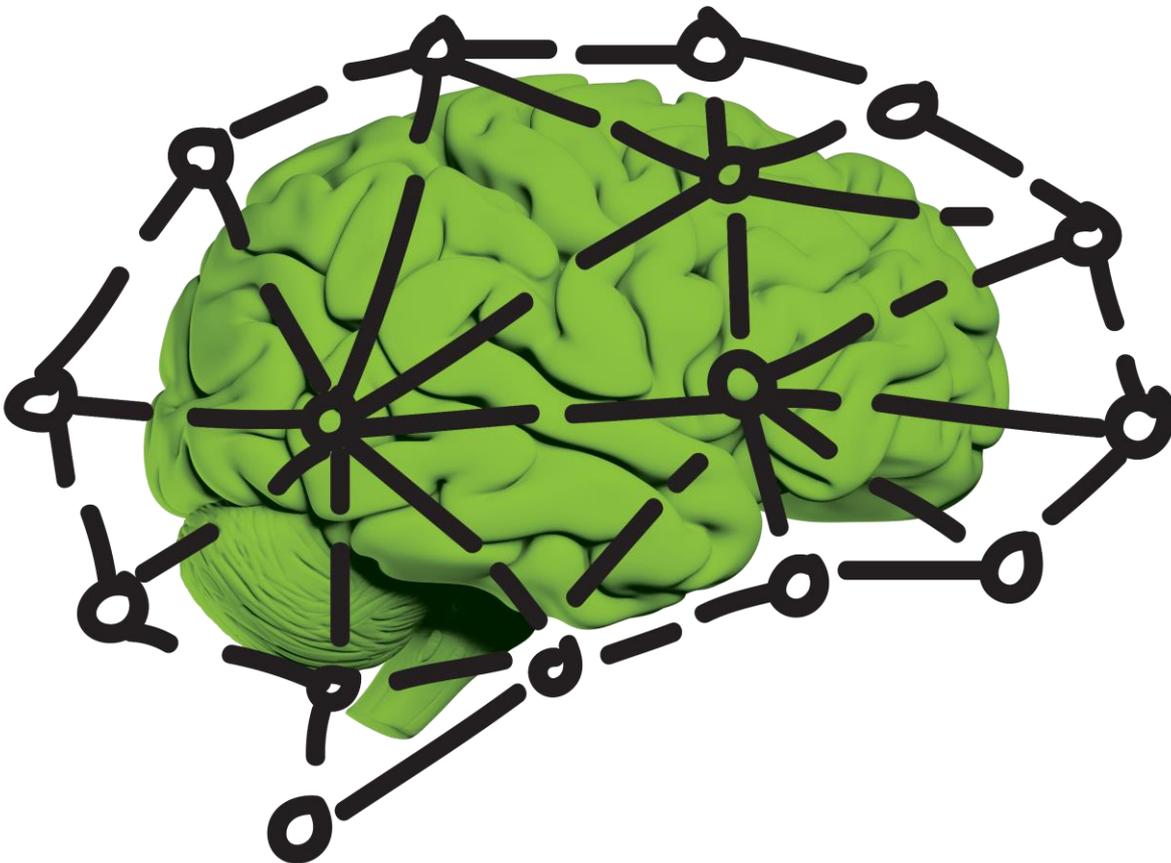




Workplace Planning and Talent Development Branch



Audiology Horizons Scanning and Scenario Generation Report



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1 Executive Summary

Audiologists are allied health professionals who are experts in hearing loss and balance disorders. They specialise in providing auditory tests that measure hearing and neural function, vestibular function, and test for tinnitus. Audiologists are also qualified to recommend, test, and fit for hearing assistive technology and can provide counselling and preventative care to patients where needed. In an era where hearing loss is becoming a common phenomenon, audiology is a truly specialised and essential workforce.

The Audiology Horizons Scanning and Scenario Generation project is driven by the NSW Health Professionals Workforce Plan 2012-22 (the Plan), which sets out the framework for addressing the workforce implications of increasing demand for health services in NSW.

To explore the potential of the audiology workforce, it is important to understand and validate the current and future demand and supply drivers. The literature review and stakeholder engagement identified and validated several high-level factors which are described below

Figure 1: Demand Drivers

| Driver | Description |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Changing demographics | Incidence of complex, chronic disease based on an ageing population, population growth and changing demographics |
| Closing the gap on Aboriginal hearing and ear health | Incidence rates of Aboriginal hearing and ear health and ways to address the gap on aboriginal hearing and ear health needs |
| Service and referral pathways | The referral pathways and expectations for accessing audiology services |
| Awareness of the profession | Patient and professional awareness of audiology services based on consumer expectations, knowledge, and perceptions |
| Service coverage and accessibility | The coverage and accessibility of audiology services based on geographic (particularly rural) distribution as well as specific population groups (CALD, Aboriginal people) |
| Government Initiatives/Policy | Impact on audiology services from research, government funding, and State/Commonwealth policy |





Figure 2: Supply Drivers

| Driver | Description |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Profile of the profession | Professional voice, image, and representation of the audiology profession |
| Workforce retention in rural and remote areas | Workforce retention of audiologists based on geographic location |
| Workforce planning | Aligning the needs and priorities of the system with those of its workforce, and appropriate planning |
| Graduate numbers and availability of positions | Ensuring that adequate numbers of graduates are available to meet demand and that clinical placements are available to support students learning |
| Aboriginal representation in the workforce | Recruitment and retention of Aboriginal people within the audiology workforce |
| Funding of roles | Funding of public sector audiology positions and activities |

In addition to understanding the factors that currently influence the audiology workforce, this work explored the opportunities that may be available to the workforce in the future, and the challenges that they may have to face. These have been identified as the following:

Challenges

- Awareness of the profession on the future workforce
- Recruitment and retention of audiologists
- Private and public career considerations
- Access to comprehensive data on the workforce and drivers of demand
- Rural and remote service accessibility and availability of audiology services

Opportunities

- Role of emerging technology on the future workforce
- Potential for private-public partnerships
- Better supporting the needs of the Aboriginal and Torres Strait Islander communities
- Extended scope of practice for audiologists
- Growing awareness of the audiology profession
- Establishment of an audiology working group/community of interest for NSW





2 Introduction

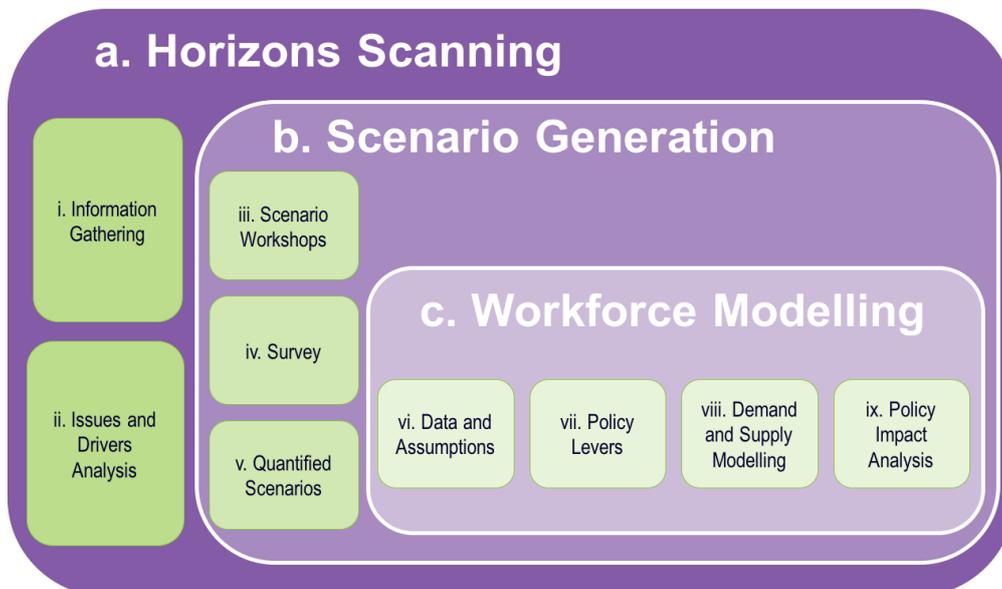
The Audiology Horizons Scanning and Scenario Generation project is driven by the NSW Health Professionals Workforce Plan 2012-22 (the Plan), which sets out the framework for addressing the workforce implications of increasing demand for health services in NSW. The Plan establishes that workforce planning requires consideration of changing workforce practices and the emergence of more efficient and effective, but increasingly more complex, models of care. It also specifies that the Workforce Planning and Talent Development Branch (WPTD) is responsible for developing and modelling projections for the Allied Health workforce in line with forecast health service delivery requirements.

