.9
CSOM without discharge	131	13.2	138	13.5	269	13.4
AOM	52	5.3	54	5.3	106	5.3
Foreign body/other	138	14.0	175	17.2	313	15.6
No ear condition[(c)]	336	34.0	344	33.7	680	33.8
Total children who received an ENT or audiology service	**989**	**100.0**	**1,020**	**100.0**	**2,009**	**100.0**

(a) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses ear condition diagnosed at most recent ENT service or, if only audiology service received, most recent audiology service. If the most recent ENT and audiology service was on the same date, diagnosis of ear condition at ENT consultation was used.

(b) Excludes children with an unknown or invalid HRN.

(c) No ear condition was reported in both right and left ears.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

Table F6.2: Type of ear condition[(a)], children and young people[(b)] who received an audiology or ENT service, 2012–13 to 2015–16

	2012–13	2013–14	2014–15	2015–16
		Number		
At least 1 type of ear condition	1,119	1,208	1,538	1,330
OME	371	428	575	453
ETD	255	277	354	324
CSOM with discharge	205	260	253	219
CSOM without discharge	208	201	313	270
AOM	124	108	125	106
Foreign body/other	264	240	307	313
No ear condition(c)	583	585	880	680
Total children who received an ENT or audiology service	1,702	1,793	2,418	2,010
		%		
At least 1 type of ear condition	65.7	67.4	63.6	66.2
OME	21.8	23.9	23.8	22.5
ETD	15.0	15.4	14.6	16.1
CSOM with discharge	12.0	14.5	10.5	10.9
CSOM without discharge	12.2	11.2	12.9	13.4
AOM	7.3	6.0	5.2	5.3
Foreign body/other	15.5	13.4	12.7	15.6
No ear condition(c)	34.3	32.6	36.4	33.8
Total children who received an ENT or audiology service	**100.0**	**100.0**	**100.0**	**100.0**

(a) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses ear condition diagnosed at most recent ENT service or, if only audiology service received, most recent audiology service. If the most recent ENT and audiology service was on the same date, diagnosis of ear condition at ENT consultation was used.

(b) Excludes children with an unknown or invalid HRN.

(c) No ear condition was reported in both right and left ears.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

Table F6.3: Age group by type of ear condition[(a)] among children and young people[(b)] who received an audiology or ENT service, 2015–16

	Age group (years)											
	0–2		3–5		6–10		11–15		16–20		Total	
Type of ear condition	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
At least 1 type of ear condition	156	71.9	360	77.8	451	67.9	270	56.1	92	50.0	1,330	66.2
OME	73	33.6	155	33.5	151	22.7	58	12.1	15	8.2	452	22.5
ETD	33	15.2	110	23.8	126	19.0	48	10.0	7	3.8	324	16.1
CSOM with discharge	24	11.1	72	15.6	69	10.4	41	8.5	13	7.1	219	10.9
CSOM without discharge	10	4.6	53	11.4	95	14.3	75	15.6	37	20.1	270	13.4
AOM	44	20.3	37	8.0	17	2.6	7	1.5	1	0.5	106	5.3
Foreign body/other	17	7.8	32	6.9	122	18.4	102	21.2	40	21.7	313	15.6
No ear condition[(c)]	61	28.1	103	22.2	213	32.1	211	43.9	92	50.0	680	33.8
Total children who received an ENT or audiology service	**217**	**100.0**	**463**	**100.0**	**664**	**100.0**	**481**	**100.0**	**184**	**100.0**	**2,010**	**100.0**

(a) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses ear condition diagnosed at most recent ENT service or, if only audiology service received, most recent audiology service. If the most recent ENT and audiology service was on the same date, diagnosis of ear condition at ENT consultation was used.

(b) Excludes children with an unknown or invalid HRN.

(c) No ear condition reported for both right and left ears.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleolotogy data collections (services provided on or before 30 June 2016).