The Horizons Scanning and Scenario Generation Project offered an opportunity for stakeholders in the Audiology workforce to participate in the development of a short, medium, and long-term vision for their field. In developing this vision, several system-wide influencing factors require consideration, including (but not limited to):

- An increasing focus on early intervention and prevention models of care
- An emphasis on collaborative, multidisciplinary teams across care to address the increased demand for care, particularly amongst patients with complex, long-term conditions and the ageing population
- A need to consider the geographic distribution of workforce to align with changing population demographics and health needs
- The impacts of advancements in technology on the audiology workforce, how technology supports their role, its capabilities and challenges with access, and the overarching state-wide strategies
- Broader NSW-wide and national programs of work including, for example, Leading Better Value Care and the National Disability Insurance Scheme.

The purpose of this document is to outline the methodology, approach and themes raised by the literature and audiology stakeholders to inform the Workforce Modelling phase (Stage C in Figure 3 below) of the NSW Ministry of Health's Workforce Planning Methodology. It should be noted that the views expressed in the report are not necessarily those of the NSW Ministry of Health

Figure 3 Workforce Planning Methodology





The Horizons Scanning and Scenario Generation phases are set out in the Ministry of Health workforce planning methodology represented in Figure 3 above.

2.1 Disclaimer

It should be noted that the views expressed in the report are not necessarily those of the NSW Ministry of Health.

Note that within NSW Health, the term 'Aboriginal' is generally used in preference to 'Aboriginal and Torres Strait Islander', in recognition that Aboriginal people are the original inhabitants of NSW. Refer to NSW Health Policy Directive PD2005_319

2.2 Methodology

The methodology used to conduct the Project comprised of two components: an information gathering phase, and an issue and driver analysis phase. Complementary approaches were used in each phase to draw out relevant information as described below.

2.2.1 Literature search and review

A rapid literature search was conducted within Google Scholar, which was used as the foundation of a literature review. To augment the initial findings, a comprehensive search of organisational and grey literature was undertaken. Key words relevant to the audiology workforce professions were identified and utilised. Major databases, including Wiley Online, JSTOR and MEDLINE, were accessed to supplement the search results. Recent publications were prioritised, and available published data were considered.

Literature published outside of NSW and Australia were also utilised, including summaries of studies conducted in the United Kingdom, United States of America, and other parts of Europe. Whilst the health systems in the United States and Europe are different to the Australian system, some of the social studies remain relevant.

2.2.2 Stakeholder online survey

An online survey was designed and distributed to Local Health District (LHD) and Specialty Health Network (SHN) nominated audiology stakeholders from across the profession as well as representatives from academic institutions and professional bodies. The survey contained a series of questions relating to the workforce demand and supply drivers, in addition to the potential challenges and opportunities faced by the workforce. The questions were informed by the initial findings of the literature review. Stakeholders were required to identify the level of significance of the drivers, challenges, and opportunities in addition to prioritising them based on the perceived level of impact.

2.2.3 Stakeholder interviews

A series of semi-structured 1:1 interviews with key stakeholders were conducted in parallel with the online survey. These interviews provided an opportunity for a 'deeper dive' into what stakeholders perceived to be key workforce drivers, challenges, and opportunities. Combined with the online survey and literature review, conclusion of the interviews completed the information gathering stage and provided a focused framework for development of the horizons scanning and scenario generation workshops. A list of stakeholders interviewed and those that were present at the workshops can be found in section 7.1

2.2.4 Horizon scanning workshop

The horizon scanning workshop was conducted on the 15th September 2020 and formed the basis for the development of a supply and demand driver model for the audiology workforce. Some of the drivers





identified by stakeholders were unique to their individual profession and have been captured throughout this report as such.

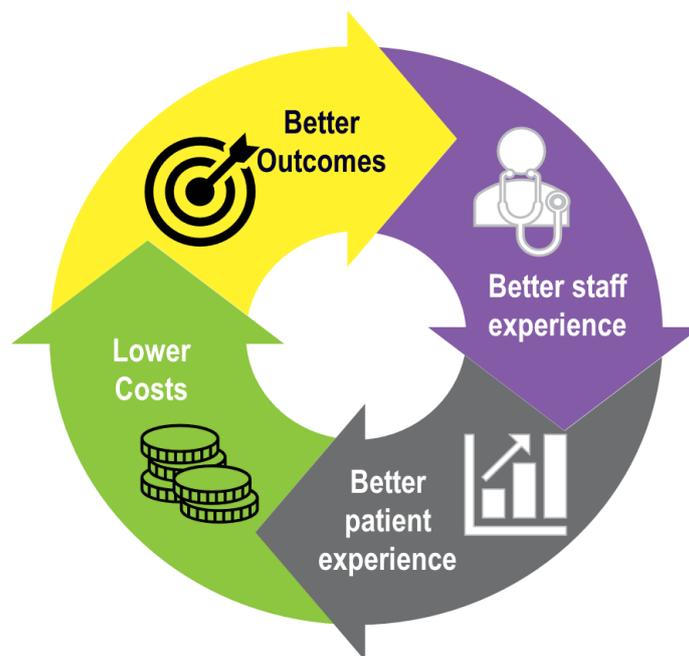
Key audiology stakeholders representing LHDs/SHNs, NSW based universities and representatives from professional bodies – including Audiology Australia, Rural Doctors Network (RDN) and Indigenous Allied Health Australia (IAHA) – participated in the workshop and as a group identified overarching workforce demand and supply drivers. A list of the stakeholders engaged throughout this project and that attended both workshops is available in the Appendices.

Validation of the high-level drivers identified in the literature review combined with those raised by stakeholders in the workshop informed the initial development of the Audiology driver model to be validated at the subsequent scenario generation workshop.

2.2.5 Scenario generation workshop

The scenario generation workshop was conducted on the 13th October 2020 and built upon themes that were explored in the horizons scanning workshop. To maintain consistency in the methodology, the same horizons scanning workshop participants were engaged.

Figure 4: Quadruple Aim of Healthcare



The workforce driver model was presented to further validate what was emerging as the key demand and supply drivers for the Audiology workforces. Stakeholders were invited to validate the concepts contained within the audiology workforce driver model. They were also asked to consider the key differences and prioritisations within the driver model for their profession.

Stakeholders were then asked to consider the quadruple aim of healthcare (see Figure 4 above), that focuses on better health outcomes, better patient experience, better staff experience and finally, lower costs. The quadruple aim is a variation of the Institute for Healthcare Improvement's (IHI) triple aim framework that describes an approach to optimising health system performance. Using this concept, participants were asked to investigate the future and identify the opportunities available to the workforce.





3 Overview of the Workforce

This section details the scope of practice for the audiology workforce, and the roles and functions of the relevant professional boards and bodies.

3.1 Scope of practice

In Australia, audiologists work with patients of all ages and degrees of complexity. Their scope of practice has three key components as follows:

- **Identification and screening:** which includes screening for hearing impairment, tinnitus, vestibular (balance) dysfunction, as well as dysfunction in other auditory-related systems (including those involved in cognition and processing).
- **Diagnostic assessments:** assessing a patients' hearing and auditory function, vestibular (balance) function, tinnitus, auditory processing function, and neural function. Assessments include a range of diagnostic tests, aural, vestibular (balance) and tinnitus habilitation as well as communication training.

Rehabilitation: Audiologists are able to provide a range of (re)habilitation services including counselling and the prescription and fitting of hearing devices/aids (e.g. bone conduction aids; earplugs (custom noise/ swim/ musician plugs); FM and other remote sensing systems; hearing aids; and hearing assistive technology. They are knowledgeable about implantable devices (e.g. cochlear implants, middle ear implantable hearing aids, fully implantable hearing aids, bone anchored hearing aids) and collaborate with other professionals in their capacity to provide rehabilitation [1].

As may be expected with a smaller and specialist workforce, audiologist activities performed within this scope vary depending on the service context of each position and the career journey of the practitioner.

3.2 Professional Bodies and Associations

Audiology is a self-regulated profession. Audiology Australia provides accreditation to members who have undertaken an approved university qualification and meet ongoing continuing professional development standards and a code of ethics.

Membership with Audiology Australia is a requirement to provide government-funded audiological services such those funded via:

- Australian Government Hearing Services Program Medicare
- National Disability Insurance Scheme (NDIS)
- State and Territory workers' compensation schemes (such as Workcover)
- Department of Veterans' Affairs.

Private healthcare funds also require that the audiologist is a member of Audiology Australia for hearing service fees to be reimbursed [1]. Eligibility for membership with Audiology Australia is generally one of the selection criteria for NSW Health Audiology positions.

3.3 Entry to the profession

Australian Audiologists spend at least five years at university, including two years in an Audiology Australia accredited master's level audiology program. There are currently six universities offering audiology postgraduate programs in Australia that are accredited by Audiology Australia, but only one in NSW.





After completing their studies, Audiology Australia members undertake a one-year clinical internship. In this first year of clinical practice, interns are supervised by more experienced colleagues who are an Audiology Australia Accredited Audiologist. This supervision program eases the transition into the workforce for the intern and ensures a high quality of service delivery from new graduates.

Experienced overseas audiologists who relocate to Australia are also required to complete the clinical internship before they become a clinically certified member of Audiology Australia. In these cases, the supervision process supports the audiologist's skill development relevant to the Australian healthcare system and audiology in the Australian context.

Once the clinical internship has been successfully completed, new members of Audiology Australia become an Accredited Audiologist. Accreditation is valid for one year. In order to have their Accreditation renewed at the end of each cycle a member must be able to demonstrate that they have participated in sufficient professional development over the previous 12 months. including attending conferences, seminars, training courses, study, and research [2]

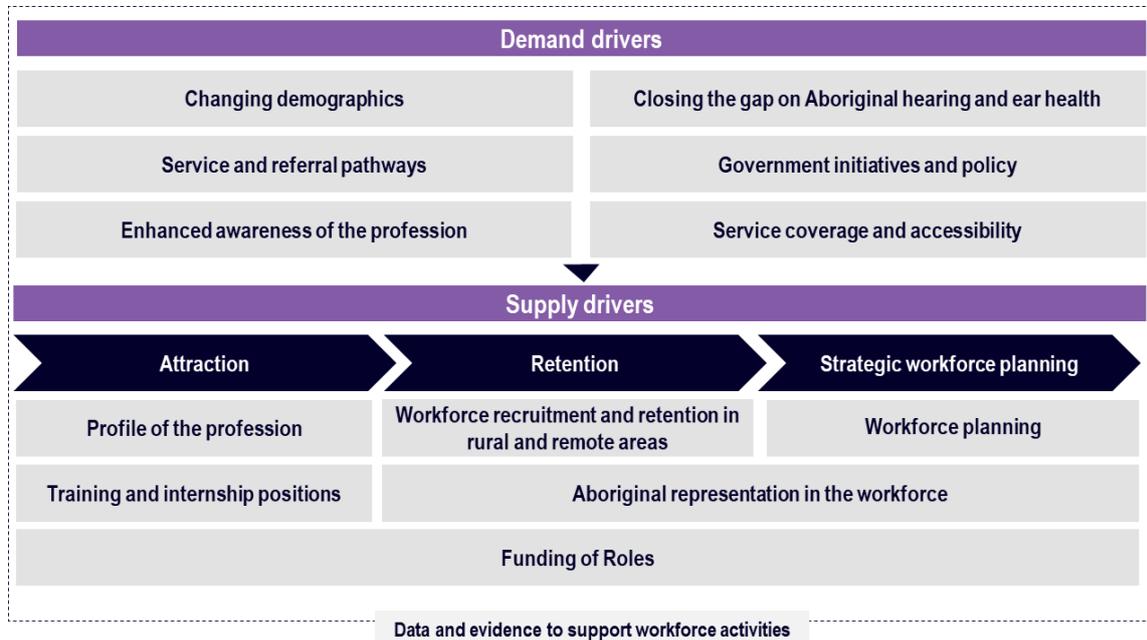




4 Summary of Drivers

This section provides an overview of the key demand and supply drivers impacting the Audiology workforce. The driver model brings together those demand and supply elements that were identified, developed, and validated through the horizons scanning and scenario generation process with key stakeholders across the profession. These drivers are summarised below in Figure 5.

Figure 5: Audiology Workforce – Supply and Demand Driver Model



4.1 Demand Drivers

Six factors expected to drive demand of audiology services in NSW in the coming years were identified through the literature review and initial stakeholder engagement process. The literature reviewed discussed the ageing population, key demographic changes, as well as service coverage and accessibility.

Input gained from our primary research (i.e. stakeholder interviews and workshops) augmented these findings and identified further influencing components specific to audiology. These concepts were ordered by priority, which was determined by group assessment of the likelihood of realisation and the degree of impact that the driver could have. The results showed ageing and changing population demographics, closing the gap on Aboriginal Hearing and Ear Health, and service accessibility and coverage as the top-most factors expected to influence the demand for audiology services.

4.1.1 Changing demographics

Current global trends towards an increasingly ageing and growing population represents a significant driver of future demand for the audiology services. A recent study found that in 2019-20, 3.95 million people suffer from hearing equating to 15.3 % of the population [3]. Projections of hearing loss show that this number is expected to more than double to 7.8 million by 2060, comprising 4.9 million males and 2.9 million females [3]. This indicates that approximately one in every five people in 2060 will have some form of hearing loss [4].

It has long been established that hearing loss increases with age. Presbycusis, or age-related hearing loss (ARHL), is multifactorial in its cause, but is thought to result from age-related degeneration of the cochlea with the cumulative effects of extrinsic damage (noise and other ototoxic agents) and intrinsic disorders (e.g. systemic diseases) [5]. Stakeholders supported the idea that an ageing population





coupled with longer lifespans currently impact the demand for audiology services and will continue to do so in the future. ARHL is one of the most common impediments to communication, affecting people as they age [6].

The consequences of hearing loss in older people are considerable, and may result in social withdrawal and isolation, functional decline with increased risk of falls and depression, and poor quality of life [7]. Despite the commonality of this condition, hearing impairment is still often under-recognised and poorly managed in the older population. The high rates of hearing loss in this cohort and the detrimental impact that this has on the daily lives of these people is in itself, a compelling rationale to enhance the range and rate of audiological rehabilitation interventions available.

Enhanced services could include:

- **Additional screening:** for hearing loss in older people. This would allow early identification of hearing loss in the older population, enabling early intervention and habilitation [8] [9].
- **Pre-and-post-fitting counselling:** has been shown to better manage patient expectations for living with hearing loss, by acknowledging the changes that come with adopting hearing aids. This also includes providing education on hearing aids and other hearables. In this context, counselling specifically refers to advice and counselling related to hearing loss.
- **Early interventional audiological assessment:** may facilitate the prevention of unnecessary falls, hospitalisations, and even death associated with complications of hip fracture and other fall-related trauma [10]. It is important that the audiology workforce move towards strategies that early management of hearing loss to minimise and harm improve functionality [11].

An ageing and growing population were identified by stakeholders as attributing factors to the increasing incidence and complexity of chronic illnesses that can be associated with hearing loss. Literature suggests dementia and vestibular concerns as some of the leading causes of illness related hearing loss [10, 12, 13, 14].

The vestibular system, contained within the inner ear, detects head movements and accelerations and is important for head and neck stability and balance control. Therefore, if generalised inner ear dysfunction occurs due to disease or degeneration (such as ARHL), both hearing and balance impairments would follow. Similarly, The Lancet report commissioned to investigate dementia categorised hearing loss as a modifiable risk factor for the illness, indicating that if hearing loss is detected and managed sooner rather than later, the impact of hearing loss on dementia may be (for many) significantly lessened [14].

Treating people who have complex hearing loss involves considerable assessment and monitoring of the associated risks as well as the need for greater patient education, counselling, or advice on the correct use of hearing aids or other intervention. Communication and social connections are critical to brain health, and as such, audiologists can act as potential “gatekeepers” that recognise changes in memory and communication status which may be indicative of dementia [15]. Similarly, audiologists play an integral role in falls prevention from a vestibular point of view and can take an active role in risk of falls screening, along with the rest of the interdisciplinary team in a hospital environment.

Stakeholders specifically highlighted that population growth and escalating rate of hearing loss related health issues in the community will increase the demand on audiology services now, and into the future. Service and workforce planning will need to acknowledge this growth, and at the same time, infrastructure planning to address the throughput will need to be explored.