Table F6.4: Ear condition[(a)] by hearing loss status[(b)], 2015–16

	Hearing loss status					
Type of ear condition	**No hearing loss**	**Bilateral**	**Unilateral**	**Subtotal of hearing loss**	**Missing[(c)(d)]**	**Total**
At least 1 type of ear condition	25.9	43.9	22.4	66.3	7.7	100.0
OME	13.7	59.4	18.8	78.1	8.2	100.0
ETD	36.1	34.3	21.9	56.2	7.7	100.0
CSOM with discharge	7.8	61.2	25.6	86.8	5.5	100.0
CSOM without discharge	17.0	42.6	34.8	77.4	5.6	100.0
AOM	8.5	57.5	13.2	70.8	20.8	100.0
Foreign body/other[(e)]	45.0	27.5	21.4	48.9	6.1	100.0
No ear condition[(f)]	78.4	7.5	6.2	13.7	7.9	100.0
Total service recipients[(g)]	**43.7**	**31.6**	**16.9**	**48.5**	**7.8**	**100.0**

(a) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses ear condition diagnosed at most recent ENT service or, if only audiology service received, most recent audiology service. If most recent ENT and audiology service was on the same date, diagnosis of ear condition at ENT consultation was used.

(b) Excludes children with an unknown or invalid HRN.

(c) Missing includes not stated, unsure, invalid and not tested responses.

(d) As hearing loss status was derived from audiology data, where a child received only an ENT service (that is, no audiology service received), then hearing loss status was coded as missing.

(e) 'Other' includes grommets, reduced ear drum movement or retracted ear drum, or other ear condition.

(f) Where no ear condition is reported for both ears.

(g) Total children who received an ENT or audiology service.

Note: Data are provided only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

Table F6.5: Presence of ear condition[(a)] by hearing loss status among children and young people with at least 1 type of ear condition[(b)], 2012–13 to 2015–16 (%)

	Hearing loss status					
Year	**No hearing loss**	**Bilateral**	**Unilateral**	**Subtotal of hearing loss**	**Missing[(c)(d)]**	**Total[(e)]**
2012–13	19.2	38.8	20.0	58.8	22.0	100.0
2013–14	18.9	43.9	24.3	68.1	13.0	100.0
2014–15	24.4	43.2	22.0	65.2	10.4	100.0
2015–16	**25.9**	**43.9**	**22.4**	**66.3**	**7.7**	**100.0**

(a) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses ear condition diagnosed at most recent ENT service or, if only audiology service received, most recent audiology service. If most recent ENT and audiology service was on the same date, diagnosis of ear condition at ENT consultation was used.

(b) Excludes children with an unknown or invalid HRN.

(c) 'Missing' includes not stated, unsure, invalid and not tested responses.

(d) As hearing loss status was derived from audiology data, where a child received only an ENT service (that is, no audiology service received), then hearing loss status was coded as missing.

(e) Total children who received an ENT or audiology service.

Note: Data are provided only where consent was obtained

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

Table F6.6: Ear condition[(a)] by degree of hearing impairment[(b)], 2015–16 (%)

		Degree of hearing impairment					
Type of ear condition	**No hearing impairment**	**Mild**	**Moderate**	**Severe profound**	**Subtotal of hearing impairment**	**Missing[(c)(d)]**	**Total**
At least 1 type of ear condition	48.9	29.5	12.9	0.2	42.6	8.5	100.0
OME	32.9	40.6	17.2	—	57.8	9.3	100.0
ETD	58.0	29.9	4.0	—	34.0	8.0	100.0
CSOM with discharge	34.2	37.0	21.5	0.5	58.9	6.8	100.0
CSOM without discharge	52.6	27.0	13.7	—	40.7	6.7	100.0
AOM	21.7	32.1	23.6	—	55.7	22.6	100.0
Foreign body/other[(e)]	67.1	20.8	4.8	0.6	26.2	6.7	100.0
No ear condition[(f)]	84.6	5.3	2.1	0.0	7.4	8.1	100.0
Total service recipients[(g)]	**60.9**	**21.3**	**9.2**	**0.1**	**30.7**	**8.4**	**100.0**

(a) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses ear condition diagnosed at most recent ENT service or, if only audiology service received, most recent audiology service. If most recent ENT and audiology service were on the same date, diagnosis of ear condition at ENT consultation was used.

(b) Excludes children with an unknown or invalid HRN.

(c) 'Missing' includes not stated, unsure, invalid and not tested responses.

(d) As hearing loss status was derived from audiology data, where a child received only an ENT service (that is, no audiology service received), then hearing loss status was coded as missing.

(e) 'Other' includes grommets, reduced ear drum movement or retracted ear drum, or other ear condition.

(f) Where no ear condition reported for both ears.