4.1.2 Closing the Gap for Aboriginal Ear and Hearing Health

Aboriginal people experience some of the highest rates of ear disease and associated hearing loss in the world [16]. The prevalence of hearing loss rates in the Aboriginal population undoubtedly influences





the demand for audiology services in NSW. In 2018–19, an estimated 43% (290,400) of Aboriginal Australians aged 7 and over, were found to have hearing loss in one or both ears during the National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) hearing test. The proportion was similar between men (43%) and women (42%) and increased with age (from 29% for 7–14 years to 82% for 55 years and over) [17].

For Aboriginal children, hearing loss is significantly more prevalent than in the broader Australian population. While ear disease is a common childhood illness, often accompanying a cold or flu, Aboriginal children are twice as likely to have a long-term ear/hearing problem and three times as likely to have otitis media (OM) than non-Aboriginal children [18]. OM is an inflammation of the middle ear which can result in withdrawal, isolation, early school-leaving, and difficulties sustaining education and / or gaining employment later in life due to disability associated with hearing loss. Chronic OM can also affect cognitive development, auditory processing skills, attention, behaviour, speech, and language [16]. Furthermore, in Aboriginal children compared to non-Aboriginal children, it is characterised by earlier age onset, higher frequency, greater severity and greater persistence [19].

As many distinct Aboriginal communities are in rural and remote locations which suffer from limited access to hearing health professionals, it can be challenging to access to specialist ear health services, such as audiologists, ear, nose, and throat (ENT) surgeons, and audiologists. Nonetheless, the Aboriginal population is much greater in number in urban regions and the audiology workforce which supports diagnosis remains significantly limited and continues to service the whole population. Many Audiology workforce representatives identified the challenge of limited functional spaces in which testing, and diagnosis may be enabled due to service demand, lack of minimum standards in the multi-purpose rooms provided which constrain testing capability and the further delay in or diminished provision of audiology services. Constrained service access further contributes to the poor outcomes for Aboriginal children with chronic OM. In addition, the longer audiology testing is delayed, the longer are the periods of hearing impairment before diagnosis, specialist review and appropriate interventions are put in place [20].

Stakeholders reported that the emphasis on ‘Closing the Gap’ on Aboriginal ear and hearing health will continue to be an important and ongoing driver of service demand for the foreseeable future. In addition to the limited-service accessibility, delayed waiting times and delayed intervention, stakeholders claimed that a perceived lack of cultural safety was another reason that the gap still existed. Audiology stakeholders advised that there was limited awareness of audiological services in the Aboriginal community, exacerbated by an apparent lack of trust between health professionals and Aboriginal people. It was identified that increasing the Aboriginal representation in the audiology workforce would be a potential solution to this issue.

4.1.3 Service and Referral pathways

The audiology workforce is employed across both the public health system (in public hospitals, clinics and community) as well in the private system (either in private practices or private hospitals). During the interview phase, stakeholders reported that service and referral pathways were one of the most significant drivers of demand for services. The referral patterns from relevant health practitioners for various scans, tests, procedures and treatment can impact how services are delivered. Stakeholders reported that despite high demand for audiology services the current referral pathways made access to services difficult, especially for those unable to access the private system.

Current service pathways for the public system were described as restrictive, especially with regards to requiring a specialty referral when specialists are otherwise preoccupied with lengthy waiting lists. This additional step causes gaps in addressing the demand for audiology services, which could otherwise be filled by the audiologist at an earlier point in the patient journey. One example is the cohort of patients that are over the eligible age for the State-wide Infant Screening - Hearing program but are still under





the age of three. Stakeholders in the interview process purported that this cohort had difficulty being tested, as they need to be referred by a speciality (ENT) or must access services through the private system. It was also discussed that the varied pathways and referral criteria from one LHD to another results in confusion for the community and referrers, reducing access to some and increasing wait times for others.

4.1.4 Government Funding and Initiatives

The prevalence of hearing loss worldwide has made hearing/ ear health a primary focus for the Australian government. As a result, there are multiple government funded initiatives that drive the demand for audiology services in the public health system. The Hearing Services Program (HSP) and NDIS fund public hearing services in Australia, while programs such as NSW State-wide Infant Screening - Hearing (SWIS-H) program and NSW Aboriginal Ear Health Program are programs initiated to identify and address hearing loss issues in NSW for specific cohorts of people.

NSW State-wide Infant Screening - Hearing (SWIS-H) program

The NSW SWIS-H Program is an early hearing detection and intervention (EHDI) program for infants born or residing in NSW. The core elements of the SWIS-H Program include: screening of all newborn infants; diagnostic audiology for those infants who get a refer result from the screening test; paediatric/ medical assessment and parent support services for those diagnosed with a hearing impairment; and referral to early intervention services. In 2011, an evaluation of the SWIS-H program was undertaken. The report stated that the audiology workforce is overall sufficient to meet current demand, however, could be increasingly feeling the pressure [21].

NSW Aboriginal Ear Health Program

The Aboriginal Ear Health Program is an NSW Health initiative to help prevent Otitis Media (middle ear infection) in Aboriginal children aged 0-6 years.

The program works to reduce the number of young Aboriginal children affected by Otitis Media in several ways:

- Working with families – by reducing the risk factors among parents, carers, and their extended families
- Working with the community – by increasing awareness of ear health in the Aboriginal community, health, and education professionals to support a preventative approach and early detection
- Improving services – to Aboriginal families to lessen the impact of Otitis Media on health and learning

The NSW Aboriginal Ear Health Program is delivered in collaboration with existing maternity and child and family health services, including through NSW Health services, Aboriginal Community Controlled Health Organisations and other non- government organisations supporting Aboriginal women expecting a baby or women pregnant with an Aboriginal baby and Aboriginal children under six years [22].

National Disability Insurance Scheme (NDIS)

From 1 July 2020, Australians 26 years and over, and under 65 years, living with hearing loss may be eligible for supports through the NDIS. For this age group, audiologists can provide devices and therapeutic supports for services such as counselling and communication training that are deemed necessary and reasonable.

For those 26 years of age and under, funding for hearing devices defaults to Hearing Services Program whereas other services may be funded by the NDIS. The NDIS may consider funding all aspects of required supports in individual cases [23].





Hearing Services Program

The Hearing Services Program operates a voucher scheme for eligible pensioners. These can include Veterans and a range of other government pension recipients [23].

4.1.5 Enhanced awareness of profession

There has been a sizeable push towards greater hearing health and hearing loss awareness over the last few years, with plans to continue building awareness in the public. In 2019, the Department of Health released a “Roadmap for Hearing Health” (“The Roadmap”) which highlighted the need to continue raising awareness for hearing health and engender a more inclusive culture for people that suffer from hearing loss and impairment. The Roadmap emphasises the role all Australians can play in the care of their own hearing health and highlights the importance of early identification and provision of suitable support by a professional workforce for people that are hearing impaired [24]. This increased awareness and call to action for the workforce will ultimately raise the demand for audiology services.

Stakeholders stressed the importance of enhanced public awareness of hearing loss a considerable factor influencing the demand for services. They cited increased health literacy, understanding that hearing loss is a feature of more conditions and a better understanding of the social determinants of hearing loss as some of the reasons why there appears to be more awareness around hearing and ear health. They felt that more awareness of hearing loss and its effects would increase the potential demand on services.

There are multiple example strategies around enhanced awareness of hearing health. Public awareness campaigns, such as Hearing Awareness Week in Australia aims to promote hearing health and encourage hearing awareness. This also coincides with World Hearing Day which occurs on the 3rd of March every year. In 2020, Hearing Australia called on all Australians to take part in a free 10-minute hearing check as part of the *Hear&Now 2020 Challenge* to limit the stigma and fear around hearing loss and deafness. The Deafness Forum of Australia has an entire webpage dedicated to different hearing loss resources and groups to assist people in finding resources that will help them in their hearing loss journey [25].

Some stakeholders stated that there was a distinct absence of understanding about audiology services across the health sector. One stakeholder noted:

“Half our hospital is not aware we have an audiology department, let alone the broader community”

It seemed apparent that while work was being done to raise awareness of hearing and ear health, there was limited understanding of what audiology services were available, and how the public could access these services. Several stakeholders mentioned that the audiology profession needed to be highlighted further for both the public and other health professionals. This would allow them to develop a better understanding of the services and value that audiologists add to a patient’s hearing loss journey.

4.1.6 Service coverage and accessibility

Service coverage and accessibility was described by participants as a significant driver in the demand for audiology services. It is well known that many health services are more difficult to access in rural and remote areas, and audiology services are no exception [26]. Approximately 15 per cent of people living outside major cities have hearing disorders compared with the 12 per cent of those living within them [27]. This can be attributed to factors such as the ageing of Australia’s population in rural and remote areas (40% of all Australians that live in rural and remote areas are 70–74 years old), a greater potential for excessive noise related hearing loss, particularly in farming and mining sectors [28], and a large portion of Australia’s veteran population (who are considered to have some extent of noise-related hearing impairment from their time in service) living in these areas [29]. Furthermore, Aboriginal people,





around 70 per cent of whom live outside the capital cities, experience some of the highest levels of ear disease and associated hearing loss in the world [16].

Stakeholders reported that existing inequities (financial, time and transport constraints) will invariably impact the demand for services in these areas. For example, patients living in rural and remote areas could have difficulties accessing audiology service sites due to a possible lack of local service transport, financial limitations or unavailable public services and may miss out on services they require. Stakeholders suggested while hub and spoke models and telehealth solve some of these concerns, there are still significant challenges in this area. It was acknowledged that there were limited public and private specialised audiology services in rural and remote areas, stakeholders citing delays in rehabilitation/counselling services, hearing aid fittings and complex diagnostic tests further impacting demand for services.

4.2 Supply Drivers

Six factors expected to impact the size and availability of the workforce were identified through the literature review. The literature reviewed discussed the limited graduate positions and challenges related to rural and remote audiology services.

Input gained from our primary research (i.e. stakeholder interviews and workshops) augmented these findings and identified further influencing components specific to audiology. These concepts were ordered by priority, which was determined by group assessment of the likelihood of realisation and the degree of impact that the driver could have. The results showed funding for positions, workforce planning, and workforce retention and recruitment in rural and remote areas as the top-most factors expected to influence the supply for audiology services. These concepts are further explored in the section below.

4.2.1 Funding of roles

The availability of publicly funded positions was recognised by stakeholders as a key supply driver to the size and availability of the audiology workforce, especially for those working in NSW Health. For the participants present, it characterised the driver that could have the greatest impact on the future workforce, but the likelihood of an increase in funding may not be as high.

Stakeholders stated there was a perceived lack of funding for positions in hospitals, as roles became vacant and stayed vacant for stretches of time. They felt that although the demand was high, in some locations, there was no role to fill. Stakeholders also referenced audiometric equipment being a constraint in public systems, with audiometric sound booths being an expensive yet necessary component to accurate hearing tests. It was reported by stakeholders that the capital investment in both the technology and the profession is not always fully understood and this is challenging in NSW when facilities are undergoing redevelopment or redesign.

There was a strong perception by stakeholders that a significant proportion of audiologists employed by NSW Health would eventually move to private sector; primarily because there were limited roles in the public sector and partly because there was a view that the private sector was better remunerated. Stakeholders concurred that it would likely be difficult to recruit graduates into the public sector without the appropriate levels of compensation, despite the clear demand for more audiologists in this sector.

4.2.2 Workforce recruitment and retention in rural and remote areas

Attracting and retaining allied health professionals in rural and remote areas is a recognised problem in Australia. This was identified as a key supply driver for the audiology workforce. Stakeholders unsurprisingly prioritised this driver as one that will be significantly impactful in the future. The ratio of allied health professionals to population decreases with increasing rurality and remoteness, which has implications for the health care of people living in non-metropolitan areas [30]. Given that the demand





for hearing health services is so significant in rural and remote areas, this is a significant supply driver for the audiology workforce.

Literature describes there being limited extrinsic motivation factors (poor professional development, lack of financial reward, lack of resources, living conditions etc) to recruit and retain allied health professions in these areas [26]. Audiology stakeholders also reported that due to the small audiology workforce, audiologists often had to work in sole positions in LHDs/SHNs, with limited opportunities for networking and professional support. This would be especially hard for new graduates/ recruits into rural and remote positions without an adequate support system.

Stakeholders suggested rotations across rural and metro settings to show the difference and/ or similarities across community needs and service demands. This would allow newer audiologists, or students to experience different aspects of the audiology service and broaden their understanding and training.

4.2.3 Workforce planning

Several stakeholders recognised that workforce planning was important to ensure that there is sufficient and sustainable capability and capacity to deliver the service demands of the future. Stakeholders identified that most audiology departments in the public system were limited to one or two positions, with limited backfill capacity available to cover periods of staff leave e.g. long service leave, maternity leave or limited administrative support to adequately cover their workload.

There was a perception by stakeholders that the number of audiologists employed by NSW Health had been steadily declining over the years and that this required their respective LHD/SHNs to address the gaps in the hospital-based audiology positions.

Succession planning was identified as a key issue for sustaining current levels of service going forward. Stakeholders raised concerns around the number of sole practitioners working in hospitals and questioned how these positions would be replaced when the role is vacated. Due to the small size of the audiology workforce, the importance of sufficiently training younger clinicians was suggested. Ensuring there are enough qualified, appropriately trained audiologists in the public sector, especially in the more rural and remote areas will be instrumental in guaranteeing the ability to meet the future demand for services.

4.2.4 Graduates and availability of clinical internships

The number of audiology students and their alignment to the availability and quality of graduate positions was identified as an important supply driver to the audiology workforce. Stakeholders affiliated with universities reported challenges around the availability of clinical internship positions for recent graduates required to qualify as an accredited audiologist. The hospital-based audiologists believed there to be a lack of dedicated trainers and time in the workforce to appropriately train new graduates, exacerbated by the variable quality of training audiology students received in university. It was suggested that collaboration and communication between LHDs and universities could facilitate appropriate training for potential audiologists and produce more workplace ready graduates.

It was suggested that because there are limited opportunities to work in the public sector as audiologists, students are taking roles within the private system with large hearing aid manufacturing companies to gain exposure to the field.

4.2.5 Aboriginal representation in the workforce

With the current and future demand on audiology services for the Aboriginal community, it is integral for a level of cultural safety to be present in the relationship between the Aboriginal community and health professionals. Stakeholders identified the priority of growing the Aboriginal audiology workforce as a significant factor to engaging the Aboriginal community into Audiology services and one which supports





the delivery of both culturally and clinically safe care pathways. The lack of Aboriginal audiology students in the current student population is a factor influencing supply now, and into the future. As at June 2020, NSW Health did not employ any Audiologists that identified as Aboriginal.

Stakeholders reported that increasing the Aboriginal workforce would not only facilitate the creation of a culturally safe service, but they would also be best placed to educate their community about the benefits of hearing health and preventative care. It was suggested that an Aboriginal health professional would be well positioned to make hearing and ear health advice more relevant and palatable, particularly if they grew up in a community that had high incidences of glue ear and Otitis Media (OM). This was further supported in scenario generation exercises where stakeholders illustrated the importance of recruiting more Aboriginal audiologists to the workforce to improve health outcomes in the future. They also suggested utilising Aboriginal Health Workers/Practitioners in a collaborative way to help engender cultural safety for the Aboriginal population.

While there are numerous benefits to Aboriginal representation in the workforce, there are some challenges were described. Indigenous Allied Health Australia's (IAHA) stakeholders advised that the model of education and training (master's program, internship, and metropolitan delivery etc.) is likely to impact the recruitment of Aboriginal people into the profession. There was recognition that the current entry pathway was not attractive for Aboriginal people to enter into the audiology workforce, citing the need to complete a master's program was a fundamental barrier for those that may not have the means to undertake this commitment. Stakeholders reported that there needs to be a greater focus on informing and educating the younger Aboriginal community to the profession and provide support mechanisms that enable completion of relevant studies. Furthermore, there may be an opportunity to develop an alternative pathway for Aboriginal people to enter the profession.

4.2.6 Profile of the profession

Stakeholders reported that the current profile of the profession is a significant factor in driving the supply of the workforce, as it has a substantial role in attracting students and professionals to the workforce. Stakeholders felt that public perception of what audiologists do and the value they add is limited. Audiology is a much broader profession than basic hearing assessments but unfortunately, the broader scope of practice including educators, researchers, programmers, software developers is not well known.

Stakeholders also stated that there is opportunity for to improve the recognition of the audiology workforce in the community and with their health colleagues. They felt that their small size could often result in their "professional voice" being stifled, which in turn made it harder to gain momentum to advocate for required resources including infrastructure (e.g. soundproof booths) or increased FTE.