(g) Total children who received an ENT or audiology service.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

Table F6.7: Presence of ear condition[(a)] by degree of hearing impairment among children and young people with at least 1 type of ear condition[(b)], 2012–13 to 2015–16 (%)

		Degree of hearing impairment					
Year	**No hearing impairment**	**Mild**	**Moderate**	**Severe/profound**	**Subtotal of hearing impairment**	**Missing[(c)(d)]**	**Total[(e)]**
			Recipients with at least 1 type of ear condition				
2012–13	43.6	28.7	13.0	0.5	42.3	14.1	100.0
2013–14	45.4	30.2	13.0	0.5	43.7	10.8	100.0
2014–15	48.8	28.5	12.0	0.2	40.7	10.5	100.0
2015–16	48.9	29.5	12.9	0.2	42.6	8.5	100.0

(a) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses ear condition diagnosed at most recent ENT service or, if only audiology service received, most recent audiology service. If most recent ENT and audiology service were on the same date, diagnosis of ear condition at ENT consultation was used.

(b) Excludes children with an unknown or invalid HRN.

(c) 'Missing' includes not stated, unsure, invalid and not tested responses.

(d) As hearing loss status was derived from audiology data, where a child received only an ENT service (that is, no audiology service received), then hearing loss status was coded as missing.

(e) Total children who received an ENT or audiology service.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

Table F6.8: Change in prevalence of ear conditions between the first and last hearing health (ENT or audiology) service[(a)(b)], July 2012 to June 2016

	First service		Last service			
Type of ear condition	**Number**	**% (x)**	**Number**	**% (y)**	**% change (y–x)/x**	**Percentage point difference (y–x)**
At least 1 type of ear condition	1,631	82.4	1,492	75.4	–8.5	–7.0
Otitis media[(c)]	1,350	68.2	1,025	51.8	–24.1	–16.4
OME	661	33.4	482	24.4	–27.1	–9.0
CSOM with discharge	376	19.0	276	13.9	–26.6	–5.1
CSOM without discharge	305	15.4	310	15.7	1.6	0.3
AOM	199	10.1	80	4.0	–59.8	–6.0
ETD	272	13.7	349	17.6	28.3	3.9
Foreign body	27	1.4	10	0.5	–63.0	–0.9
Other[(d)]	203	10.3	373	18.8	83.7	8.6
No ear condition[(e)]	490	24.8	629	31.8	28.4	7.0
Total service recipients[(f)]	**2,121**	**107.2**	**2,121**	**107.2**	. .	. .

(a) Median time between the first and last service: 19 months. Minimum time interval: 3 months.

(b) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses ear condition diagnosed at ENT service or, if only audiology service received, audiology service. If ENT and audiology service were on the same date, diagnosis of ear condition at ENT consultation was used. Excludes children with missing response for middle ear condition.

(c) Otitis media includes OME, CSOM with discharge, CSOM without discharge and AOM.

(d) 'Other' includes grommets, reduced ear drum movement or retracted ear drum, or other ear condition.

(e) Where no ear condition was reported for both right and left ears.

(f) The sum of the columns may be greater than 100% as service recipients may have more than 1 ear condition.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

Table F6.9: Children and young people with otitis media[(a)] at first hearing health outreach service, second last service and last service (among those who received 3 or more services)[(b)(c)(d)], by age, August 2007 to June 2016

		First service		Second last service		Last service	
Age group (years)	**Total service recipients**	**Number**	**%**	**Number**	**%**	**Number**	**%**
0–5	1,196	916	76.6	780	65.2	585	48.9
6–10	758	603	79.6	443	58.4	350	46.2
11–15	243	198	81.5	168	69.1	133	54.7
Total	**2,197**	**1,717**	**78.2**	**1,391**	**63.3**	**1,068**	**48.6**

(a) 'Otitis media' includes OME, CSOM with discharge, CSOM without discharge and AOM.

(b) Includes Indigenous children and young people who received 3 or more outreach audiology or ENT teleotology services with a minimum interval between the first and last service of 6 months, and with a minimum of 3 months between the first and second last services and 3 months between the second last and last services.

(c) Median interval between the first and second services: 27 months. Median interval between the second last and last services: 13 months.

(d) Compiled using linked ENT teleotology and audiology data collections based on HRN. Uses middle ear condition diagnosed at ENT service or, if only audiology service received, audiology service. If ENT and audiology service were on the same date, diagnosis of middle ear condition at ENT consultation was used. Excludes children with missing response for middle ear condition.

Note: Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided on or before 30 June 2016).