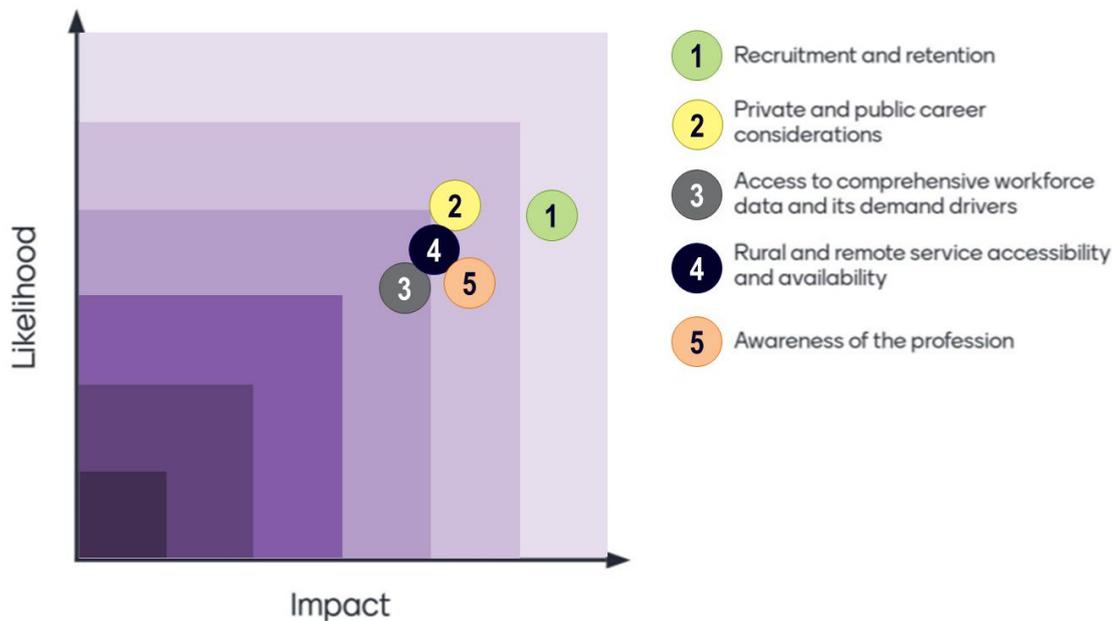




5 Challenges

The literature review and stakeholder engagement process highlighted several issues that represent current challenges to audiology services in NSW. Stakeholders were asked to prioritise the challenges in the same way as the demand and supply drivers. Figure 6 below shows these concepts ordered by priority, which was determined by group assessment of the likelihood of realisation and the degree of impact that the challenge could have.

Figure 6: Challenges - Priority Matrix



These challenges have been described below

- Managing the **recruitment and retention** of audiologists in the workforce, particularly in rural and remote areas. This consists of attracting students to the public system while also ensuring that older, experienced audiologists have the incentive to stay. Survey findings and workshop outputs suggest that this is a significant challenge for the future workforce and needs to be addressed. Stakeholders cite low remuneration compared to the private sector, limited professional support and networking and high workloads as the main barrier to retain talent in the NSW Health workforce.
- Balancing **private and public career considerations**. Stakeholders highlighted this as a considerable challenge for the future workforce, one that has a high likelihood of occurring with significant impact. Concerns were raised by stakeholders that hospital-based audiology roles would continue to decline, increasing the gap in services for the NSW community who cannot access the private sector, whilst the private sector is saturated with audiologists who have not had the full range of clinical experience. Stakeholders emphasised their concern that hearing aid technology was not appropriate for all patients. They reported that current culture suggests hearing aid technology is a “quick-fix” for any and all hearing loss related issues. Stakeholders reported a potential risk of over-selling hearing aids to those patients that may benefit from an alternative intervention that that could be provided by an audiologist.
- **Access to comprehensive workforce data**, specifically information about audiology numbers, characteristics, projected growth and demand drivers, was highlighted as a challenge by most stakeholders. There was a lack of awareness of where this data could be found and how it could be used to drive awareness of the profession and its benefits. With a workforce that was





small in nature, the lack of sufficient data hindered their progress, and establishing a professional voice. Stakeholders felt that with improved information about the overall workforce, factors driving demand for services and opportunities for growth, this will invariably support workforce planning and sustainability of the workforce.

- **Rural and remote service accessibility and availability** describes the access to audiology services in rural and remote areas, but also refers to availability of these services (waiting lists, locations etc). Stakeholders depicted challenges in low socio-economic groups accessing audiology services due to financial and transportation constraints and further challenges for those from CALD backgrounds. Additionally, as touched on in other areas, the Aboriginal population is three times more likely to suffer from some type of hearing loss, and yet may be unable to access services due to audiology services for a range of reasons including being either too far away or culturally unsafe.
- Limited **awareness of the profession**. Stakeholders reported that there was limited awareness of the audiology profession in both the public and within the health sector. They felt that a lack of professional voice was impacting on the workforce's ability to provide full input into workforce planning, especially in the public sector.

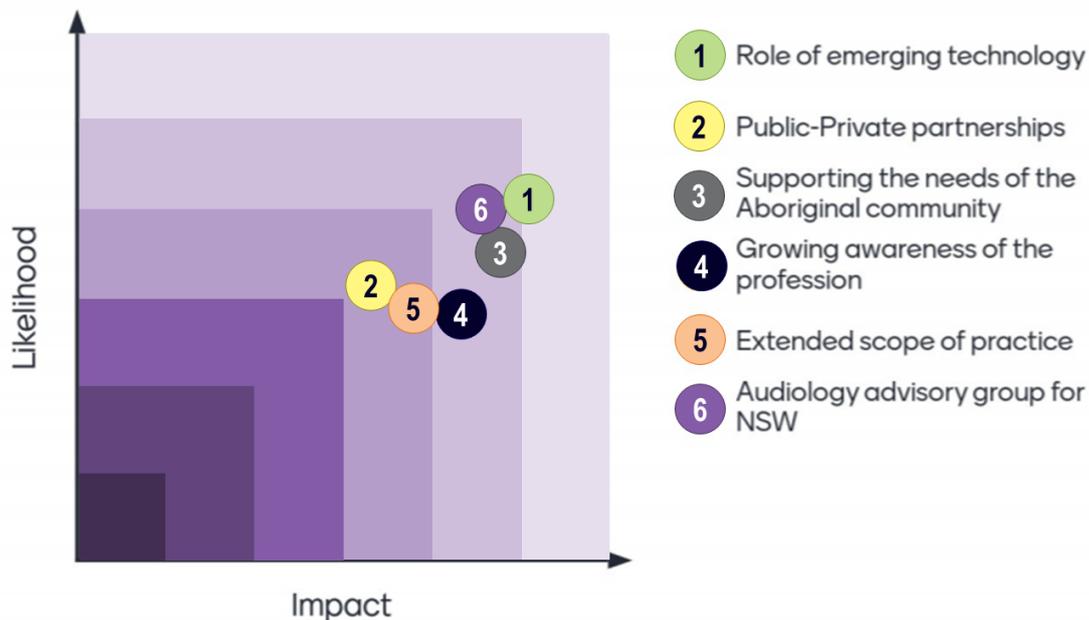




6 Opportunities

The literature review and stakeholder engagement process illustrated several key ideas that represent opportunity areas for the audiology workforce in NSW. Stakeholders were asked to prioritise these opportunities in the same way as the demand and supply drivers. Figure 7 shows these concepts ordered by priority, which was determined by group assessment of the likelihood of realisation and the degree of impact that the prospective ideas could have.

Figure 7: Opportunities - Priority Matrix



6.1 Emerging technologies

Today's innovations allow people with hearing loss to access more telecommunications and portable technology than ever, providing a more even playing field compared with those without hearing loss. The ways in which technological advancements can improve audiology services is exciting to consider and may be one of the most compelling areas for growth in the years to come. Stakeholders highlighted technologies such as hearables (Hearables or Smart headphones are technically advanced, electronic in-ear-devices designed for multiple purposes ranging from wireless transmission to communication objectives, medical monitoring and fitness tracking, in addition to hearing aid technology), software and application development, and telehealth as the main areas of growth in the future.

6.1.1 Hearables

Hearing aid technology has made strides in comfort, sound processing, connectivity, and artificial intelligence. It features digital technologies that not only enhances hearing, they allow improved connectivity between devices through wireless and Bluetooth technology, enhanced personalisation, and better functionality [31].

Stakeholders felt that this could be an exciting opportunity for the audiology workforce for a number of reasons:

- Hearable technology could encourage the de-stigmatisation of hearing loss in the public by making the hearing aid operate in a similar way to popular wrist wearable technology. This may encourage early screening and as a result, earlier intervention for patients that would not otherwise be caught by the service





- In the future, hearable technology could be used in conjunction with software developers to create a "one-stop-shop" application that contains all the patients' clinical history and test results integrated on one platform. This would increase efficiency, reduce duplication, and improve communication between health professions and their patient.
- Facilitate collaboration between scientists, engineers, and audiologists to create specialist technology that meets future demand and improves health outcomes

Stakeholders also stated that to make these prospects feasible, there would need to be significant support required for research and development into these areas. This would require enabling audiologists to have the time to partner with different vendors and innovate as required. Stakeholders suggested backfilling of positions, applications for innovation grants and collaboration with ENTs, speech pathologists and other professions as opportunities to advance in the technology space.

6.1.2 Telehealth

Telehealth has long been proposed as a service delivery model that has potential to address the critical barriers to access in under-served, rural or remote communities. Telehealth service provisions can now include remote delivery models that are synchronous (delivered in real time), asynchronous (store and forward), and most commonly, a hybrid. Hybrid models combine traditional face-to-face services with remote services and/or a combination of asynchronous and synchronous models [32]. Stakeholders felt that the use of telehealth would allow for flexibility in location and methodology in clinical practice and assist with timely diagnosis and intervention, convenience (remove the need for travel and its associated costs) and support compliance with treatment plans.

This would be particularly beneficial to those living in rural and remote areas. At risk populations could have expanded access to care through remote video otoscopy and audiometry evaluation. This is called "store and forward" telehealth, in which data is acquired and stored by a technician at a remote facility and later forwarded to a specialist for interpretation and diagnosis.

Furthermore, systematic reviews have demonstrated the feasibility and efficiency of telemedicine delivery of programming of hearing aids and/or cochlear implants. An Australian pilot study conducted by Hearing Australia confirmed that it is feasible for hearing services (assessment, hearing aid fitting and adjustment and counselling for older adults) to be provided to people located in remote regions via many of the various tele-audiology methods that are currently available [33].

One of the areas in telehealth that is expected to play an increasingly important role into the future is the field of mobile health (mHealth). It is considered a subset of telehealth that utilises mobile devices using technologies to promote, provide and monitor health care services. In audiology, numerous smartphone applications are now readily available to conduct a variety of audiological services such as hearing assessments (e.g. pure tone audiometry, speech audiometry), viewing the external ear canal, ambient noise level measurements, programming hearing aids and/or even functioning as a hearing aid (e.g. Jacoti ListenApp on iTunes) [34]

Stakeholders unanimously agreed that wider, consistent adoption of telehealth practice will be the way of the future, and some considered the opportunity that COVID-19 provided in facilitating this approach sooner. When asked to consider the audiology workforce 20 years into the future, and what should happen to achieve the quadruple health aim, all the stakeholders present identified telehealth as one of the ways to achieve better staff and patient experience, better health outcomes and lower costs. Stakeholders were quick to clarify that patients should be provided the option of telehealth, not that it becomes the only way to deliver services in the future. It was also considered that as new technological advancements are introduced, it is crucial to the sustainability of the workforce and patient care that audiologists are trained and supported appropriately to adopt the new methods of working.





6.2 Public and Private Partnerships

The potential of Public and Private Partnerships (PPP) as a means of extending service provision was highlighted as a potential opportunity in the stakeholder interviews. There was recognition that as the private audiology sector grows in both size and reach, there could be potential opportunities for collaboration in the future, particularly in rural and remote settings. When this idea was explored in the scenario generation workshop, participants discussed the following option:

- Coordination of all ear/hearing health services and service providers onto one platform, with transparency of all projects and programs available for potential patients. This will enable the public system to understand what areas are currently being serviced, and where there could be potential gaps.

While stakeholders held a range of views on how a private-public partnership could work in the future, there was general agreement in the workshop that there was merit in discussing the concept and looking to the experience of other jurisdictions.

6.3 Supporting the needs of the Aboriginal community

As indicated previously, there is a very significant opportunity in supporting the needs of the Aboriginal community with respect to hearing and ear health. Stakeholders acknowledged two main ways that this could occur:

- Extended reach of services into Aboriginal communities by using telehealth, hub and spoke models and a culturally safe practice. By removing barriers created by lack of transport, time and limited cultural awareness, the audiology workforce could help increase the service accessibility for the Aboriginal rural population. An enabling factor could be a comprehensive, multi-cultural, multi-disciplinary team including an ENT, audiologist (child & adult) and an Aboriginal Health Worker/Practitioner who would be able to engage with Aboriginal communities, providing a navigation function to connect them with culturally appropriate treatment. Increased awareness of services through educational programs that illustrates the importance of ear and hearing health. Stakeholders suggested that it was vital that health professionals understood and acknowledged the social determinants of hearing loss and took proactive steps to treat and educate their community.
- Implementing educational programs at school and high school level that focused on ear/hearing health would be beneficial and deliver insight into the audiology profession and what audiologists do from a young age could help close the gap. It was agreed for this to succeed, there would need to be collaboration between community, audiologists, and coordination with sectors that assist with the social determinants of hearing (e.g., early childhood educators, community nurses, Aboriginal Community Controlled Health Organisations etc).

6.4 Working at the top of scope

Survey findings indicated that working at the top of scope for audiologists was a highly significant opportunity for the future workforce, which was further augmented in the workshops. A prime example of an audiologist working at the top of their scope is an audiology led clinic for patients. While audiology led clinics are not widely implemented in NSW – although Royal North Shore Hospital is current trialling a similar model – stakeholders stated several benefits to a potential audiology led practice. These include:

- Improved outcomes for the client and higher job satisfaction and gratification for the clinician
- Changes in funding models should the practice be successful. Changes in funding could mean better equipment, more staff and a more attractive pay package for new graduates





- Better communication within the multi-disciplinary team

It was also determined that there would need to be a revamping of the referral pathways to ensure that there are no gatekeepers for the audiology service and that the workforce is adequately trained and upskilled as required.

6.5 Growing awareness of the profession

Fostering awareness for the audiology profession and the value of audiologists among other health professionals and the broader population would be a significant opportunity for the workforce. Stakeholders identified the following ways to improve awareness:

- Seek opportunities to collaborate with other health professionals that are relevant to the audiology profession and share knowledge, techniques, innovate and learn from each other. This would facilitate stronger relationships with speech pathologists, ENTs and neurologists and help leverage the influencing power of other workforces.
- Develop communication pathways and networks for audiologists to engender stronger internal relationships within the workforce. This would support better training for younger audiologists, those audiologists working as sole practitioners in either rural and remote areas or in hospital settings, and collectively grow the knowledge base of the workforce.
- Educate the younger generation about audiology profession and how this is beneficial to the community and overall health system.

6.6 Audiology advisory group for NSW

Stakeholders specifically raised the opportunity to implement a working/advisory group to address many of the concerns regarding professional awareness. They stated that even with a smaller sized workforce, it was difficult to come together to collaborate and work on future planning, sharing innovations or networking. Stakeholders believed that implementing an advisory group would enable proper data collection for the workforce, improve intradisciplinary communication and could grow the professional voice of the workforce. Audiologists would be able to learn from each other, improving intra-professional collaboration and development, which may support retention of talent in the public sector.





7 Appendices

7.1 Audiology stakeholders present

| Organisation | Name |
|-------------------------------------------------|------------------------|
| Ministry of Health | Rebecca Day |
| Ministry of Health | Nicola Clemens |
| Ministry of Health | Andrew Davison |
| Ministry of Health | Charles Davison |
| Ministry of Health | Wendy Bryan-Clothier |
| Audiology Australia | Dr Barbra Timmer |
| CCLHD | Richard Davies |
| HNELHD | Melanie Dowling |
| HNELHD | Catherine (Kate) Wills |
| Justice Health & Forensic Mental Health Network | Katherine Jones |
| NSLHD | Monica Gibian |
| NSLHD | Hans Satyan |
| SLHD | Juliet Smith |
| WSLHD | Monica Gibian |
| WSLHD | Michelle Christison |
| SCHN | Katherine O'Brien |
| SCHN | Monica Wilkinson |
| St Vincents | Sarah Barron |
| RDN | Samantha Pattos |
| IAHA | Paul Gibson |
| Macquarie University | Mridula Sharma |
| HNELHD | Kelvin Kong |