Table F6.10: Progress of children and young people with middle ear conditions between the initial and last service, August 2007 to June 2016

	Condition at initial service[(a)]			
	CSOM with discharge		CSOM without discharge	
Condition at last service	**Number**	**%**	**Number**	**%**
CSOM with discharge	216	32.0	137	16.7
CSOM without discharge	201	29.8	288	35.2
OME	40	5.9	51	6.2
AOM	21	3.1	10	1.2
Other conditions	45	6.7	52	6.4
No ear condition[(b)]	174	25.8	288	35.2
Unsure	7	1.0	13	1.6
Total[(c)]	**674**	**100.0**	**818**	**100.0**

(a) 'Initial service' is the initial service at which a child or young person was diagnosed with CSOM with discharge or CSOM without discharge, which is not necessarily the service recipient's first audiology or ENT service.

(b) No ear condition was reported for both right and left ears.

(c) The total may be greater than 100% as service recipients may have more than 1 ear condition.

Notes

1. Minimum interval between the initial and last services: 3 months. Median interval: 40 months. Maximum interval: 96 months.
2. For the last service, if children and young people received 2 services on the same day (that is, 1 ENT and 1 audiology service), the ENT diagnosis was selected for analysis.
3. Data are reported only where consent was obtained.

Source: AIHW analysis of hearing health outreach audiology and ENT teleotology data collections (services provided between 1 August 2007 and 30 June 2016).

Glossary

acute otitis media: The general term for both acute otitis media without perforation and acute otitis media with perforation. It is the presence of fluid behind the eardrum plus at least one of the following: bulging eardrum, red eardrum, recent discharge of pus, fever, ear pain or irritability. A bulging eardrum, recent discharge of pus, and ear pain are the most reliable indicators of acute otitis media.

adenoidectomy: Surgical removal of adenoids.

audiometry/ pure tone audiometry: The standard technique of testing hearing ability. Pure tone audiometry records a subjective response to threshold (softest) sound stimuli presented through headphone, bone conductor or speaker at discrete frequencies essential to detect and discriminate speech. Any response deviation from the normal range, at any sound stimuli, in either ear, is described as a hearing loss and the type of hearing loss is diagnosed.

aural toilet: A procedure where an ear, nose and throat surgeon clears wax, debris or foreign bodies from the ear canal. It is often used in treating patients with recurrent infections of the ear canal.

bilateral hearing loss: Hearing loss in both ears.

chronic suppurative otitis media (CSOM) with discharge: A persistent suppuratives (see **suppurative**) discharge from the middle ear through a tympanic membrane (ear drum) perforation for more than 6 weeks. Importantly, the diagnosis of CSOM with discharge is appropriate only if the tympanic membrane perforation is seen and if it is large enough to allow the discharge to flow out of the middle ear space.

chronic suppurative otitis media without discharge: The presence of a perforation (hole) in the eardrum without evidence of discharge or fluid behind the eardrum. It is also known as inactive chronic supperative otitis media, and as dry perforation.

conductive hearing loss: Describes a deviation of hearing threshold from normal range associated with reduced conduction of sound through the outer ear, tympanic membrane (eardrum) or middle ear, including ossicles (middle ear bones).

Eustachian tube dysfunction: Negative middle ear pressure associated with compromised equalisation impeding middle ear function and sometimes causing middle ear fluid accumulation.

examination under anaesthetic: Examination of a person's ear(s) while under anaesthetic.

grommet: A small tube surgically placed across the eardrum to re-establish ventilation to the middle ear. It is also called 'ventilation tube', 'pressure equalisation (PE) tube', or a 'tympanostomy tube'.

hearing: The sense for perceiving sounds; includes regions within the brain where the signals are received and interpreted.

hearing impairment: Describes the degree of impairment associated with hearing loss in the 'better hearing ear', using a scale of mild, moderate, severe and profound. It is based on degree of deviation from normal thresholds in the 'better ear', calculated as a 3-frequency average of the threshold of hearing (in dB HL)—500 Hz, 1000 Hz and 2000 Hz.

hearing loss: Any hearing threshold response (using audiometry) (see **audiometry**) outside the normal range, at any sound stimuli, in either ear. Hearing loss in a population describes the number of people who have abnormal hearing. Hearing loss may affect one ear (unilateral) or both ears (bilateral).

mild hearing impairment: On average, the quietest sounds that people can hear with their better ear are between 16–30 dB HL in soundproof conditions and 26–35 dB HL in non-soundproof conditions. These people are able to hear and repeat words spoken in normal voice at 1 metre. Counselling and hearing aids may be needed.

mixed hearing loss: Hearing loss that has conductive (see **conductive hearing loss**) and sensorineural (see **sensorineural hearing loss**) components combined.