8 References

- [1] Audiology Australia, "Audiology Australia," September 2016. [Online]. Available: https://audiology.asn.au/Audiology_and_You/About_Audiologists.
- [2] Audiology Australia, "Qualifications_and_training," 2018. [Online]. Available: https://audiology.asn.au/Consumer_Hub/About_Audiologists/Qualifications_and_training.
- [3] Deloitte Access Economics, "Hearing for Life – The value of hearing services for vulnerable Australians," The Hearing Care Industry Association , Canberra , 2020.
- [4] Department of Health, "Ear Health," 2020. [Online]. Available: <https://www.health.gov.au/health-topics/ear-health>.
- [5] XZ Liu and D Yan, "Ageing and hearing loss," *Journal of Pathology*, vol. 211, no. 2, pp. 188-197, 2007.
- [6] J. Gussekloo , L. E. de Bon and M. von Faber, "Auditory rehabilitation of older people from the general population – the Leiden 85-plus study," *The British Journal of General Practice: The Journal of the Royal College of General Practitioners*, vol. 53, pp. 536-540, 2003.
- [7] L. Huang, N. T. Phan, J.-L. McKenzie, B. Whitfield and A. Chang, "Diagnosis and management of hearing loss in elderly patients," *Australian Family Physician* , vol. 56, no. 6, pp. 366-369, 2016.
- [8] L. Fook and R. Morgan, "Hearing impairment in older people: a review," *Postgraduate Medical Journal* , vol. 76, pp. 537-541, 2000.
- [9] T. B. Kelly, D. Tolson and W. Maclaren, "Older people's views on what they need to successfully adjust to life with a hearing aid," *Health & Social Care in the Community*, vol. 21, no. 3, p. 293–302, 2013 .
- [10] F. R. Lin and L. Ferrucci, "Hearing Loss and Falls Among Older Adults in the United States," *Archives of internal medicine*, vol. 172, no. 4, p. 369–371, 2012.
- [11] B. Taylor , "Interventional Audiology: Broadening the Scope of Practice to Meet the Changing Demands of the New Consumer," *Seminars in hearing*, vol. 37, no. 2, p. 120–136., 2016.
- [12] A. Viljanen, J. Kaprio, I. Pyykkö, M. Sorri , S. Pajala, M. Kauppinen, M. Koskenvuo and T. Rantanen, "Hearing as a Predictor of Falls and Postural Balance in Older Female Twins," *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, vol. 64, no. 2, p. 312–317., 2009.
- [13] "Association of Hearing Impairment With Incident Frailty and Falls in Older Adults," *Journal of Aging and Health* ., vol. 28, no. 4, p. 644–660., 2015.
- [14] G. Livingston, A. Sommerlad, V. Orgeta, S. G. Costafreda, J. Huntley, D. Ames, C. Ballard, B. Sube, A. Burns, J. Cohen-Mansfield, C. Cooper, N. Fox, L. N. Gitlin, R. Howard, H. C. Kales, E. B. Larson, K. Ritchie , K. Rockwood, E. L. Sampson, Q. Samus, L. S. Schneider, G. Selbæk, L. Teri and N. Mukadam, "Dementia prevention, intervention, and care," *The Lancet*, vol. 390, pp. 2673-2720, 2017.
- [15] B. E. Weinstein , D. L. Beck and M. Harvey, "Dementia screening: A role for audiologists," *Hearing Review*, vol. 25, no. 7, pp. 36-39, 2018.





- [16 J. Burns and N. Thomson, "Review of ear health and hearing among Indigenous Australians," *Australian Indigenous Health Bulletin*, vol. 13, no. 4, 2013.
- [17 ABS, "National Aboriginal and Torres Strait Islander Health Survey, 2018-19," Australian Bureau of Statistics, Wednesday July 2020. [Online]. Available: <https://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4715.0Main%20Features82018-19?opendocument&tabname=Summary&prodno=4715.0&issue=2018-19&num=&view=>.
- [18 AIHW, "Indigenous hearing health," Australian Institute of Health and Welfare, Thursday July 2020. [Online]. Available: <https://www.aihw.gov.au/reports/australias-health/indigenous-hearing-health>.
- [19 J. Jervis-Bardy, L. Sanchez and A. S. Car, "Otitis media in Indigenous Australian children: review of epidemiology and risk factors," *The Journal of Laryngology & Otology*, vol. 128, pp. 16-S27, 2014.
- [20 H. Gunasekera, P. S. Morris and J. Daniels, "Otitis media in Aboriginal children: The discordance between burden of illness and access to services in rural/remote and urban Australia," *Journal of Paediatrics and Child Health*, vol. 45, p. 425–430, 2009.
- [21 Health Outcomes International, "Evaluation of the Statewide Infant Screenin - Hearing SWISH Program," NSW Department of Health, 2011.
- [22 NSW Health, "NSW Aboriginal Ear Health Program," NSW Health, October 2018. [Online]. Available: <https://www.health.nsw.gov.au/kidsfamilies/MCFhealth/Pages/Aboriginal-ear-health.aspx>. [Accessed August 2020].
- [23 NDIS, "Hearing supports," National Disability Insurance Agency, October 2020. [Online]. Available: <https://www.ndis.gov.au/understanding/ndis-and-other-government-services/hearing-supports>. [Accessed November 2020].
- [24 Hearing Health Sector Committee, "Roadmap for Hearing Health," Department of Health, Canberra, 2019.
- [25 Deafness Forum of Australia, "Facebook groups & organisations," Deafness Forum of Australia, 2020. [Online]. Available: <https://www.deafnessforum.org.au/resources/organisations-that-can-help/>.
- [26 N. Campbell, L. McAllister and D. Eley, "The influence of motivation in recruitment and retention of rural and remote allied health professionals: a literature review," *Rural and Remote Health*, 2012.
- [27 National Rural Health Alliance, "Fact Sheet: Hearing loss in rural Australia," August 2014. [Online]. Available: <https://www.ruralhealth.org.au/content/fact-sheet-hearing-loss-rural-australia>. [Accessed August 2020].
- [28 House of Representatives Standing Committee on Health, Aged Care and Sport, "Hearing Health in At-Risk Populations," Parliament of Australia, September 2017. [Online]. Available: https://www.aph.gov.au/Parliamentary_Business/Committees/House/Health_Aged_Care_and_Sport/HearingHealth/Report_1. [Accessed August 2020].
- [29 "What is hearing loss?," Hearing Australia, [Online]. Available: <https://www.hearing.com.au/Hearing-loss/Symptoms/What-is-hearing-loss>. [Accessed August 2020].
- [30 S. Keane, T. Smith, M. Lincoln and K. Fisher, "Survey of the rural allied health workforce in New South Wales to inform recruitment and retention," *Aust. J. Rural Health*, vol. 19, p. 38–44, 2011.





- [31 M. Mroz, "New hearing aid technology," *Healthy Hearing*, June 2020. [Online]. Available:
] <https://www.healthyhearing.com/help/hearing-aids/technology>. [Accessed August 2020].
- [32 M. L. Bush and R. Sprang, "Management of Hearing Loss Through Telemedicine," *JAMA Otolaryngol Head Neck Surgery*, vol. 145, no. 3, p. 204–205., 2020.
- [33 P. Wendy, C. Teresa and D. Harvey, "A Pilot Investigation Into the Provision of Hearing Services Using Tele-Audiology to Remote Areas," *THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF AUDIOLOGY*, vol. 31, no. 2, p. 96–100, 2009.
- [34 D. Swanepoel and J. L. Clark, "Hearing healthcare in remote or resource-constrained environments," *J Laryngol Otol*, pp. 1-7, 2018.
- [35 ABS, "Australian Demographic Statistics, June 2017," 2017. [Online]. Available:
] <http://www.abs.gov.au/ausstats/abs@.nsf/mf/3101.0>. [Accessed 2017].
- [36 NSW Health, "2016-17 Annual Report," NSW Health, 2017.
]
- [37 Australian Health Ministers' Advisory Council, "Aboriginal and Torres Strait Islander Health Performance Framework," AHMAC, Canberra, 2017.
- [38 Care for Kids' Ears, "Welcome to Care for Kids' Ears," Department of Health, June 2020. [Online].
] Available: <http://www.careforkidsears.health.gov.au/internet/cfke/publishing.nsf/Content/Home>.
- [39 AHHA, "Clinical decision-making tools: how effective are they in improving the quality of health care?," 17 June 2014. [Online]. Available:
] http://ahha.asn.au/system/files/docs/publications/deeble_issues_brief_nlcg-2_clinical_decision-making_tools.pdf. [Accessed 2018].
- [40 L. Zitelli and C. V. Palmer, "The Role of Audiology in an Outpatient Interdisciplinary Post-Trauma Clinic," *Seminars in Hearing*, vol. 38, no. 2, p. 169–176., 2017 .