moderate hearing impairment: On average, the quietest sounds that people can hear with their better ear are between 31–60 dB HL in soundproof conditions and 36–60 dB HL in non-soundproof conditions. These people are able to hear and repeat words spoken in raised voice at 1 metre and have difficulty keeping up with conversations without using a hearing aid.

myringoplasty: The repair of a perforation of the tympanic membrane (ear drum).

otitis media: All forms of inflammation and infection of the middle ear. Active inflammation or infection is nearly always associated with a middle ear effusion (fluid in the middle ear space).

otitis media with effusion (OME): The presence of an intact eardrum and middle ear fluid without symptoms or signs of acute infection. Other terms used to describe OME include 'glue ear', 'serious otitis media' and 'secretory otitis media'. OME may be episodic or persistent.

profound hearing impairment: On average, the quietest sounds that people can hear with their better ear are 91+ dB HL either in soundproof conditions or non-soundproof conditions. These people are unable to hear and understand even a shouted voice. Hearing aids may help in understanding words. Additional rehabilitation is needed, and cochlear implants, lip-reading and sometimes signing are essential.

sensorineural hearing loss: A deviation of hearing threshold from the normal range, attributable to problems in the inner ear or vestibulocochlear nerve.

severe hearing impairment: On average, the quietest sounds that people can hear with their better ear are between 61–90 dB HL either in soundproof conditions or non-soundproof conditions. These people are able to hear some words when shouted into the better ear. Hearing aids are needed. If no hearing aids are available, lip-reading and signing may be necessary.

suppurative: Describes pus produced in response to inflammatory bacterial infections.

teleotology: Method of offsite service delivery whereby specialists assess middle ear function, diagnose middle ear conditions and recommend further actions and treatment based on information provided to them electronically by an audiologist or an ENT nurse consultant.

tympanometry: An examination to test the condition of the middle ear and mobility of the eardrum and the conduction bones. It is an objective test of middle ear function and provides a measure of energy transmission through the middle ear.

unilateral hearing loss: Hearing loss in one ear.

visual reinforced observation audiometry: A hearing assessment technique (using specialised sound field facilities) that is appropriate for smaller children and babies aged 9–36 months). When able to sit and turn their heads independently, children can be conditioned to repeatedly and reliably respond to frequency-specific warble tones, presented via speaker, headphone or bone conductor. This conditioned response is reinforced with a visual reward (puppet) to obtain threshold (softest) measures. Results obtained via speaker (standard test) do not provide separate ear information but determine adequacy of hearing for speech and language development and reflect the better ear.

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Related publications

The following AIHW publications on CHCI(CtG), SFNT and NTRAI hearing health programs may be of interest:

- AIHW 2010 (Australian Institute of Health and Welfare). Health and wellbeing of young Australians: indicator framework and key national indicators. Bulletin no. 77. Cat. no. AUS 123. Canberra: AIHW.
- AIHW 2011. Ear and hearing health of Aboriginal and Torres Strait Islander children in the Northern Territory. Cat. no. IHW 60. Canberra: AIHW.
- AIHW 2012. Northern Territory Emergency Response Child Health Check Initiative—follow-up services for oral and ear health: final report, 2007–2012. Cat. no. DEN 223. Canberra: AIHW.
- AIHW 2014. Stronger Futures in the Northern Territory: hearing health services 2012–2013. Cat. no. IHW 117. Canberra: AIHW.
- AIHW 2015. Hearing health outreach services to Indigenous children and young people in the Northern Territory: 2012–13 and 2013–14. Cat. no. IHW 149. Canberra: AIHW.
- AIHW 2015. Hearing health outreach services to Aboriginal and Torres Strait Islander children and young people in the Northern Territory: 2012–13 to 2014–15. Cat. no. IHW 163. Canberra: AIHW.

These reports can be downloaded for free from the AIHW website <http://www.aihw.gov.au/publications>. The website also includes information on ordering printed copies.

This report presents data on the Indigenous children and young people who participated in the audiology, ear, nose and throat (ENT) teleotology and Clinical Nurse Specialist (CNS) services delivered under the National Partnership Agreement on Northern Territory Remote Aboriginal Investment.

During 2012–16, 9,221 outreach audiology services were provided to 5,357 children and young people, and 3,799 ENT teleotology services to 2,434 children and young people. A total of 2,612 children participated in the CNS services and presented for 3,085 visits. Of the children and young people who received audiology services in 2015–16, 31% had a hearing impairment.